

The Potential Impact of Digital Transformation on Egypt

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Abstract

Digital transformation offers Egypt a unique opportunity to transform several economic sectors such as financial services, retailing, healthcare, agriculture, and manufacturing while creating opportunities for individuals and enterprises and impacting inclusive development and economic growth. However, while digitalization can make a significant difference in the economy, it should be supported by the required technological infrastructure, human capital, and the appropriate legal, regulatory, and other enabling environments so that digital transformation becomes a platform for equity rather than divide. This paper reviews the current state of the economy, the evolution of information and communication technology in Egypt, and the potential impact digital transformation can have on society.

Keywords: Digital transformation, digitalization, inclusive development, human capital, innovation, digital economy, information technology, Egypt.

JEL Classification: O3, O4

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Executive Summary

According to the International Monetary Fund's World Economic Outlook, Egypt's economy grew by 3.6 percent in April 2021 down from the 5.9 percent forecasted before the COVID-19 pandemic hit, with economic expansion projected to grow by 2.5 percent in FY2020/2021 and 5.7 percent in FY2021/2022 (IMF, 2021a). Following the acceleration in digital transformation as a result of the pandemic, Egypt has a unique opportunity to leverage the information and communication technology (ICT) sector to become a platform for a digital economy while creating opportunities for individuals and enterprises and impacting economic development and growth.

Since COVID-19 hit, and because of its various repercussions on society, a lot has changed in the behavior and attitude of many Egyptians towards technology adoption, diffusion, and adaptation. Digital transformation offers ample opportunities for Egypt. However, innovation in general, and ICT in specific, cannot solve all the problems or answer all the economic and societal challenges that have developed over many decades. While digital transformation can make a significant difference in the economy and enable a more conducive business environment, it should be supported by the required universal digital infrastructure and skilled human capital, as well as the proper legal, regulatory, investment, governance, educational, security, and other enabling and support environments. The acceleration of digital transformation represents an opportune moment for the government to impact various economic sectors and industries, including, but not limited to, financial services, retailing, healthcare, agriculture, manufacturing, education, tourism, media, culture, and more. However, in order to realize inclusive, sustainable, and impactful economic growth, Egypt needs to implement a holistic approach to building a dynamic and integrated ecosystem that capitalizes on the reach and potential enabled through digital transformation.

If properly adopted, digital transformation could be a great equalizer that can lead not just to digital access but, more importantly, to digital equity. According to the 2020 Global Competitiveness Index, Egypt was ranked 82nd among 141 countries and was among the few countries with the largest improvements compared to previous years, thereby reflecting some of the achievements in the economic and administrative domains while showing the country's ability to compete economically (World Economic Forum, 2020 and 2019). Although there has been clear progress, there is still a lot that needs to be done so that the society across Egypt benefits from digital transformation, which can help transform the lives and livelihoods of many Egyptians. Therefore, policies need to ensure that universally different groups of people in various geographical locations, including rural and underprivileged areas across Egypt, have affordable access to technology platforms, coupled with the opportunity to acquire the needed knowledge as well as the digital (and other) skills to adopt them.

Despite the prospects of digital transformation, there are several questions that remain unanswered, including: how can digitalization help mitigate the impediments and challenges faced because of COVID-19 while building for a better future? How can ubiquitous digitalization overcome the challenges that existed even before the pandemic hit, including, but not limited to, the divide in the society reflected in disparities between income groups, gender, and age brackets as well as remote and underprivileged locations? Such divide will undoubtedly be exacerbated by further acceleration of digitalization, unless a timely and inclusive nationwide approach is implemented. How can society embrace the ICT culture? Are we just digitalizing the way we work, study, shop,

and get entertained, or are we moving into the digital economy? Is Egypt ready for digital transformation? If not, what are the challenges faced and what needs to be done to overcome them? What changes need to be introduced and what policies need to be put in place? What are the main structural reforms that should be made to enable Egypt to unlock the prospects empowered through digitalization in a way that enhances the country's competitiveness and economic resilience? Following is a review of the current state of the economy, the evolution of ICT, and the potential impact of digital transformation on Egypt, coupled with an overview of some of the programs and initiatives that promote and support digitalization which are already in place or are being developed and planned for implementation.

Egypt's recent economic journey

In recent years, Egypt has had one of the most compelling economic stories in emerging economies. Following a severe hit during the period 2011-2016, with a downfall of macroeconomic indicators and a depletion of foreign reserves, Egypt had embarked on a robust reform program (“Program”) from 2016-2019, which was supported by a USD 12 billion extended facility from the International Monetary Fund (IMF). The Program helped stabilize the economy, led to higher growth rates, improved fiscal accounts, reduced the debt-to-gross domestic product (GDP) ratio to 83.7 percent in FY2018/2019, and improved the level of foreign reserves that was paralyzing the economy (IMF, 2019). The Program’s main building blocks included: liberalizing the exchange rate; introducing new laws to address the long-standing challenges in the regulatory business environment; imposing a value-added tax; expanding public investment into developing and modernizing the road infrastructure network for better connectivity; and reforming the energy sector. The latter helped boost electricity supply and gas exports, therefore opening the energy market for the private sector, especially in renewables. The Program also included reducing the non-food subsidy to close to zero coupled with increasing the prices of water, fuel, power, and other public goods for households and business users, in addition to expanding the social protection programs. The government also invested in megaprojects (such as the construction of new cities) to keep pace with the needs of a fast-growing population. The combined reforms helped reposition Egypt in terms of ease of doing business from 131 in 2016 to 114 in 2020 (World Bank, 2020a).

These reforms set the economy on a more sustainable and promising path, including improving macroeconomic stability, restoring confidence in the economy, and enhancing socioeconomic conditions. The World Bank (2020a) considered Egypt the number one destination for Foreign Direct Investment (FDI) in Africa and the second in the Middle East North Africa (MENA) region in 2019. Accordingly, in recent years, Egypt was hailed as one of the region’s fastest-growing economies and a promising destination for foreign investments. It became an increasingly favorable destination by international investors looking for high yields in a continuously uncertain and changing global environment. According to Morgan Stanley’s chief global strategist: “Egypt is on track to become a breakout nation” (Saleh, 2019). Further, in 2020, the poverty levels in Egypt declined for the first time since 1999 to 29.7 percent of the population down from 32.5 percent two years earlier (CAPMAS, 2020).

The Program also helped stimulate growth, generate a solid primary budget surplus, and lower inflation rates. Accordingly, in FY2018/2019, Egypt enjoyed a 5.6 percent economic growth, the highest since 2010, with most macroeconomic indicators heading towards a positive direction (CBE, 2019). The government’s next objective was to turn Egypt’s promising macroeconomic improvements into prosperity for its sizable population of 103 million – and growing at a rate of 1.9 percent per year – and realize close to six percent growth in FY2019/2020. In terms of the main revenue channels into Egypt, workers’ remittances reached USD 26.8 billion, while tourism

revenues were at an all-time high of USD 13 billion (reflecting a record number of tourists that exceeded 12 million), and the Suez Canal proceeds were USD 5.9 billion (CBE, 2019).

However, despite the promising improvement in the economy's indicators, FDI outside the oil and gas sector never reached its pre-2011 levels. Other concerns remained, such as debt stock, trade imbalances, a modest level of exports, and a budget deficit, even though the latter has been heading in the right direction, reaching 7.8 percent of GDP in FY2019/2020 compared to 8.2 percent in FY2018/2019 and 12.2 percent in FY2015/2016 (Reuters, 2020) and estimated to be around 7.9 percent in FY2020/2021 (FitchRatings, 2021).

COVID-19 strikes

The world witnessed the first reported case of COVID-19 in Wuhan, China on 17 November 2019, which escalated into a disruptive global pandemic. Universally, the pandemic slowed down economies; forcing millions to work from home or remotely to follow the precautionary health and safety measures; affecting financial markets; disrupting Global Value Chains (GVCs); and causing financial distress to private sector firms, especially micro, small-, and medium-sized enterprises (MSMEs).² This led to changes in deployed business models, the introduction of innovative approaches, and eventually job losses in some sectors with varying degrees and implications in different countries. The world witnessed a long standstill and a global shift from encouraging business continuity to focusing on the health of individuals and curbing the progress of the virus while looking at alternative options, including the acceleration of digital transformation to keep economies and businesses operational.

When COVID-19 hit Egypt with the first reported case on 14 February 2020, and due to the structural and policy reforms undertaken by the government, the country was in a relatively better position to absorb the impact of the pandemic compared to a few years earlier. However, the economy was hit hard with diverse implications. For example, in tourism, the third-largest source of revenue, cancellations reached 80 percent by the end of Q1/2020 compared to the same period in 2019. There was a monthly loss of USD one billion in a sector that contributes to about 12 percent of the GDP and represents nearly ten percent of total employment (IMF, 2020). Egypt's Purchasing Managers Index (PMI) for non-oil private sector activity was at its lowest level since January 2017, decreasing to 42.2 in March 2020 from 48.2 in December 2019 and indicating a deterioration in business conditions in the country in Q1/2020. In May 2021, the index stood at 48.6 (The Global Economy, 2021).

² There are discrepancies in the literature when using the term small- and medium-sized enterprises (SMEs) versus micro, small- and medium-sized enterprises (MSMEs). Accordingly, for clarity, reference is made to MSMEs throughout this document and a classification and definition of the different sizes of these enterprises is mentioned later based on the new MSMEs law 152 of 2020.

The government responded quickly with several initial health, safety, fiscal, and monetary measures to mitigate the impact of COVID-19. The collective objectives of the government strategy were three-fold: (1) to protect the population from the spread of the virus, (2) to stimulate the economy by providing easier access to credit to help households smooth consumption and provide liquidity for firms, especially MSMEs, to survive the disruption, and (3) to keep an eye on continuing the structural reform program through and beyond the pandemic. Following is a sample of the health and safety measures as well as the fiscal and monetary policies taken to mitigate the repercussions of COVID-19.

- *Health and safety measures:* The government closed all schools and universities, malls, shops, food and beverage outlets, and all public events and gatherings. A night-time curfew was initially introduced, airports were closed, and travel was suspended for several months, except for cargo. The government reduced the number of public sector employees going to work by almost 50 percent and only grocery stores, bakeries, and pharmacies remained open. The private sector also adopted a variety of remote work models, including hybrid work models and the use of shifts. In addition, the government allocated EGP eight billion (USD 509 million)³ for urgent medical supplies and as disbursements for medical professionals, including doctors, nurses, and support staff working in quarantine hospitals and labs.
- *Fiscal policy:* The government developed a sector-specific plan to ease the impact of COVID-19 and bolster the economy; allocating a budget of EGP 100 billion (USD 6.4 billion), which was equivalent to 1.7 percent of the FY2019/2020 GDP. Around 50 percent was allocated to the tourism sector, which comprises ten percent of total employment, while the rest was used to support low-income families by expanding the social security programs. The government also cut tax on dividends for enterprises listed on the exchange by half to five percent, lowered the stamp duty tax on stock market transactions, implemented several tax policy measures covering both individuals and enterprises, and suspended the tax law on agricultural land for two years (CBE, 2020).
- *Monetary policy:* The Central Bank of Egypt (CBE) cut interest rates on deposits by 400 basis points since the pandemic hit to ease liquidity, enable individuals' access to credit at more favorable terms, and stimulate economic growth (CBE, 2020). It also initially imposed a series of new limits on cash withdrawals and deposits in March 2020 to avoid overcrowding, especially for payroll and pension disbursement. In addition, measures were taken to increase liquidity in the stock market by EGP 20 billion (USD 1.2 billion) and fees on electronic transactions were initially lifted for six months to encourage reliance on electronic payment methods and bank transfers. All credit entitlements for individuals and enterprises were also postponed by six months.

³ All currency conversions in this document use the rate of USD 1 = EGP 15.6

Other measures taken by the government included: reducing natural gas and electricity prices for industrial use; stabilizing the cost of electricity for other industries for three to five years (LYNX Industry Notes, 2020); postponing loans repayment for MSMEs; allocating EGP 45.4 million (USD 2.9 million) for informal workers, including women who lost their jobs due to COVID-19; and making additional payments to women community leaders to ensure gender equality – especially since women represent around 24 percent of the workforce (OECD, 2020a). However, while the public sector is the largest employer of women, many are also self-employed or work informally for the private sector (especially MSMEs) with minimal wages and limited or no access to social protection mechanisms, including healthcare. It is worth noting that the government constantly changed the health and safety measures and amended several of the fiscal and monetary policies taken to adapt to the changing conditions and the magnitude of the several waves that occurred since February 2020.

Although the recent macroeconomic and structural reforms allowed Egypt to be in a relatively better position to face COVID-19, the repercussions of the pandemic have clearly affected the country's economic progress, highlighting the already existing challenges. This covers issues such as the below par non-oil private sector activity, underperforming exports, level of FDI, and limited budget allocations to health and education – despite its improvement compared to previous years – as well as the government debt-to-GDP ratio that increased to 92.9 percent despite a recent and significant pre-pandemic reduction (IMF, 2021a). In addition, key economic sectors and revenue sources such as tourism, manufacturing, the Suez Canal, and oil and gas extractives continue to be severely impacted by restrictions on international travel, the slump in demand, and disruptions to supply chains and trade, both domestically and internationally, as well as the projected adverse social implications caused by the slowing of economic activity.

The impact of the pandemic was felt by individuals and enterprises in the informal sector,⁴ which includes 63 percent of the total employment in all industries and between 30-40 percent of GDP (Medina and Schneider, 2018). Informal enterprises represent around 85 percent of MSMEs; most, if not all, lack health and social insurance and paid leave (OECD, 2020b). Therefore, after the COVID-19 pandemic hit, there was an expansion in the Takaful (Solidarity) and Karama (Dignity) social protection programs launched in 2015 by adding 60,000 households. Women represent 75 percent of the programs' beneficiaries, with a large percentage in the informal sector. By the end of Q1/2021, more than 3.6 million households (IMF, 2021b) – which is around 9.5 million individuals and translates to nine percent of the population of the most vulnerable segments – benefited from the social protection programs, with almost 67 percent of the program's cash

⁴ According to the Central Agency for Public Mobilization and Statistics (CAPMAS): “The informal sector is defined as the production unit that carries out an economic activity, whether industrial, commercial and service, without administrative registration or practicing their activities without holding a permission or a license from the concerned official authorities. Besides, they do not have any legal entity in accordance with the necessary procedures to practice the activities they are involved with.” The Results of the Fifth Economic Census for Egypt by Economic Activity and Governorates, 2017/2018.

component directed to underprivileged communities. The impact of the program aims to increase women's decision-making powers, human capital in health and education, and productive inclusion (World Bank, 2020b). However, there is also a need to think beyond supporting the most vulnerable segment of the society and the informal workers and consider designing policies and measures to provide support for the self-employed running MSMEs as well as farmers and artisans who sometimes face worse challenges than informal workers (OECD, 2020a).

Furthermore, in its quest to contain the impact of the pandemic and expedite the next wave of reforms, the government negotiated financial assistance with the IMF. In May 2020, the Fund approved a USD 2.8 billion Rapid Financing Instrument to address the balance of payments needs, support the most affected economic sectors, help maintain macroeconomic stability, and strengthen the social safety net for the most vulnerable citizens. Further, in June 2020 the IMF approved a 12-month, USD 5.2 billion Stand-By Arrangement to advance key structural reforms, support health and education spending, and improve fiscal transparency to spur a business climate conducive to more inclusive, private-sector-led growth and job creation (The Economist Intelligence Unit, 2021). The IMF support demonstrates the confidence in the economy's prospects and is expected to catalyze further bilateral and multilateral financial assistance to support MSMEs and sustain infrastructure projects.

The initial economic outlook indicated that the impact of COVID-19 would affect Egypt's economy until June 2021 due to declining travel and tourism, lower domestic consumption, capital outflows, reduced remittances, and a reduction in exports and earnings from the Suez Canal due to weaker global trade, coupled with a decrease in FDI. The World Bank expected Egypt's GDP to grow by two percent during FY2019/2020, making it the only MENA country with a positive growth given the position of the economy when the pandemic hit. Interestingly, Egypt has somehow partially weathered the storm despite the severe and disruptive implications of the pandemic. Therefore, because the economy never completely shut down, the growth in FY2019/2020 eventually reached 3.6 percent. Table 1 demonstrates Egypt's macroeconomic indicators for FY2018/2019 and FY2019/2020 and the projections for FY 2020/2021 (IMF, 2021a).

Table 1. Egypt’s macroeconomic indicators (IMF, 2021a)

Macroeconomic Indicators	2018/2019	2019/2020	2020/2021(P)	Source
GDP in billion \$US	302.33	361.85	394.28	IMF
Real GDP at market prices growth (%)	5.6	3.6	2.5	IMF
Real GDP per capita in \$US	3,056.98	3,586.97	3,831.88	MoPED ⁵
Share of private sector contribution in GDP (%)	69.77%	72.43%	--	IMF
Unemployment (%)	7.9	8.0	8.4	IMF
Inflation (%)	9.4	5.7	6.3	IMF

By December 2020, Egypt’s PMI had recorded 50.9; the unemployment rate decreased to 7.3 percent due to the gradual resumption of more economic activities (Dcode, 2020). Following an outflow of about USD 17.4 billion of foreign investments in government securities during the first two quarters in 2020, portfolio inflows reached approximately USD 12.6 billion by the end of November 2020 (Oxford Business Group, 2020). In FY2020/2021, GDP growth is expected to be around 2.5 percent depending on the rollout of the vaccine (IMF, 2021b), which is already underway since early 2021 and has reached 4.5 per 100 individuals (4,560,082 people), with 3.6 percent vaccinated and one percent fully vaccinated as of 9 July 2021 (Our World in Data, 2021). If the vaccine is steadily rolled out throughout 2021 and early 2022, Egypt is projected to gradually start regaining its pre-pandemic growth momentum by FY2022/2023 (The Economist Intelligence Unit, 2021). However, if the vaccination process is delayed for any reason, or if variants of the virus cause further disruption leading to more lockdowns, these projections will be revisited. It is worth noting that, as indicated before, the government continued to adjust the policies and measures taken to navigate these challenging times throughout the pandemic while trying to preserve the health and safety of the society, take the economy back to its pre-COVID-19 levels, and move on with the second wave of reforms as described below.

Reform 2.0: An opportune moment for digital transformation

The multi-dimensional health and economic crisis caused by the COVID-19 pandemic demonstrated the significance of advancing the human capital agenda, accelerating digital transformation, and strengthening social protection. Therefore, in April 2021, the government announced a second wave of structural reforms, labelled the National Structural Reform Programme (NSRP), not only to preserve the hard-won macroeconomic stability but, more importantly, to realize sustained growth while focusing on key economic sectors. This was done with a view to further diversify the economy to better safeguard against external shocks and address long-standing constraints and structural challenges to avail a robust, agile, and competitive private-sector-led economic transformation, create better and more job opportunities, and improve

⁵ MoPED stands for Ministry of Planning and Economic Development, Egypt.

livelihoods (El-Said, 2021). The three-year program targets a growth rate of around six to seven percent, a primary surplus of two percent, and a budget deficit of 5.5 percent by 2023-2024 (Madbouly, 2021).

The next wave of reforms (Reform 2.0), which seeks to build on the 2016-2019 economic reform program, aims to encourage private sector participation and provide more logistical and financial support for the industrial sector. This is to help unleash the potential of the private sector to achieve greater and more inclusive growth; foster a level playing field between the public and private sectors; and digitalize government services to improve efficiency, reduce bureaucracy and red tape, and combat corruption. It is important to note that if a dysfunctional system is digitalized, it remains dysfunctional yet automated. Therefore, streamlining the processes and operations should be the first order of business for digitalization for it to be successful and effective. The next reforms should help pave the way to integrate informal enterprises into the formal sector through financial inclusion, introduce better governance, enhance gender diversity for better equality, and break the silos between different government agencies, which could collectively lead to more job opportunities, reduce poverty, leverage development, and improve prosperity (MoPED, 2021a).

The plan of Reform 2.0 includes five main pillars: (1) promoting growth in ICT, manufacturing, and agriculture, with health and education becoming a priority for public spending; (2) spending on infrastructure and development while targeting the country's poorest areas; (3) investing in developing Egypt's large labor force through lifelong learning, technical education, and vocational training; (4) growing the green economy by making green projects constitute around 30 percent of government projects; and, (5) increasing the role of the private sector in the economy. On this latter note, the Sovereign Fund of Egypt (SFE), which was established in 2018, has already been spearheading the state-led privatization program.

With its diversified economy, manufacturing base, and competitively priced and large human capital – although requiring substantial upskilling and reskilling – Egypt has the potential to become one of the manufacturing destinations in a world that might see a shift towards more onshoring and distribution logistics that are local or regional, besides being an integral component of GVCs by offering the right incentives within an enticing legal and regulatory environment. Meanwhile, there is a need for a change in mindset to focus on growth that has, at its core, the private sector as a driver while capitalizing on the opportunities enabled through the acceleration of digital transformation, which could also play a pivotal role as an integral element of Reform 2.0 to realize Egypt's Vision 2030. The planned reforms have promising implications for multiple economic sectors as they are being implemented with an eye on three primary strategic objectives: (1) reaching an annual USD 100 billion in exports through advancing trade, including digital and outsourcing services; (2) realizing inclusive and sustainable development across all 27 governorates; and (3) adopting digital transformation for different government and public services. Reform 2.0 emphasizes the importance of the private sector in the economy and should lead to

taking the appropriate actions that would help create a conducive business environment that is inviting, attractive, and governed by fair and transparent rules and regulations that promote competition and support economic empowerment.

The evolution of information and the diffusion of technology in Egypt

Through its ancient history that goes back to 3,000 years B.C., Egypt has witnessed massive information flows, from the Rosetta stone and papyrus papers to the establishment of the Bibliotheca Alexandrina. During the Middle Ages, Arabic manuscripts became one of the most common means for information and knowledge dissemination. In the early 19th century, Egypt witnessed the publishing of the first journal and the establishment of the first national archive system (Kamel, 1998a). However, until late in the 20th century and prior to 1985, Egypt was perceived as being rich in data but poor in information (El-Sherif and El-Sawy, 1988). Computers were viewed as ends and not means; accumulated bureaucracy through red tape and the existence of islands of innovation with no connecting bridges restrained the production of information (Kamel, 1998b). The government focus was more on technical issues and not on decision outcomes; multi-sector coordination was poor and synergy between information and socioeconomic development strategies was lacking. Given how important and useful ICT has proven to be for socioeconomic development, building the required information infrastructure for Egypt was a necessity.

Since the mid-1980s, Egypt has heavily invested in its ICT infrastructure and infostructure as one of the key building blocks for development. Early in the journey, Egypt launched a nationwide strategy towards its socioeconomic development objectives to address national challenges such as debt, a high illiteracy rate, poor infrastructure, and structural reforms. ICT was perceived as an integral component and a catalyst for strategy design, development, and implementation. In 1985, the government of Egypt established the Information and Decision Support Center (IDSC): a think tank affiliated with the cabinet of Egypt. The objective was to develop and implement – using a supply-push strategy – large nation-wide informatics projects to support socioeconomic development using state-of-the-art ICTs.

During the period 1985-1995, a government-private sector partnership had a remarkable impact on the build-up of Egypt's infostructure by establishing hundreds of informatics projects and centers in different public and private sector organizations targeting socioeconomic development. In 1999, ICT was identified as a priority at the highest policy level and, consequently, a new cabinet office was established: the Ministry of Communications and Information Technology (MCIT). Since its inception, the MCIT's mission has been focused on building Egypt's digital economy and making it more competitive, agile, and inclusive, in addition to ensuring that it is a key driver of economic growth. Over a decade ago, the ICT sector transformed itself from a sector looking for support and subsidies to a sector with tangible and intangible contributions to the economy. In 2017, the MCIT developed the country's 2030 ICT strategy, Digital Egypt, to support the growth of the sector and contribute to economic and societal development through several

initiatives and projects, such as addressing the development of MSMEs and investing in human capital capacity-building. On this latter note, it is worth noting that Egypt moved up in the 2020 UN Global Knowledge Index to 72nd place compared to 82nd place in 2019 and became 23rd in 2020 in technical and vocational training and 74th in ICT in 2020 compared to 78th in 2019 (UNDP, 2020).

Table 2. The evolution of the ICT sector in Egypt

Timeline of the ICT Sector	Year
Open Door Policy	1974
Economic Reform Program	1985
Information Project Cabinet of Ministers (IPCOM)	1985
Information and Decision Support Program (IDSC)	1985
National Information and Administrative Reform Initiative	1989
Egypt Information Highway	1994
Ministry of Communications and Information Technology (MCIT)	1999
National Information and Communications Technology Master Plan	2000
Egypt Information Society Initiative (EISI)	2003
Extending Information and Communication Technology to Public Services	2004
Information Technology Industry Development Agency (ITIDA)	2004
Information Society	2005
ICT Strategy (2007-2010)	2007
ICT Strategy (2013-2017)	2013
The Cloud Strategy	2014
Digital Egypt: The 2030 ICT Strategy	2017
National AI Strategy	2019

In November 2019, the government of Egypt established the National Council for Artificial Intelligence (AI) as a partnership between the government, academia, and the private sector to explore opportunities in the field of AI and its diverse implications on the different economic sectors. Table 2 demonstrates the timeline of the evolution of the ICT sector in Egypt over the last five decades, starting with the open-door policy of 1974 and the resulting opportunities created for private enterprises and foreign investments that helped encourage ICT multinationals to penetrate

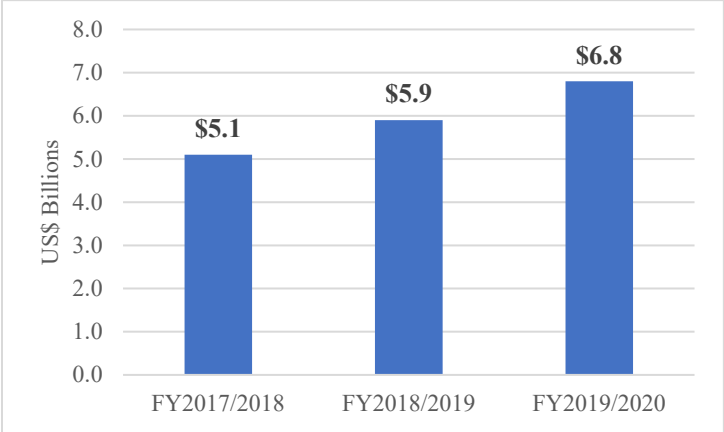
the market and inspired the establishment of local ICT enterprises, which effectively contributed to the growth of the sector.

It is worth noting that the evolution of the ICT sector in Egypt over the last several decades was a model of public-private sector partnership (PPP) through a collaboration between the government and the private sector (including multinationals in the ICT industry) with an effective role played by the civil society, including several ICT-focused non-governmental organizations (NGOs) who were engaged and had an impactful role in the dissemination of ICT in Egypt. On this note, the Information Technology Industry Development Agency (ITIDA), which was established in 2004, works closely with ICT-focused NGOs to address the needs of its members, including offering managerial and technical support, financial incentives for institutional development, market research, training, and more. Examples of these active and engaged ICT-focused NGOs include the Egyptian Information Telecommunications and Software Alliance (EITESAL) established in 1997, the Chamber of Information and Communication Technology Industry (CIT) established in 1999, and the General Division of Computer and Software of the Federation of Egypt Chambers of Commerce (FECC) established in 2001.

Egypt’s ICT profile

In 2011, the Internet contributed around USD 2.2 billion to the economy, which was comparable to 1.1 percent of GDP, including consumption related to Internet access and transactions as well as private investments and government spending (Chabenne et al., 2012). This volume of contribution was fueled by entrepreneurship, innovation, creativity, investment promotion, and technology start-ups, and was supported by different stakeholders, including the government, the private sector, and civil society. Over a decade later, there has been a steady increase in the contribution of the ICT sector to GDP by 16.6 and 15.1 percent in FY2017/2018 and FY2019/2020, respectively, supported by a portfolio of diverse digital transformation projects. Figure 1 demonstrates the growth of the revenues of the ICT sector (Talaat, 2021a).

Figure 1. ICT sector contribution (Talaat, 2021a)



Similarly, Figure 2 shows the increase in the value of IT-related exports, including outsourcing services and digital exports, by 13 percent in FY2018/2019 compared to the previous year and by a further 14 percent in FY2019/2020. Accordingly, the ICT sector remained the fastest growing sector in the economy for the second consecutive year and is projected to grow by a further 16 percent in FY2020/2021 (MCIT, 2021). Table 3 demonstrates the contribution of the ICT sector as a percentage of GDP (State Information Service, 2021).

Figure 2. Outsourcing services and digital exports (MCIT, 2021)

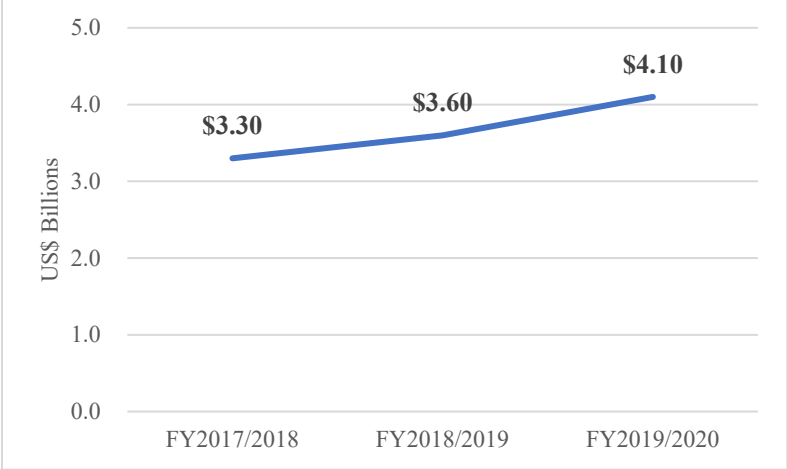


Table 3. ICT sector contribution to GDP (State Information Service, 2021)

Fiscal Year	ICT Sector Contribution to GDP
FY2017/2018	3.5 percent
FY2018/2019	3.8 percent
FY2019/2020	4.4 percent

Being located at the crossroads of Africa, Asia, and Europe, Egypt is an essential transit point for the global transmission of data and is second only to the United States, with 17 percent of the world’s Internet submarine cables crossing through Egypt (Mounir, 2020a). This contributed around USD 185 million in revenues to Egypt in 2019 and points to the country’s strong potential to develop a data center industry that serves the MENA region with implications on the work environment as well as the exploration of a diverse array of business opportunities.

For several years, the government has been heavily investing in upgrading the digital infrastructure to become more secured and resilient and to ensure its performance and sustainability. This was further boosted due to the increased use of the Internet caused by COVID-19, coupled with the forecasted use of the newly introduced digital government services. Examples of such efforts include establishing a new network of fiber optic cables with a total investment of around EGP six billion (USD 382 million) to connect 33,000 government buildings to provide a more timely and efficient public service, as well as investing in human capital and encouraging innovation to help the ICT sector effectively contribute to Egypt’s economic development and growth. The network installation is well underway, with thousands of buildings already connected (MCIT, 2021).

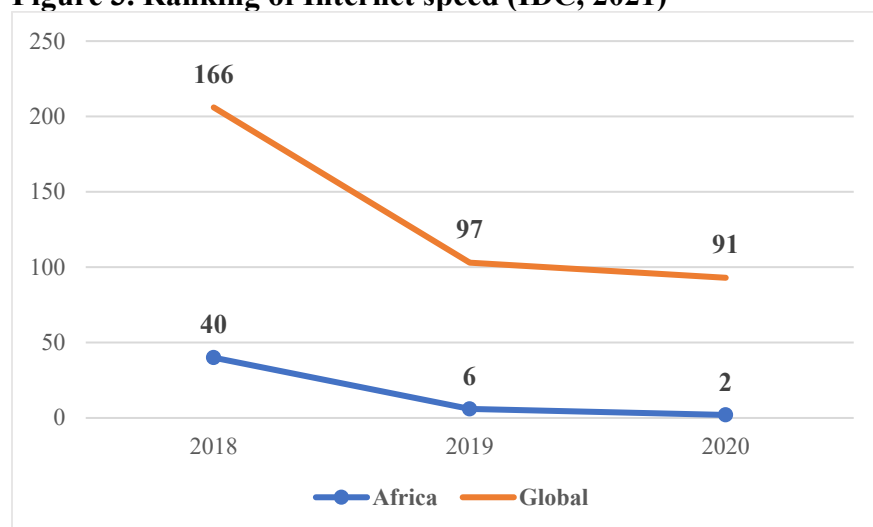
Through MCIT, the government also launched several major projects to improve the quality of fixed broadband in Egypt with a total investment of USD 1.6 billion since mid-2018, reaching around USD 1.8 billion during FY2020/2021 – of which the private sector contributed 26 percent – to raise the speed and efficiency of the Internet and accommodate the increase in the number of digital services offered and the volume of use by a growing population of tech-savvy youth. Table 4 demonstrates the increase in the Internet speed in Egypt in recent years.

Table 4. Increase of Internet speed (Speedtest Global Index, 2021)

Fiscal Year	Internet Speed
FY2017/2018	6.5 Mbps
FY2018/2019	26.5 Mbps
FY2019/2020	31.38 Mbps
FY2020/2021	34.88 Mbps

Figure 3 demonstrates the remarkable improvement in the ranking of the average Internet speed in Egypt over the last few years, occupying the second place in Africa and the 91st position globally in March 2021 (IDC, 2021). Moving forward, the use of fiber optic cables will be important to the realization of the government digitalization strategy. Therefore, as of April 2021, fiber optic connectivity became one of the public utilities required for new construction permits, and the rollout of fiber optic cables nationwide is integral to the recently announced economic and social structural government reforms (MCIT, 2021).

Figure 3. Ranking of Internet speed (IDC, 2021)



In 2019, Egypt scored 55.7 in its Mobile Internet Connectivity Index, which is based on measuring the country’s mobile internet adoption, infrastructure, affordability, consumer readiness, content, and services (GSMA Mobile Connectivity Index, 2019). In March 2021, Egypt was occupying the 98th position at the international level in terms of mobile broadband speed (Speedtest Global Index, 2021). This build-up phase of the infrastructure in recent years was boosted in 2017 with the

introduction of 4G technology, which contributed to the surge in data usage and presented the opportunity to offer new online products and services. Furthermore, Egypt is taking the necessary steps to introduce 5G; a key enabler of the digital economy that allows for the penetration and dissemination of several of the Fourth Industrial Revolution's emerging technologies and other next-generation technologies (Oxford Business Group, 2020) associated with the information society and the knowledge economy. It is worth noting that the implications of digital transformation, coupled with the growing influence of data-driven platforms such as AI and data analytics, could contribute USD 15 trillion to the global economy (WEF, 2021a).

In 2020, Egypt secured more than USD one billion for digital transformation, and development financing worth USD 3.19 billion was allocated to support the private sector with a focus on MSMEs, including transforming their operations through digitalization (Ministry of International Cooperation, 2021). One of the key building blocks of digital transformation is accelerating and improving broadband connectivity, which opens new opportunities for economic and social development. According to the International Telecommunication Union (ITU), for most African countries, expanding mobile broadband penetration by ten percent could yield an increase of 2.5 percent in GDP per capita; besides, a ten percent drop in mobile broadband prices can boost the adoption of mobile broadband technology by more than 3.1 percent (Katz and Callorda, 2019). Therefore, broadband connectivity can help create new jobs through the demand for human capital from technology-based enterprises and the ecosystem that supports them. In other words, innovation-related jobs – coupled with universal, affordable, and good quality ICT infrastructure, including broadband services – underpin the digital economy and its rapidly expanding opportunities to help create jobs where innovation did not exist or was insignificant.

Finally, digital transformation can help expand access to basic needs and services, including several of the 17 Sustainable Development Goals (SDGs), such as universal identification, efficient government services, financial inclusion, and job creation; all requiring the equal and affordable dissemination and adoption of emerging technologies. Therefore, for digital transformation to effectively contribute to socioeconomic development while avoiding exacerbating the societal divide, a more inclusive approach should be deployed by offering an equitable and affordable opportunity to the entire society to benefit from the digital environment.

On a different note, in the 2020 Digital Inclusion Index, Egypt was ranked among the top improving countries for digital inclusion. The index includes elements such as enabling individuals and societies to effectively adopt ICT and enhance their ability to contribute to the digital economy. In 2020, Egypt ranked 50th among 82 countries with a score of 60 points compared to 52nd in 2017 (Egypt Daily News, 2021). The progress was demonstrated in: (1) the digital availability dimension which measures the ability of individuals to access the internet and its efficiency, (2) the digital policy dimension which measures the elements of trust, security, usage, and privacy, (3) the digital financial capacity dimension of individuals which determines the ability to purchase

digital devices, and, finally, (4) the digital readiness dimension which measures the relationship between the level of digital education and the ability to apply them (Digital Inclusion Index, 2020). The number of mobile subscribers in Egypt has reached 95.75 million in January 2021, of which 95 percent are pre-paid and showing an increase of 2.9 percent compared to the previous year (Global Snapshot Report, 2021). Table 5 demonstrates the mobile penetration rate in Egypt.

Table 5. Mobile penetration rate (Global Snapshot Report, 2021)

Year	Population	Number of Mobile Subscribers	Penetration Rate
January 2019	100.3	93.49	92.7 percent
January 2020	101.4	92.71	91 percent
January 2021	103.3	95.75	93 percent

Furthermore, Table 6 demonstrates the number of smartphone units, which represents a good platform for digital transformation and an enabler for higher levels of mobile Internet usage.

Table 6. Number of smartphone units (Global Snapshot Report, 2021)

Year	Number of Smartphones Units	Smartphones Growth Rate	Percent of Total Mobile Units
January 2019	23.8 million	11 percent	25 percent
January 2020	27.9 million	17 percent	30 percent
January 2021	38.7 million	39 percent	40 percent

As for the number of Internet users, Table 7 demonstrates the penetration and growth rates over the last three years.

Table 7. Internet penetration rate (Global Snapshot Report, 2021)

Year	Number of Internet Users	Penetration Rate	Growth Rate
January 2019	49.23 million	49 percent	9 percent
January 2020	54.74 million	54 percent	11 percent
January 2021	59.19 million	57.3 percent	8.1 percent

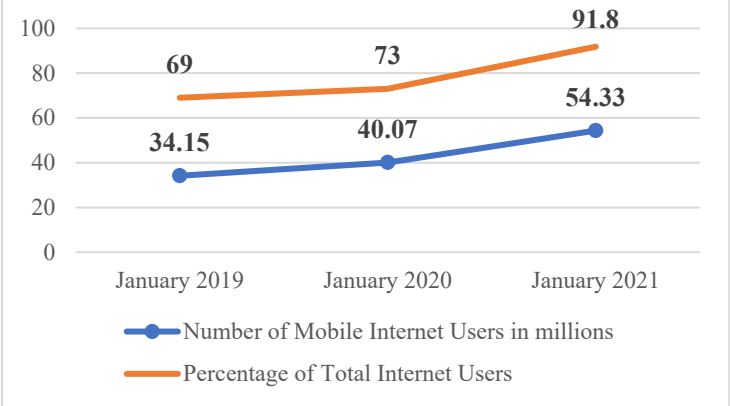
The number of ADSL subscriptions during Q3/2020 was 8.29 million, showing a 16 percent increase compared to the same period a year before. The number of active social media users in January 2021 was 49 million, representing 47.4 percent of the population, with an increase of 16.7 percent compared to January 2020 (Statista, 2021). Table 8 demonstrates the growth of mobile Internet in Egypt for the period 2018-2021 (Statista, 2021).

Table 8. Growth of mobile Internet (Statista, 2021)

Year	Number of Mobile Internet Users	Percentage of Total Internet Users	Growth Rate
January 2019	34.15 million	69 percent	8 percent
January 2020	40.07 million	73 percent	17 percent
January 2021	54.33 million	91.8 percent	35.6 percent

Figure 4 shows the significant growth in the number of mobile Internet users from January 2019 to January 2021, with the last two years reflecting the increase in use due to the impact of COVID-19.

Figure 4. Growth of mobile Internet (Statista, 2021)



According to one of several research studies conducted in 2020, household internet consumption increased by 87 percent and mobile Internet consumption went up by 18 percent. The increase was mainly divided into: 131 percent in web browsing, 96 percent in Internet gaming, 69 percent in Netflix usage, and 41 percent in YouTube usage; reflecting a mix of increases in the applications used for work, education, social interaction, and entertainment (AWE Living Research, 2020). These changes reflected not just the increase in traffic, but also a diversification and shift in the usage patterns, including more than doubling the number of hours that witness peak usage hours per day from seven to 15 hours. The latter is due to more people either working, studying, or shopping from home, which pushed the government of Egypt to ask mobile operators to increase the data packages by 20 percent to accommodate the increase in usage at no extra cost to the subscriber (AWE Living Research, 2020). It is worth noting that such a trend is here to stay and is putting more demand on the infrastructure that needs to be addressed, including access, content – with a focus on Arabic – and interconnectivity. However, digital transformation requires much more than an up-to-date technology infrastructure and high-speed connectivity. It requires a society-wide ecosystem, readiness, and a well-thought and institutionalized governance model to enable the opportunity to capitalize on the outreach and power of digital technologies, in addition to impacting the segment of the society that are not digitally connected or digitally literate.

In 2021, there are more than 200,000 professionals currently employed in the country’s business process outsourcing (BPO) industry, making Egypt an attractive outsourcing option – particularly given its low attrition rates, which are estimated to be between five and 11 percent, compared to other countries. According to the IDC, Egypt has become one of the fastest-growing exporters of BPO services in the world. Before the pandemic hit, Egypt’s ICT industry was projected to generate around USD 6.9 billion in revenues in FY2020/2021, including USD 4.7 billion from BPO, and the workforce was expected to reach 240,000 full-time-equivalent-FTEs (IDC, 2019).

Moreover, to promote the sustainable and scalable growth of the ICT sector in general, universities, higher education organizations, and vocational training institutions have introduced a portfolio of diverse IT and computer science curricula to cater to different market needs. Today, roughly ten percent of Egypt's annual university graduates major in ICT-related specializations.

Digital Egypt: ICT Strategy 2030

Egypt's Vision 2030 comprises three main dimensions: (1) an *economical* dimension targeting inclusive development and transparency and leveraging government efficiency; (2) a *social* dimension focusing on investing in human capital in lifelong learning, health, culture, and social justice; and (3) an *environmental* dimension focusing on environmental and urban development. The ICT sector is an integral and cross-cutting element of such a vision; it cuts across the three dimensions horizontally and can effectively contribute to achieving the targeted objectives.

In line with Egypt's Vision 2030, the MCIT launched its nationwide ICT strategy Digital Egypt in 2017. The strategy strives to move Egypt to benefit from the digital economy through the universal, equitable and affordable access to ICT tools and applications to impact the lives and livelihoods of Egyptians and the development of a competitive, innovative, and agile ICT industry. Digital Egypt goes way beyond connectivity and building the ICT infrastructure into the creation of intellectual property, goods, and services based on information-intensive activities. It aims to capitalize on digital transformation and lays the foundations to move Egypt to become more digitally driven, with a strategic objective to digitalize most of the government services and that of 60 state-owned enterprises (SoEs) and create a legislative framework that provides governance and data security, while at the same time preserving personal rights. The digitalization of various government and public services bundled under the umbrella of electronic government services is expected to increase efficiency, reduce bureaucracy, and improve data availability and sharing, which will help in rationalizing the decision-making process and lead to further alignment, reduction of silos, and better allocation of resources. Digital Egypt is dependent on an ecosystem that primarily relies on a solid, cutting-edge, safe, and secured digital infrastructure and an inviting, conducive, transparent, and well-governed legal and regulatory environment. Both the 2030 Vision and the MCIT strategy aim to drive Egypt's economy to: become more competitive and resilient; build highly-skilled human capital; foster innovation, transition to a knowledge economy and achieve social justice, equality, and integrity; fight corruption; protect cybersecurity; and promote as well as advance Egypt's position both regionally and internationally.

Digital Egypt has three primary ambitious objectives: digital transformation, digital skills and jobs, and digital innovation.

- a. *Digital transformation*: Digital Egypt – as a platform for electronic government services – offers a portfolio of over 100 services, including food subsidy, notarization, court filing, driver and car licenses, and health, real estate, education, agricultural, and investment related

services. In July 2019, a pilot program was launched in the governorate of Port Said to digitalize government services with a mandate to expand to the rest of the governorates across Egypt and link the 33,000 facilities with fiber optics, as indicated earlier, via a secured and unified platform by 2021. In Q2/2021, there are over 35 government-to-consumer (G2C) services that have been rolled-out across Egypt and around 150,000 Egyptians have already registered for digital identities to access them. Moreover, there are around 60 government-to-business (G2B) services that are being rolled-out, including commercial registration. Today, these services are accessed through several electronic platforms including the government services portal,⁶ which offers 75 online public services in both Arabic and English with plans to add 25 more services, coupled with the possibility to access more than 30 services through mobile platforms (MCIT, 2021).

- b. *Digital skills and jobs*: The government put an initial investment of EGP 400 million (USD 26 million) towards upskilling, reskilling, and providing lifelong learning and capacity building in different ICT specializations as part of the digital skills and job component of Digital Egypt. Additionally, in order to support innovative and tech-enabled start-ups to increase their competitiveness, the government launched a series of initiatives, mentorship programs, boot camps, ideathons, incubation, and acceleration schemes targeting undergraduate and graduate students, entrepreneurs, and professionals – with programs earmarked for youth and women across all governorates to meet the growing need in the local market, improve unemployment ratios, and introduce different MSMEs to the new trends associated with the future of work and the opportunity to access and compete internationally given the reach provided through digital transformation.

During FY2019/2020, 13,000 learners were trained, and during FY2020/2021, the plan was to train 115,000 learners; demonstrating the acceleration of the reskilling and upskilling of human capital through multiple private and public sector channels. However, despite these efforts, the seamless integration of ICT and digital skills into education and lifelong learning at the level and pace that can help achieve the transformation expected through digitalization is yet to be realized. Hence, it requires additional attention to the continuous investment in human capital across different segments of society. One of these programs addresses the creation and empowerment of an innovation culture within MSMEs and leverages their capacities to generate and implement innovative ideas. The skills development and job creation components also support the entrepreneurial space by creating tech hubs across the country. To date, six of Egypt's universities in the governorates of Sohag, South Valley, Qena, Menoufia, Minya, and Mansoura have established a tech hub (innovation center) on-campus. Future phases will take the total number of these university-based innovation centers to 15, including in the governorates of Ismailia, Aswan, Cairo, Giza, and Fayoum; reflecting the important role of universities in promoting entrepreneurship and innovation among youth as a natural incubator

⁶ www.egypt.gov.eg

of ideas as well as being an inviting, creativity- and discovery-driven environment offering mentorship, co-working spaces, workshops, demo days, and offering many more opportunities for collaborative activities with different businesses and industries (Alaa El-Din, 2021a). In that context, the first incubator program was launched in April 2021 in the field of clean and green technology in Upper Egypt. It aims to encourage people to find creative solutions to social and environmental challenges.

- c. *Digital innovation*: the objective is to build and foster an ecosystem that encourages and promotes research and development in entrepreneurship and innovation to drive growth and support sustainable development. On this note, the Technology Innovation and Entrepreneurship Center (TIEC), established in 2010, supports entrepreneurship and innovation in different industries. Similarly, MCIT supports young entrepreneurs, start-ups and innovative MSMEs through training, incubation, financial and in-kind support, and mentorship. According to MAGNiTT, a renowned start-up platform, Egypt is home to the fastest growing ecosystem in MENA and recorded the highest number of start-up funding and investment deals in the region during Q1/2020, achieving 37 percent of the total number of deals worth USD 277 million, with 52 percent of those deals attracting international investors. Most, if not all, are tech-enabled start-ups that contribute to the acceleration of digital transformation (Oxford Business Group, 2020). Earlier in 2019, the start-ups ecosystem attracted 142 investments amounting to USD 95 million up 13 percent from 2018 (MAGNiTT Report, 2020). All these developments were supported by an increasingly dynamic funding and support ecosystem comprising several stand-alone and university-based accelerators and incubators, venture capitalists (VCs), and angel investor networks such as Flat6Labs, Algebra Ventures, Cairo Angels, Alex Angels, AUC Angels, and many others.

Moreover, in line with Egypt's higher education and research strategy that aims to promote science, technology, and innovation within higher education institutions and research centers, Egypt is setting up a 300-acre Knowledge City to provide an environment of learning and scientific and applied research with an emphasis on innovation and entrepreneurship. The Knowledge City is planned to host a consortium of international and local universities, including a specialized ICT university (Egypt University of Informatics, starting in the fall of 2021) with a focus on scientific, technology, and engineering fields. Several of these universities have launched their operations in 2019 and 2020. The Knowledge City will include technology-focused training and development centers that cater to people with disabilities. In addition, it will include research and innovation centers specialized in advanced technologies such as AI, the Internet of Things (IoT), and integrated systems, as well as technology and business accelerators, to promote entrepreneurship. This is along with a technology park that includes local and international IT enterprises to promote collaboration and build bridges between universities, research institutes, and industries for the transfer of technology, knowledge, and skills in a variety of fields, including smart applications

and digital systems. The Knowledge City and its role in investing in the human capital digital capacities is an integral element in building a digital Egypt.

Furthermore, to encourage innovation among the start-up community, several technology parks were established, with the first being the Smart Village in 2001. MCIT also launched Silicon Waha, a joint stock company with a mandate to create a series of specialized business and technology parks across Egypt. In line with the establishment of dedicated technology parks, the government, the private sector, and academic institutions have all expressed interest in developing a vibrant entrepreneurial environment (a start-up culture) which resulted in the establishment of several stand-alone and university-based incubators and accelerators, including, but not limited to, the Venture-Lab (The American University in Cairo), Flat6Labs, Falak, TIEC, MINT (EG Bank), Nahdet El-Mahrousa, Endeavor, iHub (Ain Shams University), and many others. According to a recent Global Entrepreneurship Monitor (GEM) survey in Egypt, 61.6 percent of respondents showed interest in pursuing entrepreneurial endeavors, which is exceeding the MENA region average of 40 percent and the global average of 23.7 percent (Bosma et al., 2019).

Prospects of digital transformation

As indicated earlier, Egypt has taken steady steps in the digital transformation direction, which have been amplified with the COVID-19 crisis. Indeed, the pandemic disrupted economies, businesses, and people's lives and livelihoods in the developed world and emerging economies, Egypt included. The impact is not just political, economic, and social; it has also affected the way people work, with more people working remotely – especially in established and connected institutions and enterprises. New business models emerged, including hybrid models for teleworking. Online and distance learning in schools and universities became the norm under the pandemic – with variations among schools based on affordable access to and availability of infrastructure and connectivity for online learning – with the emergence of different blended models to deliver content remotely using a variety of digital platforms in both synchronous and asynchronous modes. Besides, to preserve the health and safety measures, more people are reverting to various online media channels for entertainment (AWE Living Research, 2020). However, such transformation only benefited the relatively small segment of the society that enjoys affordable and reliable access to the Internet, making the gradual transition towards digitalization easier and doable for them.

Building and regularly upgrading the infostructure and infrastructure needed to enable digital transformation is crucial for the economy and the private sector to remain relevant and agile and to accommodate the surge in using digital platforms as statistically demonstrated since March 2020. Digital infrastructure is at the center of the ecosystem of the digital economy (ITU, 2020a), including the digital elements of competitiveness, factors of production and industries, production processes, the connectivity of digital services, and the proliferation more digitalized households (ITU, 2020b).

During the COVID-19 pandemic, the ICT sector in Egypt played an important role through the effective response of different enterprises and organizations that have managed to implement tech-based applications and solutions to allow businesses to continue their operations, even if not at full steam, in light of the health and safety measures. This allowed them to reach their consumers at home for shopping, employees for working remotely, and learners for studying from home or anywhere, as part of exploring a portfolio of digitally-based experiences. Egypt will probably benefit from the continuous progress it witnessed as a result of the pandemic with an emphasis on digitalization – which was a must during these difficult times to preserve and sustain business continuity. The accumulated experiences gained from the increasing adoption of ICTs since March 2020 across different sectors will hopefully lead to further economic and business opportunities in the future through digital transformation.

Furthermore, based on a public-private partnership, *Benya Raqameya*,⁷ also known as Digital Future, was launched in 2020 as a one-stop-shop marketplace that empowers enterprises irrespective of their size and across different sectors to cope with digital transformation. Digital Future is a collaboration between the Federation of Chamber of Commerce, the Ministry of Public Enterprise Sector, and several multinationals including SAP, Microsoft, Honeywell, Cisco, Dell, and Fiber Misr System, to provide financial and technology services with telecom companies offering support in strategy development and universities, including The American University in Cairo helping with capacity-building. Digital Future is based on four primary components: (1) developing the required digital policies and procedures, (2) introducing advanced IT applications into various enterprises such as enterprise resource planning (ERP), (3) offering technical support, and (4) upskilling and reskilling human capital. Digital Future reflects the next generation of cloud solutions that support the development of a digital economy based on equitable, affordable, and secured access to information and IT-based and digital solutions. *Benya Raqameya* offers different enterprises the option to choose the cloud services that meet their business needs while ensuring cost optimization, avoiding vendor lock-in, providing flexible data storage options, and addressing the enterprises' lack of management expertise and business acumen in a digital environment.

Digital Future, in its current phase, includes 63 enterprises operating in 12 different economic sectors with an initial investment of USD 50 million. Its ambition is to move around 30 percent of the job opportunities – with an emphasis on MSMEs – to be tech-ready in line with the government's policy of digitalization and help them apply innovative technologies at affordable prices to advance their services to their consumers (Egypt Today, 2020). The Federation of Egyptian Industries (FEI) – which represents over 60,000 industrial enterprises, more than 90 percent of which are from the private sector and account for more than 1.2 million workers – will use the platform to promote digital transformation in the industrial sector to help it cope with the

⁷ *Benya Raqameya* translates to “digital infrastructure.”

constant technological developments taking place, leverage its productivity, and boost its competitiveness.

For digitalization to achieve its prospects, Egypt needs a robust, dynamic, and conducive nationwide digital ecosystem, including universally affordable high-speed Internet, a human capital asset with digital skills, digital platforms to connect enterprises to consumers, interoperable digital financial and payment services, digital identities, digitally literate consumers, a legal and regulatory environment, and an overall entrepreneurial and innovative ecosystem (Lukonga, 2020). Several of these elements are being gradually and simultaneously implemented for several years.

There is also the urgent need to mitigate the associated risks of digitalization, such as digital divide or lack of robust cyber protection, or else the impact of digital transformation can be neutralized or even become negative, including the marginalization of more segments of the society that are not connected for a variety of reasons such as illiteracy, affordability, and quality of infrastructure available, if the associated risks are not well addressed. On this note, the government launched a nationwide project to connect 1,300 villages to fiber optics as a first stage at a cost of USD 350 million. The project will connect 4,584 villages across the country, representing 58 percent of Egypt's population, at a total cost of USD 32 billion (Talaat, 2021b). The project is part of the Decent Life project launched in 2020 and will help meet the growing demand for high-speed Internet due to the pandemic as well as support the government's efforts to reduce the digital divide. On a different note, and besides the development of various ICT-based services, "Egypt *Makes* Electronics," launched in 2015, can help move Egypt from being a consumer of IT services into becoming a producer of technology with the development of an electronics industry coupled with its associated implications on human development, employment opportunities, and investing in innovation capital.

Societal readiness

Technology infrastructure and access cannot drive digital transformation without societal readiness. According to the 2020 Network Readiness Index (NRI) (Portulans Institute, 2020), digital transformation requires societal readiness based on four main dimensions: technology, people, governance, and impact. The NRI model's premise is that there is a need to combine the complementary strengths and reach of technology and people within an effective governance framework to achieve economic and social impact while offering a balance between the human and technology dimensions of network readiness. Therefore, for Egypt to gradually transition into a digital economy, there is a need for the following building blocks to be properly developed and seamlessly integrated:

- a. *Technology*: State-of-the-art infrastructure is integral to the network economy. This includes the access to, use, and quality of the infrastructure, the adoption level and degree of

affordability; the volume of the content and applications that are deployed locally and adapted to accommodate the local needs; and the level of preparedness in society to integrate the digital economy platforms such as AI, cloud computing, big data analytics, and IoT.

- b. *People*: Human capital is the most important asset in society. Capacity-building is invaluable through lifelong learning, including vocational training. This can be manifested using emerging ICTs as a comparative advantage and to impact the effectiveness, efficiency, and productivity of individuals, private and public enterprises, and the government.
- c. *Governance*: The environment needs to be conducive to effectively engage in the network economy and must be manifested in a variety of ways, including the development and implementation of policies addressing issues such as: (1) trust and how enterprises feel safe with respect to privacy and security; (2) regulation and how the government promotes participation and engagement through a legal and regulatory framework; and (3) inclusion and the importance to address different inequality elements such as gender, disabilities, and digital and socioeconomic aspects.
- d. *Impact*: The NRI index is, by design, country-wide and uses a multi-dimensional approach addressing a broad spectrum of issues that measures the potential of the deployment of innovative technologies and applications in accelerating digital transformation across different economic sectors such as education, health, retailing, agriculture, and manufacturing; consequently impacting the society (Portulans Institute, 2020).

The 2020 NRI report revealed that Egypt ranked 84th in the world and is the most network-ready country in Northern Africa. Egypt has an advantage in the level of ICT usage and skillset given its young and tech-savvy population – with over 60 percent under the age of 30 making them overwhelmingly digital natives – primarily through the government’s support of emerging technologies and various research and development efforts and activities. However, Egypt’s weakest dimension is in ICT-related governance (Portulans Institute, 2020). Its challenges include improving the legal and regulatory environment and ensuring equal universal access to digital technologies across the country, including remote and underprivileged locations in different governorates, which could also help support the private sector, improve its competitiveness, leverage its digital readiness, and reduce the digital gap between the haves and have nots, especially among remote communities, women, and youth. Besides, digital transformation can help support and accelerate the implementation of the United Nations’ SDGs through the adequate dissemination and utilization of emerging technologies (Kamel, 2020).

Table 9. Egypt’s 2020 Network Readiness Index (Portulans Institute, 2020)

Network Readiness Index	Rank (out of 134)	Score (out of 100)
Technology	85	33.46
Access	80	53.81
Content	96	20.32
Future Technologies	76	26.24
People	80	42.64
Individuals	93	43.30
Businesses	78	39.28
Government	60	45.35
Governance	93	46.52
Trust	85	31.33
Regulation	88	58.52
Inclusion	102	49.70
Impact	84	47.61
Economy	60	28.18
Quality of Life	96	57.56
SDG Contribution	93	57.09

Accordingly, for Egypt to maximize its digital transformation prospects, it needs to invest continually in its (1) technology infrastructure – the heart and soul of the network economy – by providing affordable and universal access and localized content, (2) human capital – the most valuable asset of the economy – should be digitally-ready with the upskilling and reskilling of capacities to help navigate the challenges of the 21st century, including the future of work, learning, and retailing, and (3) governance – the checks and balances mechanism – with its multifaceted benefits, including a legal and regulatory environment that can help build trust, create transparency, and enable inclusivity. Table 9 demonstrates the details of Egypt’s NRI ranking in 2020 according to the Portulans Institute.

MSMEs and start-ups in Egypt: Challenges and opportunities

The development of MSMEs and start-ups is integral to the creation of employment opportunities; MSMEs being the main form of enterprises in Egypt. The MSMEs sector is a key driver to Egypt’s economic growth (Abdel Bary, 2019) and represents a significant contributor to GDP with around

70 percent of employment opportunities, especially when the informal sector is considered (Saleem, 2017). Supporting MSMEs has been a policy priority of the government since 1991, when the Social Development Fund (SFD) was formed, which was transformed in 2017 with the establishment of the Micro, Small- and Medium-Sized Development Agency (MSMEDA) with a focus on the development of MSMEs and entrepreneurship either directly or through coordination with different constituents. MSMEs account for 44.6 percent of the private sector and the sectoral distribution is 51 percent in manufacturing, 40 percent in trade, four percent in tourism, three percent in construction, and two percent in other activities (Abou Elseoud et al., 2019) with a primary focus on the local market and an insignificant penetration in GVCs (Ganne and Lundquist, 2019). In terms of size distribution, 91 percent are micro enterprises, eight percent are small and medium enterprises, and one percent are large enterprises (CAMPAS, 2021).

Table 10. Classification of MSMEs (CBE, 2021)

Enterprises	Business Turnover	Industrial Projects	Non-Industrial Projects
Micro	Any enterprise or project with an annual business turnover less than EGP one million (USD 64K)	Any enterprise that has been incorporated no more than two years ago with a paid in or an invested capital that is less than EGP 50K (USD 3,200)	---
Small	Any enterprise or project with an annual business turnover between EGP one million (USD 64K) and EGP 50 million (USD 3.2 million)	Any industrial project that has been incorporated no more than two years ago with a paid in or an invested capital between EGP 50K (USD 3,200) and EGP five million (USD 319K)	Any non-industrial project or enterprise that has been incorporated no more than two years ago with a paid in or an invested capital between EGP 50K (USD 3,200) and EGP three million (USD 192K)
Medium	Any enterprise with an annual business turnover between EGP 50 million (USD 3.2 million) and EGP 200 million (USD 12.8 million)	Any industrial project that has been incorporated no more than two years ago with a paid in or an invested capital between EGP five million (USD 319K) and EGP 15 million (USD 958K)	Any non-industrial project or enterprise that has been incorporated no more than two years ago with a paid in or an invested capital between EGP three million (USD 192K) and EGP five million (USD 319K)

In 2020, a revised MSMEs law, Law 152 of 2020, was issued; providing several fiscal and non-fiscal incentives for MSMEs, in addition to a simplified taxation scheme. Table 10 demonstrates the classification of MSMEs according to Law 152. It is worth noting that the law also allows the prime minister of Egypt, based on the CBE's recommendation, to either reduce those figures by a maximum of 50 percent or increase them by up to ten percent depending on the business sector (CBE, 2021).

Law 152 encourages the formalization of businesses that apply within one year from the date of entry into effect of the executive regulations of Law 152 (6 April 2022) by suspending criminal action against informal business for crimes arising out of lack of formalization and providing for tax holiday for periods preceding the application to formalize the business, among others. It is worth noting that MSMEs face diverse challenges; some are beyond the digital realm, including,

but not limited to: financing, where their share of bank financing is two to four percent (CBE, 2021) with only eight percent having bank loans; the general regulatory impediments; and finding the right human capital talent and proper managerial capacities (Saleem, 2017).

With the registration of these MSMEs and the formalization of their operations, several of these challenges could be eased through the different support environments. Therefore, the government is undertaking policy reforms to gradually improve the business climate throughout the country by reducing the time to register and start a business, introducing online services for registering a business, improving information sharing across different government organizations, creating incentives to enhance access to finance through various channels, and reducing paid-in capital requirements needed when incorporating a business (World Bank, 2020a). It is worth noting that in 2017, the CBE updated the 2015 policy on MSME lending by requiring 20 percent of bank loan portfolios to comprise MSME loans at an interest rate of five percent, which was a game-changer for formal MSMEs. Under normal conditions, these MSMEs would have faced interest rates of more than 16 percent following the flotation of the Egyptian pound in 2016 (CBE, 2017). Moreover, in 2019, Egypt signed a USD 200 million agreement with the World Bank to support start-ups and MSMEs through better access to credit (Hashish, 2021); an example of several agreements and schemes that were developed to support MSMEs over the last few years.

ICT could be one of the cost-effective methods to help MSMEs acquire a wider market share and compete against larger enterprises in an increasingly globalized and competitive environment (Tan, 2009). As the capacity for digitalization improves, so does the social and economic resilience. The digital infrastructure offers different enterprises access to digital content and services within the digital value chain so that they can deliver a value proposition to different markets. If the infrastructure does not perform in response to social and economic demands or does not reach the different constituents, it could have a negative impact on the entire digital ecosystem (ITU, 2020a).

However, in terms of digital engagement, most MSMEs do not take advantage of the Internet despite the possible economic benefits both locally, regionally, and internationally given its nature as a consumer acquisition and market outreach channel, especially for those whose online presence is bilingual. On this note, it is important to emphasize that to scale up the adoption and, consequently, the impact of digitalization across different MSMEs, investing in the localization of ICT applications and enterprises' online presence is key. In addition, one of the main challenges facing various enterprises is the limited adoption of the service and content layers as compared to the infrastructure and access layers reflected in more spending on infrastructure and access. This indicates that the digital economy in Egypt is still focused on enablement and has not transitioned into a full-fledged consumption-driven ecosystem (Chabenne, 2012). Therefore, Telecom Egypt recently launched the "WE access" service to provide technical solutions to MSMEs in developing their business and supporting them in their digital transformation process, including connecting

their offices, providing data control and security, and providing data analysis services that could help in marketing and business development activities (Alaa El-Din, 2021b).

The pandemic has added to the challenges facing MSMEs given their limited online presence and the fact that only a handful of them had the vision to digitalize their business models. This digital vulnerability impeded business continuity for many MSMEs as most could not adapt to remote working. However, the limited ICT adoption by different enterprises precedes the pandemic. A 2015 study on the impact of ICTs on MSMEs in Egypt covered 105 enterprises from 37 different industries and lines of business, including, but not limited to, agribusiness, food and beverages, healthcare, media, trade, textiles, education, and furniture. It found that there was a clear demonstration of the gradual yet relatively slow transition in MSMEs' culture from being risk averse to pushing for ICT adoption. The deployment of various technologies, although visible, could hardly attest to real transformation in business development or operations. Among the MSMEs covered, 59 percent were operating in Cairo and 67 percent were operating in other governorates across Egypt. Table 11 demonstrates the level of ICT infrastructure of the sample MSMEs surveyed.

Table 11. Level of ICT infrastructure (Kamel and Abouseif, 2015)

Level of ICT Infrastructure	Percentage
Poor or no Infrastructure	1 percent
Basic Infrastructure with no presence online	51 percent
Advanced Infrastructure with minimal presence online	25 percent
Full-Fledged Infrastructure with proper presence online	23 percent

As for the degree of ICT adoption, it was mainly among executives and the senior management levels, as opposed to the staff and the operational level where the adoption level was minimal. In general, the findings of the study demonstrated that the level of ICT adoption was, in general, relatively basic, and many of the applications used, such as cloud computing, were more personalized rather than institutionalized for most of the MSMEs covered by the study.

As for start-ups, following over a decade of government, private sector, and civil society support, the promotion of tech-enabled entrepreneurship and increased funding via various channels led to a significant growth and the establishment of a good foundation for a dynamic start-up ecosystem. Today, Egypt is home to the MENA region's largest start-up ecosystem (MAGNiTT, 2020) and has been ranked among the top ten cities globally for affordable talent (Bosma et al., 2020). It is worth noting that, in 2019, Egypt led the MENA region in VC transactions, accounting for 25 percent of the total transactions, and ranked second for its share of total VC funding at 14 percent. In addition to the focus on financial inclusion, which represents a major component of the growing entrepreneurial space, Cairo is now home to many financial technology (fintech) start-ups that are contributing to reducing the unbanked segment of the society as well as helping Egypt move away from being a primarily cash-based market.

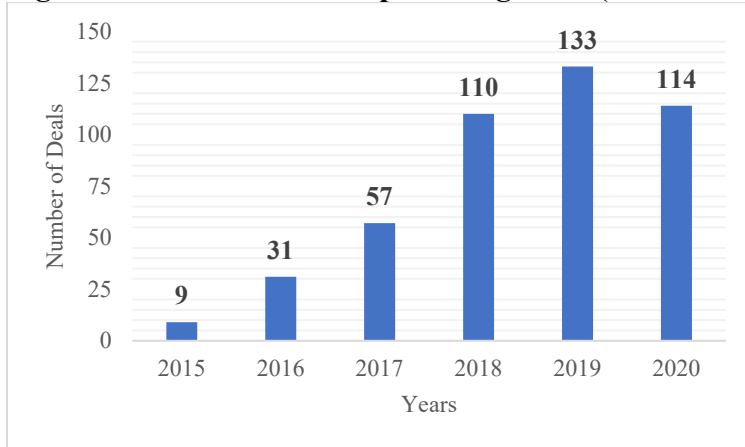
In 2020, investing in start-ups remarkably grew, with e-commerce transactions coming on top with 18 deals; showing an increase of 64 percent year-on-year compared to 2019 and raising a total of USD 19 million. In terms of funding, healthcare registered around a 1,615 percent increase in capital deployed, amounting to USD 57 million (MAGNiTT, 2020). Both indicators demonstrate the potential in both sectors and the opportunities for job creation and economic impact. However, the impact of tech-enabled start-ups overall remains modest with respect to the job market and reducing youth unemployment, and the impact of the start-ups on job creation remains geographically limited due to their presence in urban locations and mainly in Cairo. In Q1/2021, a total of ten start-ups focusing on fintech, shipping services, and e-commerce raised about USD 55.3 million (Alaa El-Din, 2021a). Table 12 demonstrates the industry funding in 2020 compared to 2019 (MAGNiTT, 2020).

Table 12: Egypt’s 2020 start-up funding by industry (MAGNiTT, 2020)

Rank	Industry	Funding	Percentage of Funding	Absolute YoY Change	% Funding Share change
1	Healthcare	\$57 million	30 percent	+1615%	+28%
2	Transportation	\$41.8 million	22 percent	-4%	-8%
3	Home Services	\$19 million	10 percent	+310%	+7%
4	E-Commerce	\$19 million	10 percent	+127%	+4%
5	FinTech	\$15.2 million	8 percent	+16%	-1%
6	Food and Beverages	\$9.5 million	5 percent	+305%	+3%
8	IT Solutions	\$7.6 million	4 percent	+269%	+3%
9	Others	\$20.9 million	11 percent	--	--

Despite the growing and promising entrepreneurial ecosystem, there is still a need to establish more incubators and accelerators in all of Egypt’s universities and higher education institutions to scale up the impact across the country and support the innovative start-ups that focus on priority issues and sectors such as transportation, fintech, healthcare, logistics, education, retailing, and agriculture and, more importantly, to help in the inclusion process especially for the underserved communities and in the remote locations in the Delta, Upper Egypt, and Sinai regions. What is needed is the creation of a nationwide tech-enabled entrepreneurial culture based on a government-enabled, innovation-driven, youth-empowered, and private sector-led digital transformation strategy which can be one of the key platforms to help grow the economy in a more competitive and inclusive way. Figure 5 demonstrates the growth in the number of start-up funding deals from 2015 to 2020.

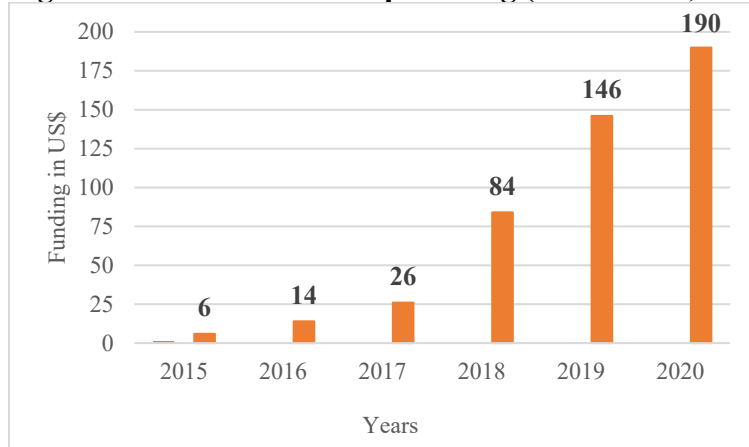
Figure 5. Growth of start-up funding deals (MAGNiTT, 2020)



For MSMEs to become effective engines of inclusive growth, a revamping of their business model is imperative, with digital transformation playing a major role given what innovative technologies can offer. This includes enhancing operational efficiencies, reducing capital expenditures, accessing wide and more global markets at lower costs, speeding up cross border transactions, facilitating business continuity, enhancing resilience, improving productivity (Ganne and Lundquist, 2019), and, consequently, helping create more employment opportunities.

Therefore, MSMEs must adapt and start investing in their digital transformation to remain not just competitive, but also relevant in the digital economy (Lukonga, 2020). Accordingly, broadband Internet is key for different enterprises. The space is overwhelmingly untapped, with the Internet mostly being used for connectivity and entertainment (including social media platforms), and less to innovate and develop business opportunities locally and internationally. Globally, innovative technologies, such as data analytics, IoT, AI, machine language (ML), 3D printing, automation and robotics, cloud computing, and blockchain, will be driven by over 150,700 GB of data flowing per second on the Internet by 2022 and are helping transform how enterprises are constantly connected, the speed and convenience with which goods and services are exchanged, and the way value is being created (Ganne and Lundquist, 2019). The global market size of these innovative technologies is growing fast and is expected to reach around USD 3.2 trillion by 2025 (UNCTAD, 2021). Figure 6 demonstrates the growth of start-up funding in Egypt.

Figure 6: Growth of start-up funding (MAGNiTT, 2020)



The impact of digitalization on employment

There are an estimated 800,000 graduates that enter the labor market every year in Egypt (World Bank, 2020a). In terms of unemployment rate, it declined to eight percent prior to the pandemic, increased to 9.6 percent in Q2/2020, and has recently reached 7.4 percent in Q1/2021 (CAPMAS, 2021). Youth unemployment was significantly high, standing at 31.05 percent in December 2019 (OECD, 2021), and is estimated to be 29.96 percent in 2020 (Statista, 2021), which is partly due to the mismatch between what education and training institutions offer and what the market needs in terms of skillset and capacities. Women's unemployment remains a major concern and an impediment to effective and inclusive economic development. That being said, the space of tech-enabled start-ups, and especially micro and small-sized enterprises, have witnessed a growing number of women taking the lead both in Cairo and in several other governorates, which is a promising and positive sign. The number of these enterprises is not significant enough to realize a real impact, yet it is a step in the right direction and requires further investigation and follow-up.

On the one hand, there is no evidence to date that the consequences caused by digital transformation as a result of COVID-19 has led to a major disruption or significant job losses in Egypt. It is expected that digital transformation will probably lead to creating new jobs and augmenting some of the existing ones, and some of the routine jobs that could be automated will disappear due to lack of relevance and for better efficiency. The World Economic Forum (WEF) outlook indicates that 75 million jobs are expected to be displaced by 2022 in around 20 leading economies around the world. However, 133 million new jobs will be created and mostly driven by large-scale growth in new products and services that will demand new skills where human capital should be able to deal better with machines (Schwab, 2018). It is expected that emerging economies will also be affected, each depending on their readiness and their adaptation to a more tech-driven and enabled environment (UN, 2019). Following the COVID-19 pandemic, these figures are likely to change given the acceleration of digital transformation since Q1/2020. The rewards to the skills that create intangible capital will be important and will create more

opportunities for youth as opposed to the skills that can be substituted by physical capital. In terms of machines replacing humans, it is worth noting that people will always be capable of doing things that technology cannot offer such as creativity, innovation, and emotional intelligence, among other human-only skills.

With more Internet access and ICT adoption, it is expected that employment and productivity levels could be improved (Kolko, 2012). However, this will be industry dependent. For example, in retailing, with the projected growth in e-commerce replacing traditional distribution channels, more jobs will be created in new sales and delivery services. Research indicates that e-commerce can have an adverse effect on the geographic distribution of the new jobs it creates. For example, downtown areas in cities may witness loss of jobs, even though new jobs will be created in warehouses and distribution networks outside the cities they serve.

Despite the opportunities for economic growth and productivity that digital transformation offers, the unprecedented rate of change and innovation is creating high levels of uncertainty (Brynjolfsson and McAfee, 2012). The magnitude varies between positive implications on different economic sectors to negative repercussions on employment, especially given the various openings related to the future of work. In other words, the outcome of the current wave of automation is not clear; it will be shaped by the policies and decisions made by individuals, enterprises and governments (European Commission, 2019). For Egypt, how the labor market takes advantage of the opportunities enabled through digital transformation in an inclusive and sustainable manner is largely a factor of the policies, their timeliness, and their relevance.

Despite improvement in recent years in terms of schooling, content delivered, gender parity, and literacy rates, the quality of productivity remains an issue given the focus on irrelevant skillsets and qualifications that are different from what the market needs. Additionally, the digital divide keeps playing a role in creating a market gap that mirrors and fosters social inequalities. Therefore, one question remains unanswered: Is the labor market in Egypt ready for digitalization? And how can the impact of the digital economy on employment be measured?

The impact of the digital economy on employment is difficult to assess in the context of Egypt, and it is not clear if it is ready for digitalization yet. With the increasing shift in consumer behavior, which was further accelerated by the pandemic, the trend of embracing innovative digital platforms is likely to gain gradual momentum. Digital platforms can help create opportunities to increase businesses efficiency as well as provide opportunities for women, young graduates, and people with disabilities (ILO, 2021). Digital platforms have emerged as a distinctive element of the digital economy. Business owners and freelancers across different sectors would be able to sell goods and offer various services via digital platforms.

Furthermore, employment could be affected by the gig economy and gig workers – given the size of the informal and self-employed segment – whose services are generally performed offline and are not long-term whether they are in full-time or part-time employment, including freelancers such as home repair, care services, and seasonal workers such as farmers. They can benefit from what simple tech apps and mobile connectivity can offer following the example of Uber drivers. These gig workers will be able to source their business online given the growing entrepreneurial space (some of them have already been capitalizing on the reach of mobile applications, including Filkhedma and others), which is also causing some shifts in the established patterns for work (WEF, 2021b) as well as opening global markets through ICT-powered platforms such as cloud computing (UNCTAD, 2021).

However, while many research studies have shown that access to the Internet increases employment and labor productivity, the inability of producers – often due to lack of technical education and knowledge (Jayakar and Park, 2013) – to leverage digital platforms to achieve economic growth will mitigate any potential positive effects on employment unless there are large and advanced production bases. Therefore, Egypt needs to continue to: build the universal ICT infrastructure; develop its human capital, including digital and ICT-related skills; promote innovation; strengthen the development of financial inclusion; and deregulate the digital environment to help minimize the disparities between urban and rural areas that could be further exacerbated due to the acceleration of digital transformation, in addition to striking a balance between digital access and digital equity.

Digital divides and the socioeconomic impact of digitalization

The primary limitation for digital transformation to impact economic growth is the digital divide which has been further exposed by the pandemic. In May 2021, just over half of the world population had mobile or Internet access; around 66.6 percent (5.22 billion people) had a mobile phone and more than 59.5 percent (4.66 billion people) were connected to the Internet (Global Snapshot, 2021). It is important to note that this digital divide is not just between the developed world and emerging economies; it also exists in remote and rural locations and sometimes in urban areas within the same country.

The gaps in reach and quality of digital connectivity and digital literacy would be a determining factor for future development. For example, those in Egypt who are unserved or underserved by broadband, those who cannot afford access to the Internet, or those who are not digitally literate cannot benefit from what digitalization can offer, including distance learning for learners, teleworking for workers, e-commerce for consumers, and telehealth for patients – to name a few of the benefits of digitalization. This divide is caused by various inequalities within the society including, but not limited to: access to technology, education, job opportunities, gender, healthcare, and the public service support environment. Laws can also foster such a divide, such

as in the Data Protection Law that requires a high application fee (USD 1,280) for data subjects to exercise their rights.

Accordingly, digitalization is currently mitigating the pandemic-induced disruptions for only the segment of the population who has adequate access to the digital infrastructure. The digital divide could be narrowed if the proper investment is made to universally build the digital infrastructure. However, the divide in Egypt is also caused by the demand-adoption side (users who could afford buying the broadband service and are not doing so for various reasons, including digital illiteracy, lack of trust, or the lack of available appropriate content) and not necessarily by the supply-availability side (no access to broadband due to lack of service or infrastructure). The constraints on the ability of digital infrastructure to enhance social and economic resilience have to do with both the supply and demand gaps (Katz and Berry 2014). The digital infrastructure is at the core of the digital economy and could represent a critical component of Egypt's economic growth, such as facilitating the flow of goods and services, including digital ones, advancing exports, and enabling the proper delivery of digital public services to the society (Nadim and Ribarsky, 2017).

Digitalization will undoubtedly affect the labor market and, consequently, have social implications, including the number of people whose work will be digitalized, which will vary across businesses and industries. In theory, knowledge workers would adapt better. Accordingly, it is important to determine the number of workers who – due to their profession – cannot work remotely. There are occupations whose workers are likely to continue going to the workplace, including essential workers such as health workers, food processing, and factory operators, while others could work through digital platforms. Therefore, based on the industry and profession, a proportion of the workforce will face unemployment when enterprises digitalize some or all their routine functions. These social implications are even more serious when examining the number of affected workers with low education and/or low income and those associated with the informal sector. The analysis by educational and inclusion levels within the formal sector indicates the disproportionate impact of disruption on the most vulnerable social groups. It is expected that post-COVID-19, there will be no full return to prior working and studying patterns; some hybrid version for enterprises with technological capabilities will prevail where some will continue to work full/part time remotely (Flannery et al., 2020), which confirms that the above scenarios are more likely to happen.

The legal and regulatory framework of digitalization

There is no publicly available vision of the legislative and policy trend in relation to regulating digital matters. An overview of the legislative trend suggests that Egypt is adopting a reactive approach that responds with sometimes considerable delay (for example, the new CBE law, data protection law, or cybercrime law). There is no clear plan that considers the actual time needed to implement reforms (inferred from the delay in issuing key executive regulations of certain laws and the recurring postponement of some aspects of the cashless transformation), users' readiness,

or what streamlines and simplifies the actual processes prior to automation (for example, automation at the notary public and courts).

Digital regulation is no light matter and poses significant regulatory challenges worldwide; it requires speed, agility, and a commitment to stop legislating in silos. The digital risks are unprecedented, such as cyber-attacks, hacking, identity theft, and stolen data. Indeed, Regulation 4.0 is a delicate balancing act where premature regulations can stifle innovation, and a delayed one can have little effect in cases of overly harmful situations (Brennan and Dobra-Kiel, 2019). A simple digital purchasing transaction demonstrates the interconnectedness of different regulatory areas as it involves questions of electronic contract formation, consumer protection, digital payment, cybercrime, product safety, and data protection, to cite a few. Also, the international element in the digital sphere has become increasingly prominent, calling for international cooperation; adherence to international legal instruments; and harmonizing laws to offer a similar level of protection to users and businesses worldwide, and deterring practices of “forum-shopping.”

In Egypt, the government has taken considerable steps, especially in the last four years, to cover many lacunas as will be demonstrated in the relevant sections below. However, to reap the full benefits of this legislative leap and commitment to digital transformation, the government would need to address several overarching issues, including:

1. *Red tape*: Many laws are filled with lengthy processes and multi-layered approvals which can act as a deterrent for new investors. For example, the Telecommunications Regulation Law 10 of 2003 (“Telecom Law”) grants the National Telecommunications Regulatory Authority (NTRA) large powers to approve/reject licenses, with multi-layered approvals to import, manufacture, or assemble telecommunications equipment. The Data Protection Law (DPL) did not opt for modern trends of voluntary certification and has the potential to create excessive requirements for licensing (which remains to be assessed after the issuance of its executive regulations).
2. *Outdated laws*: Some laws that are essential to digital transformation require comprehensive updates. A case in point is the law on intellectual property rights that has not been updated since 2003, leaving significant gaps in matters such as copyright piracy and digital rights management. The numerous gaps in both the intellectual property rights legal regime and enforcement has prompted the International Intellectual Property Alliance to recommend putting Egypt on the watch list in 2020 (IIPA, 2020).
3. *Fragmented legal regime*: Fragmenting the legal regime negatively affects users’ access and has the potential to create a discrepancy in implementation and enforcement. For example, consumers of banking, financial, and capital market services, newspapers, flights, and hotel

bookings are excluded from the protection of the Consumer Protection Law 181 of 2018 in relation to remote contracting and are left to the provisions of their respective laws – which require a savvy consumer to be alert to the different types of laws/protections they are subject to. The same applies to the DPL, which excludes the central bank and media from its scope (among other sectors).

4. *Transparency*: There are over 55 regulatory instruments governing digital transformation-related matters that are not compiled in one place that is easily accessible to businesses or users. This contributes to the digital divide, where those who can afford legal advice are at a distinct advantage with access to more information enabling them to make more informed decisions.
5. *Excessive and vague criminal sanctions*: Law 175 of 2018 on the Combating of Information Technology Crimes (the “Cybercrime Law”) contains severe and yet vaguely defined crimes. The implementation of this law generated significant controversy when it was used to incriminate users of the social media platform “TikTok” for violating family values and principles; raising several questions on the use of vague language for criminal penalties and the interplay between the instrument of the crime and the crime itself (and, hence, that of applicable law(s)). Another example is the sanctions in the Telecom Law that require more clarity and precision. Finally, custodial sentences across the legal regime require revision so as not to act as a deterrent for enterprises and users to effectively engage in digital transformation.
6. *International dimension*: Many laws are yet to strike the balance between protecting local interests and encouraging international transactions. For example, the Consumer Protection Law 181 of 2018 (CPL) has taken the important step of dedicating a chapter to remote contracting, which incorporates, by reference, most of the CPL provisions. This may create problems in practice; small international businesses might be required to provide information on Egyptian standards in Arabic for non-repeat transactions with small values, which would deter them from transacting in Egypt.
7. *Dispute resolution*: Dispute resolution, whether through the court system or within different government institutions, requires a significant overhaul towards simplifying and streamlining the process, allowing remote access, outsourcing alternative dispute resolution to private organizations (rather than creating government centers that can be conflicted with users), and exploring AI solutions for small matters (Ibrahim, 2021).

Potential impact of digital transformation on businesses and industries

The implication of digital transformation means real-time connectivity and the access to vast amounts of information coupled with massive processing powers allowing integration and

synergies across different economic sectors. Following are examples on the impact of digital transformation on financial inclusion, retailing, healthcare, agriculture, and manufacturing. A number of issues remains unanswered such as: Could digital transformation and the Fourth Industrial Revolution change the relationship between growth and unemployment? Could the change in production processes lead to other changes in the structure and composition of different enterprises? What are the implications of these changes taking place for human capital and inequality? How will the financial sector keep adapting to stay competitive and relevant? Finally, how will the future of work look like and what does it mean for the next generations of entrepreneurs, professionals, and workers in terms of skills and capacities needed to benefit from the changes taking place?

1. Financial inclusion

Financial inclusion is a vital building block in the development process. It means that individuals and enterprises have access to useful and affordable financial products and services that meet their needs while having payments, savings, credit, and insurance transactions conducted in a responsible and sustainable way (MENA Financial Inclusion Report, 2020). The United Nations' 2030 SDGs consider financial inclusion to be a fundamental underpinning and a vital enabler of global development, which is reflected in five of its 17 SDGs given its invaluable role in eradicating poverty, ending hunger, achieving food security, promoting sustainable agriculture, profiting health and well-being, achieving gender equality and economic empowerment of women, promoting economic growth and jobs, supporting industry, innovation, and infrastructure, and reducing inequality (IIF, 2018). All these goals require improved and universal access to a comprehensive financial services portfolio, especially that over two billion people (24 percent) of the world population have limited or no access to basic financial services such as payments, insurance, funds transfers, and personal finance (World Bank, 2017).

Fintech – A catalyst to achieve financial inclusion

Fintech can have a far-reaching impact on financial inclusion for individuals and enterprises alike, and it can help narrow the digital divide. Fintech continues to disrupt the global financial services space; causing significant digital transformation in the banking, insurance, and financial services ecosystem. According to various recent reports, fintech and other innovative and digital financial solutions could benefit billions of people worldwide by driving inclusive growth that can add around USD 3.7 trillion to the GDP of emerging economies within the next decade (Manyika et al., 2016b). Fintech is playing a significant role in changing consumer behavior and perception towards engaging with different financial transactions and services. Recently, statistics showed a growing trend resulting in more than 80 percent of traditional banks' consumers worldwide who are increasingly adopting and trusting what fintech has to offer. Accordingly, in the years to come, one should expect that the competition between traditional banks, financial institutions, and fintech start-ups and operators to evolve and become fiercer, which will be reflected in the acceleration of

innovative solutions, all contributing to offering better and more diversified services to global markets.

Fintech can also help transition individuals and enterprises from the informal into the mainstream economy. Incorporating the informal sector could be a game-changer not only for tax collection purposes, but also to reduce competition from unregulated and untaxed businesses. This will result in a level playing field and consequently increase Egypt's attractiveness as an investment destination, in addition to helping such enterprises access government services and solicit financial support. The financial inclusion of MSMEs and informal enterprises through fintech solutions can effectively improve their capacity to compete, grow, and prosper. However, the bulk of such potential in Egypt remains untapped to date, and while taxes (including the possibility of back taxes) are often mentioned as an impediment for the formalization process, it is the bureaucracy associated with tax collection that represents a major obstacle.

Egypt fintech profile

According to the World Bank, Egypt is primarily a cash-based society with a financial inclusion rate of 42 percent in 2020 (World Bank, 2020b). The ranking is based on four primary elements for financial inclusion for adults: access to banking services and financial accounts (42 percent), access to credit cards (4.5 percent), access to debit cards (26 percent), and access to digital wallets (21 percent). In 2019, the number of Automated Teller Machines (ATMs) per 100,000 adults (age 16+) was 22.2 compared to 2.65 in 2004 (The Global Economy, 2021). The non-banked segment is estimated to be around 67.2 percent of the 103 million Egyptians (Worldometer, 2021) with a literacy rate of 71.2 percent and 42.8 percent living in urban areas (Statista, 2021). Accordingly, no more than 32.8 percent of the adult population (aged 16+) have a bank account, up from 9.7 percent a decade or so ago, which was primarily spurred by regulations and policies encouraging the use of electronic wallets and the increasing adoption of cashless payment solutions by different public and private enterprises as well as the government.

This sounds like an improvement, however, the banking sector penetration rate remains significantly low. The statistics could relatively improve if the Egypt Post and the Agriculture Bank of Egypt are included given the financial services they offer to the community – especially in rural areas due to the spread of their branches across the country. The percentage of those using online banking also remains significantly low, which is partially due to the lack of awareness and trust in technology adoption, especially in rural areas and among less-educated segments of the population requiring regular awareness and training. Table 13 demonstrates the financial inclusion status in Egypt (World Bank, 2020a).

Table 13. Financial inclusion in Egypt (World Bank, 2020a)

Item	Percentage
Adults (15+ years old) owning an account with a financial institution	32.8
People owning a credit card	3.3
Women owning a credit card	2.6
Women making online transactions	3.1
People having a mobile account	1.8
People making online purchases and/or paying bills online	3.5
Men owning a credit card	4.1
Men making online transactions	3.9

Realizing the value of financial inclusion for socioeconomic development and growth, the government and the private sector have collectively introduced several initiatives and projects that support the digital transformation of financial services by increasing access to the required technological infrastructure, encouraging the development and use of innovative digital financial solutions, and increasing awareness of the benefits of fintech among other digital platforms. In Egypt, financial inclusion can effectively contribute to inclusive development for individuals, households, and enterprises given the large segment of the society that does not have access to basic banking and financial services. As such, Egypt has identified financial inclusion as a priority in its sustainable development strategy, with the CBE introducing measures to facilitate electronic payment, thereby encouraging point-of-sale (PoS) payments and the use of ATMs (World Bank, 2020c).

There were several efforts put in place as early as 2012, including a national initiative led by the Egyptian Banking Institute (EBI) called “Shaping the Future.” The initiative focused on financial literacy through awareness and education, in addition to offering innovative financial products and services to MSMEs. Besides, a government-wide effort towards cashless transition started with the establishment of the National Council for Payments in 2017 and the Cashless Payment Law 18 of 2019 that requires most government payments and collections to be made digitally. In 2018, the CBE launched the “Strengthening Financial Coverage Censorship and Supervision of Banks in Egypt” project in collaboration with the European Union with a mandate to strengthen the CBE’s regulatory framework on banking as well as support Egypt’s financial inclusion efforts (MENA Financial Inclusion Report, 2020). The CBE has also established a central unit for financial inclusion and required banks to do the same with a view to reach out to remote areas, youth, and women. It also issued instructions for banks on rules governing the classification of financial

inclusion products and services and the due diligence requirements for financial inclusion customers as well as guidelines for protecting their rights. Nevertheless, the legal coverage of financial inclusion products is still volatile, with measures changing in the direction of requiring fewer approvals (but not yet for accounts relying on technology or accounts launched for the first time), providing more flexibility in know your customer (KYC) procedures such as using social media for verification and encouraging the informal sector by allowing certain documents to stand in lieu of permits or commercial registry. Despite those efforts, financial inclusion remains largely untapped, as noted by the CBE in its March 2021 circular requiring banks to raise financial inclusion at the top of their agenda, to stop requiring excessive documentation, and to reduce the impediments that push people away from using their services.

It is worth noting that fintech started growing in Egypt over a decade ago, providing solutions including electronic payments for peer-to-peer transfers and bills, payroll, pension and social security payments, merchant and online purchases, and smart wallets. One of the early adopters, Fawry, was launched in 2008. Just over a decade later, in 2020, as an endorsement of the value and importance of financial inclusion, Fawry became the first tech start-up in Egypt to reach a valuation of USD one billion and was announced as the first unicorn in the country. Around six months later, the market cap hit USD two billion, making it the fourth most valuable company listed on the Egyptian Exchange (EGX) (Paracha, 2021). Such a development only confirms the potential in Egypt's growing electronic payment market. Fawry was a pioneer in the field and remains the leading digital transformation and electronic payment platform in Egypt. It offers a variety of financial services and e-commerce solutions to individuals and enterprises through over three million daily transactions serving 29.3 million consumers and businesses who enjoy around 1,198 services delivered from around 225,000 locations and service points nationwide, in addition to a variety of channels such as ATMs, mobile wallets, retail shops, post offices, and vendor kiosks, with a total collection value of USD 5.1 billion in 2020 (Kamel, 2020). Some of the other key players in the market that are growing fast and gradually capturing a bigger market share and contributing to financial inclusion are Aman, established in 2016, and Paymob, established in 2015. It is worth noting that fintech start-ups represent one of the fastest growing segments among tech-enabled enterprises with over 40+ new start-ups launched since the beginning of 2021.

In 2016, the CBE started licensing mobile wallets, the first being Vodafone Egypt, followed by other mobile operators. In March 2021, Egypt became home to 14.5+ million mobile wallets and banks had issued more than 3.3 million credit cards, 17.3 million debit cards, and 16.2 million prepaid cards with around 13,300 ATMs nationwide (Mounir, 2020b). Through a partnership between the public and private sectors, the CBE introduced the national electronic payment prepaid debit card "Meeza"; reaching over 500,000 cards since its establishment in December 2018, which should help facilitate higher banking penetration as Egyptians become more comfortable with the ease and security of cashless transactions. Meeza cards are accepted in over 12,000 ATMs and 76,000 PoSs in government offices, public organizations, and universities

across Egypt. Meeza is used for any government service payments and allows cardholders to receive their salaries and pensions, withdraw funds from ATMs, conduct local purchases, and make electronic payments and online purchases in Egypt (Oxford Business Group, 2020).

Besides, the CBE is working on digitalizing the Village Savings and Loans Association (VSAL) whose beneficiaries include 18,000 members (92 percent women). To date, through the VSAL, 6,138 loans were given to members, of which 71 percent were used for income-generating projects and activities. Digitalizing the process would promote a cashless society in villages and ensure that the VSAL model is more efficient and secured to support the nationwide effort to advance inclusivity. The pandemic has helped accelerate the use of online transactions acting as a catalyst in this regard. According to the NTRA, the monthly electronic transactions increased by approximately 156 percent between March and October 2020. The volume of electronic transactions between mobile wallets increased by 224 percent to 3.8 million with an average transaction of EGP 987 (USD 63). These digital payment trends are likely to remain beyond the pandemic, bolstered by the implementation of policies requiring government fees, taxes, and utilities to be paid electronically.

On this note, during the period March-October 2020, the number of online transactions, including utility bill payments and online shopping, increased by 155 percent, reaching 370,000 transactions with an average value of EGP 188 (USD 12) per transaction. All these developments are supported and encouraged by the large percentage of the population who are young, tech-savvy, and skilled. Today, the utilization of fintech in the financial sector contributes to 1.6 percent of the GDP (Anwar and Salama, 2020).

Fintech opportunities for Egypt

There are significant opportunities to expand cooperation between fintech firms and banks to improve customer experience and increase banking and financial services uptake; micro- and nano-financing initiatives will likely pay greater dividends in Egypt's case. Providing small loans to farmers, street vendors, and the self-employed, for example, will help support small business growth as well as generate a meaningful multiplier effect for the broader economy. This, in turn, can encourage greater participation in the country's formal economy. Early signs have demonstrated that a small yet growing number of MSMEs have recently been formalizing their status to make use and benefit from the services offered by the government, which is a step in the right direction.

According to the Institute of International Finance (2018), the business opportunity presented by the unbanked segment of the market in Egypt is comparable to the traditional banked consumer segment, which is around EGP 1,411 billion (USD 90 billion). Consequently, banks need to deploy digital transformation and use advanced data analytics tools to tap this massive opportunity. Adopting data-focused strategies – including developing a culture of innovation, attracting

technical talent, modernizing IT systems, collaborating with fintech firms and other parties, and engaging with regulators – can help banks reach the unbanked segment more quickly and efficiently, and, in doing so, support financial inclusion, poverty alleviation, and economic growth. Accordingly, banks and financial institutions should continue to move away from legacy systems and harness the full potential of data to expand financial services to new consumer segments, further embrace innovation, and integrate data-driven technologies into their organizational culture in order to remain competitive, agile, and relevant. The opportunities that could be created go way beyond integrating the informal sector and the unbanked segment of the society into developing more business prospects locally and internationally.

Besides, with the growing mobile and Internet penetration rates, including smartphones, there are ample opportunities to increase the dissemination and adoption of digital financial services, thus enabling the gradual integration of the unbanked segment. It is imperative that the different stakeholders in the ecosystem work together to achieve financial inclusion by promoting the notion of a cashless society and disseminating the use of electronic payments. First, however, they need to make sure that universally affordable access, reliable connectivity, and proper human capital readiness – in terms of understanding of the potentials coupled with the digital and other skillsets required – are all at the core of such an invaluable effort.

Legal and regulatory framework

The regulatory authority for fintech is divided between the CBE and the Financial Regulatory Authority (FRA). There is not much regulation available on the topic with FRA's law being a draft and the new CBE law laying the foundation upon which it would regulate fintech. In it, the CBE is empowered to exempt enterprises from complying with certain regulatory requirements in the regulatory sandbox; an important improvement that can allow for more innovation. The CBE's prior approval is required for digital financing providers whose services are associated with electronic payment or electronic collection. The CBE licensing is mandatory for the issuance, trading, marketing, and establishment of platforms for the circulation or implementation of activities related to crypto-currency and electronic money. Further regulations are expected in relation to the criteria, requirements, and scope of electronic applications that allow access to clients' accounts; electronic provision of services; electronic ratification of banking transactions, payment, and transfer orders; and electronic settlement of cheques, issuance and circulation of electronic checks, delegation, and direct deduction order for electronic copies.

Cybersecurity is paramount to the banking industry as one of the main data breach targets, the collapse of which can have devastating effects on the entire economy. It is also an important component to encourage users to engage in fintech products. Law 175 of 2018 on the Combating of Information Technology Crimes (the "Cybercrime Law") protects the conduct of online activities with 23 punishable crimes covering: violations against networks and ICT safety; crimes committed by means of ICTs which cover scam and breaching privacy of banking cards, services

and electronic payment methods; invasion of privacy and illegal content; web administrators; and criminal liability of service providers and legal persons. The cybercrime law and its executive regulations establish new obligations such as requiring service providers to save and store certain data for 180 days; maintain data secrecy; and take several measures to secure it. Additional obligations apply to service providers managing, owning, or operating critical information infrastructure (which covers networks that can impact the state's provision of services or its main facilities or cause significant economic or social losses and includes financial entities and banks). The law has extra-territorial scope and applies to perpetrators outside Egypt so long as the crime is also punishable in the country in which those crimes were committed. The law has been criticized for having vague and harsh sanctions, with no sufficient coverage for the intricacies of a cyberworld.

Another integral piece to build trust in digital transformation is data protection, which was finally enshrined by the long-awaited Data Protection Law which was issued on 13 July 2020 and came into effect on 14 October 2020. The executive regulations are expected to be released soon, the issuance of which triggers a one-year transitional period for compliance. Unlike the General Data Protection Regulation (GDPR) on which the law is based, the Data Protection Law leaves several significant issues to the regulations; making it premature to properly assess the full extent of the data protection regime in Egypt. Nevertheless, the law laid the foundations of a new regime by establishing the principle of protection of personal digital data (with some exclusions), defining personal and sensitive personal data, establishing new business functions (data controller and processor) and obligations (in relation to processing and controlling data and licensing etc.), regulating cross-border data transfer, and creating the Personal Data Protection Center (PDPC) with extensive mandates covering both policy and regulation.

A missing piece, however, is data protection under the CBE law, since personal data in the possession of the CBE and entities falling under its supervision (except money transfer and exchange companies) were excluded from the Data Protection Law's scope. The CBE law does not have sufficient data protection measures; it protects data secrecy in general terms and does not deal with the various intricacies related to how to protect processed data, nor does it establish functions required to ensure data protection. In addition to not creating a safe environment for data protection, this execution creates discrimination in the financial sector at large since companies falling under FRA would follow the Data Protection Law provisions and would have to incur the extra obligations and financial burdens under the latter law, with entities falling under the CBE having fewer compliance obligations.

Table 14 demonstrates the different institutions with active mandates in fostering and protecting financial inclusion (it does not cover institutions moving towards automating their systems and services such as the Ministry of Justice, the Ministry of Local Development, or the General Authority for Investments).

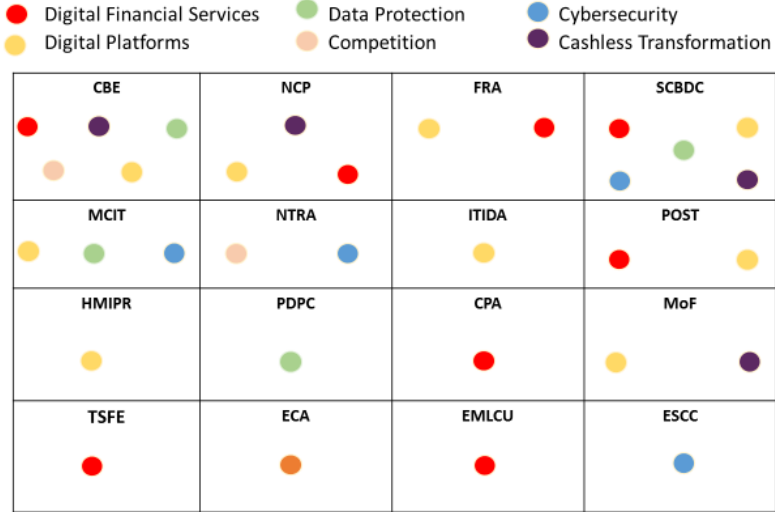
Table 14. Financial inclusion ecosystem in Egypt

Entity	Scope
1. Central Bank of Egypt (CBE)	Encourages financial inclusion; fosters use of and regulates fintech; authorizes digital financial service provision; sets frameworks to reduce use of cash; regulates and licenses Payment Service Operators (PSOs) and Payment Service Providers (PSPs); regulates digital banking, cryptocurrency, electronic money, contactless payments, technical payment aggregators, payment facilitators and mobile payment; and ensures and enforces fair competition for entities falling under its jurisdiction.
2. National Council for Payments (NCP)	Mandated to reduce the use of cash; supports the use of electronic payment and electronic platforms; develops national payment systems and needed supervisory framework; sets legal framework for payment systems and operations; and coordinates, follows-up and ensures complementarity of and lack of redundancy between different government initiatives. It is unclear if NCP's mandate will change considering the CBE Law.
3. Financial Regulatory Authority (FRA)	Regulates microfinance electronic payment systems (including pre-paid cards); electronic issuance, collection, and payment of insurance policies premiums and consumer finance.
4. Ministry of Finance (MoF)	Regulates electronic collection/payment of government dues and electronic tax filing.
5. Ministry of Communications and Information Technology (MCIT)	Assists government bodies to digitalize their services and supervises NTRA, ITIDA, Egypt Post, ESCC, and PDPC.
6. National Telecom Regulatory Authority (NTRA)	Guarantees the provision of telecommunication services; regulates telecommunication service providers; regulates granting of equipment; sets digital communication policy; and ensures and enforces fair competition for entities falling under its jurisdiction.
7. Information Technology Industry Development Agency (ITIDA)	Regulates and grants electronic signature licenses as well as any other activities that are relevant to electronic transactions, and acts as depository of original software and databases for intellectual property rights protection.
8. Egypt Post (Post)	Provides digital governmental services including electronic payment, and facilitates e-commerce.
9. Egyptian Supreme Cybersecurity Council (ESCC)	Develops cybersecurity national strategy and industry development plans; monitors critical communication and information structure across different sectors; and sets cybersecurity quality standards.
10. Higher Committee for Intellectual Property Rights of Information and Communications Technology (HMIPR)	Participates in developing strategies to enforce intellectual property rights in the ICT field, sets licensing standards for entities specialized in computer software and databases, and proposes policies to digitalize information including digital libraries and cultural content.
11. Personal Data Protection Center (PDPC)	Sets data protection policies and regulations and issues license, permits, and certifications in relation to data protection measures (to be established).

12 Egyptian Competition Authority (ECA)	Ensures and enforces fair competition in digital markets.
13 Consumer Protection Agency (CPA)	Regulates consumer protection issues in relation to remote contracting.
14 Egyptian Money Laundering Combating Unit (EMLCU)	Sets frameworks for regulating electronic financial activities to combat money laundering and terrorism.
15 Supreme Council for Building a Digital Community (SCBDC)	Sets policies and strategies for digital transformation; builds digital industry; sets technical and operational requirements for cybersecurity, digital financial services and digital platforms.
16 Egypt Sub-fund for Financial Services and Digital Transformation (TSFE)	Invests in non-banking financial services; digital transformation; financial inclusion; and fintech.

With the government’s growing commitment to regulate financial services, some of the institutional mandate between the aforementioned organizations overlap as shown in Figure 7. As mentioned previously, this requires a wider effort to remove overlaps or create and strengthen the existing collaboration mechanisms.

Figure 7. Mapping the financial digital services in the ecosystem



Policy recommendations

Egypt is well-positioned to benefit from the NextGen innovation-driven financial inclusion ecosystem, assuming the enabling and supportive policy and the legal and regulatory environment is opened to adapt, leverage data, and apply innovative approaches to cater to improving the consumer journey being redefined by the ongoing progressive digital transformation and the creative and agile platforms offered by emerging fintech solutions, making it more efficient, fast, and effective to adopt. It is important to ensure that upcoming fintech regulations would encourage, promote, and support disruptive innovative technologies that can help enhance financial inclusion

and, consequently, economic development and growth while ensuring that fintech can fend off the continuous push by traditional banks to prevent them from entering the marketplace given their significant potential role in supporting financial inclusion with implications on individuals, organizations, and society.

Other challenges include the interoperability issues among different systems, cybersecurity, the degree of vulnerability, and the arrays of risks that come along with-it including breach of privacy and data protection which could have serious implications on the trust and confidence elements coupled with many entrepreneurs' and professionals' minimal understanding of the advantages associated with digital financial services. Any such policy would be more effective if it targets the individuals, households, and enterprises that did not initially have access to finance, including the poorer segment of the population and those living in underserved areas and rural communities, as well as further integrating women and youth. Besides, more attention needs to address several issues, including access versus adoption of ICT, the literacy and knowledge gap, cultural beliefs, legacies, trust, and transparency issues that will not be solved through legal regulations but rather require more comprehensive and nationwide awareness campaigns among the society.

2. The future of retailing

E-commerce: new business prospects for MSMEs

E-commerce can help alleviate poverty, create business opportunities and introduce new business prospects locally and globally by integrating gig workers through online platforms and offering unprecedented tools to various enterprises and especially MSMEs, such as data analytics, new communication channels, and connection with suppliers and consumers irrespective of location and beyond traditional business solutions to be able to overcome the barriers to growth. It offers ample opportunities for Egypt to increase trade in tangible and intangible goods, promote investment, facilitate business transactions, provide a larger and more diverse local market – all leading to more inclusive economic growth and competitiveness.

Digital platforms offer MSMEs the opportunity to reduce transaction costs, increase efficiency, and improve performance (Mahroum, Unpublished). As a result, e-commerce has the potential to generate economic surplus through sharing information, leveraging the value chain for different enterprises (Porter, 2001), and improving productivity given the valuable role of advanced and innovative new technologies in knowledge sharing about markets dynamics and consumer changing behavior and preferences (Grossman and Elhanan, 1991). Digital platforms can help MSMEs avoid investing in fixed assets using the ample services offered online, engage in real-time value chains, conduct transactions using electronic payments, manage promotional and marketing campaigns on various social media platforms, source skills and talent remotely, and tap into alternative financial resources (Mahroum, Unpublished).

E-commerce platforms provide MSMEs with an unprecedented opportunity to find and directly connect with new suppliers and consumers locally, regionally, and globally irrespective of the enterprise size, resource constraints, time, or distance barriers (Manyika et al., 2016a), and by that it creates innovative and new channels for value creation and capture.

Egypt's e-commerce profile

The digital uptake amongst MSMEs in Egypt remains insignificant; one of the early comers to the scene was Otlob.com. Established in 1998, it was one of the pioneers in the space and provided online destinations for ordering food. According to FitchSolutions (2019), there are over 450 e-commerce websites serving around 30 million customers in Egypt, which is the largest number in MENA.

Like most MSMEs around the world, many in Egypt's retail industry are challenged by scarce resources and do not possess the abilities to leverage e-commerce sales channels (Quinn, 2009). Hence, they are lagging when compared to larger enterprises in the adoption of innovative technologies required for e-commerce (Abebe, 2014). This has also been confirmed by the study conducted on MSMEs and their online presence and engagement in business transactions (Kamel and Abouseif, 2015). From a consumer perspective, social factors still limit the uptake of e-commerce, such as: consumers' preference to use cash on delivery; preference for face-to-face interaction and bargaining; and lack of trust in online channels. This is coupled with the level of poverty; illiteracy rate; limited digital capacities; low purchasing power; and infrastructure limitations, especially in rural areas (Khan, and Uwemi, 2017). Also, the logistics of distribution to ensure faster, efficient, and cheaper delivery remain a key impediment. All these elements should be closely addressed and carefully acted upon.

Although the direction to support e-commerce in Egypt started in 1990 with the gradual liberalization of the telecommunications sector, only recently did the ICT-enabling environment become more conducive to e-commerce growth; with the acceleration in the investments in the ICT infrastructure and the actions taken by the CBE and the FRA to enable electronic payments through different channels. However, Egypt is still poorly integrated in GVCs and one of the lowest among its peers, which is due to the limitations of its trade support services with key enabling sectors such as transportation, logistics, finance, telecommunications, and energy. These sectors are critical to support the growth of multiple export-oriented sectors such as manufacturing, agribusiness, and services. This is coupled with the composition of its exports portfolio which is made of primary commodities and less sophisticated products, whereas GVC growth is concentrated in machinery and electronics.

For example, the lack of fast and reliable transportation and logistics hinders the integration into GVCs of firms in industries such as apparel and electronics. Similarly, a lack of cold chain services hampers Egypt's ability to integrate into agribusiness GVCs successfully, and the lack of roll-on,

roll-off (Ro-Ro) service limits exports of agribusiness and automotive products to European and Mediterranean countries. Making Ro-Ro services effective would require making considerable improvements in customs, taxation, border management, and logistics capacity and performance. Egypt's weak participation in both regional and global value chains mean that the country is missing opportunities to boost its exports and generate more jobs. Between 2009 and 2018, more than half of Egypt's goods' exports consisted of primary and resource-based products, and about a quarter consisted of medium- and high-technology exports (IDC, 2019).

In 2014, around 15,000 enterprises had an online presence that is quite limited compared to the 3.6 million MSMEs operating in Egypt (CAPMAS, 2018), out of which around 1.7 million MSMEs (68 percent) are formal and employ 5.8 million Egyptians (Oxford Business Group, 2021). Many of the established MSMEs in the retailing business chose not to go online (El-Said et al., 2014) and the cultural factors have led to limited growth with a market largely dominated by few enterprises with real and effective online presence. According to a sample survey conducted by the World Bank, 52 percent of enterprises had a website, offering significant potential in terms of marketing outreach and customer base. The enterprises were divided into 92 percent large, 73 percent medium, and 38 percent small. However, many of these websites needed to be more informative and updated to become more effective (World Bank, 2020c). MSMEs need to digitalize their operations and their online presence to be able to meet the fast and continuously changing consumer expectations to remain relevant and competitive (Lukonga, 2020).

Impact of COVID-19 on e-commerce in Egypt

Online shopping was slowly gaining momentum in Egypt pre-COVID-19. The annual growth rate of e-commerce, according to several reports, has been rising by more than 30 percent since 2019 yet the volume of transactions remains modest compared to the size of the population. The retail sector growth was 3.8 percent and 3.9 percent in FY2018/2019 and FY2019/2020, respectively (Oxford Business Group, 2021). In 2019, the wholesale and retail trade sector amounted to 13.7 percent of GDP, with Egypt scoring 39 in the B2C index (UNCTAD, 2019).⁸ Before COVID-19 hit, around eight percent of Internet users in Egypt shopped online. However, starting Q1/2020, COVID-19 forced more enterprises to move online and more consumers to shop online instead of visiting brick-and-mortar stores. As of January 2021, several surveys indicated that the volume of e-commerce conducted during 2020 reached USD 3.27 billion (an average of USD 79 per purchase) with an increase of 63.5 percent compared to 2019 with over 41.36 million people (many repeat consumers) shopping or conducting through business-to-consumer (B2C) transactions; reflecting soaring pandemic-driven growth (Statista, 2021). According to another study related to the pandemic impact conducted by MasterCard, 72 percent of the sample consumers surveyed indicated that they increased their online shopping volume since the pandemic, 57 percent

⁸ The index is based on four indicators linked to e-commerce including (a) account ownership at a financial institution or with a mobile-money-service provider, (b) individual using the Internet, (c) Postal Reliability Index, and (d) secure Internet servers.

indicated that they started to bank online, and 54 percent were spending more money on their virtual experience (Oxford Business Group 2021).

Also, according to another survey conducted using a sample of 300 online tech-savvy consumers from across Egypt in March 2020, consumer purchasing habits have changed since the pandemic hit. Many augmented the volume of their purchases online to an average of USD 89 per purchase basket value, with the top products being groceries and personal and home care, with increased traffic in online retailing through platforms such as Souq (an Amazon company) by 83 percent, Jumia by 37 percent, and Noon by 13 percent (AWE Living Research, 2020). In regards to in-home entertainment, paid and free online streaming increased by 84 percent in TV watching, 83 percent in free online streaming websites, and 32 percent in paid online streaming websites (AWE Living Research, 2020). As a result of the pandemic, many enterprises – especially MSMEs – were pushed to operate from home or remotely, which required gaining new digital skills, exploring more efficient business models, and looking for further opportunities, enabled through digital transformation. These include penetrating new markets, outreaching for new business prospects, and being able to compete at a lower cost as they navigate these challenging times and plan for a world post-COVID-19.

Today, Egypt's penetration in terms of e-commerce reflects 2.5 percent of the total retail sales (Oxford Business Group, 2021). The fastest-growing categories in Egypt during the period 2017-2020 were electronics, personal care and beauty products, fashion, and groceries. While the shift to e-commerce was on its way before the pandemic, the health and safety issues resulted in a remarkable acceleration of such a trend, pushing many of the retailers to establish online ordering systems, including mobile apps, to facilitate orders.

Digital platforms impact social and economic cohesion and inclusion within the society. Therefore, the digital contribution to GDP in Egypt is still below par when compared to other countries in the world, including some countries in MENA (Comminos, 2020). In 2020, the digital contribution to Egypt's economy stood at 4.4 percent (Mahroum, Unpublished). As more economic surplus – in the form of consumer, producer, or retailer – is created through digital platforms, the average Egyptian is increasingly at the risk of being left out of such surplus. The current disparity in ICT and Internet access and adoption in Egypt could be further exacerbated if it is not carefully and timely addressed. Therefore, despite all these advantages, the impact of e-commerce on society could be negative and widen the digital divide unless the proper investments in infrastructure, including 5G broadband networks, digital skills, and electronic government services, take place coupled with massive scale investments by MSMEs on digital platforms to benefit from the prospects of the marketplace.

Opportunities and challenges for e-commerce expansion in Egypt

With Egypt's demographics and the increasingly technologically- and social media-savvy young population, the country has a large potential of prospective online shoppers; most of it remains untapped. Besides, while the consumer base is steadily growing, the digitalization of the production base is not going at the same pace. According to a study by Bain and Company in 2019, around 56 percent in Egypt begin their online shopping with search engines rather than retailers' portals and websites; 50 percent use their smartphones to shop online; and 43 percent complete their online transactions with an average of two to four purchases per year, which is very little compared to around 19 purchases in the United States (Fabre et al., 2019).

With the increasing Internet and smartphone penetration rates coupled with the improvement and proliferation of online payment systems and the development of better distribution logistics, it is expected that the volume of e-commerce will move to the next level (Neaime, and Gaysset, 2018). According to another study conducted by Egypt's Institute of National Planning, e-commerce will grow by at least 50 percent because of the pandemic and some of the online shopping habits will remain post COVID-19. These developments have encouraged many entrepreneurs to establish start-ups and online mobile applications to cater to the growing market needs. Nevertheless, the growth remains below par when compared to the market size, with the volume of B2C and business-to-business (B2B) transactions representing around 0.57 percent of the GDP. This is primarily due to the inequitable access to credit cards and electronic payment as well as financial institutions' penetration, which is hindering the development of e-commerce. Therefore, moving forward, the inclusion of a greater share of the population in electronic financial services is becoming invaluable.

For Egypt to benefit from e-commerce, there is a need to focus on the comparative advantage it has across its different economic sectors. Accordingly, tourism represents a mega opportunity for the economy to benefit from digital platforms and is positioned to be a genuine global destination for the industry. Besides, leveraging the power and reach of the digital economy for trade and commerce can offer ample trade opportunities for Egypt both locally and regionally, especially in the context of the African continent's population of 1.3 billion. Digitalization would increase connectivity with various global markets with evidence indicating that Internet augments trade in physical goods and digital services.

However, it is expected that in a post-COVID-19 world, online shopping will parallel and complement the traditional retailing habits rather than replace them. Therefore, retail outlets have begun investing in and enhancing their physical spaces with entertainment as well as food and beverage services to provide a better and more enriched in-person experience. Following the trends in 2020, and based on a survey conducted by checkout.com, 47 percent of consumers in Egypt expect to shop online more frequently, with 44 percent expecting to shop online at least once a month and 54 percent indicating that digital payments are their preferred payment method

(MENAP Report, 2021). It is expected that the boom in e-commerce will continue to grow based on the changing consumer behavior; the evolution of credit card and digital payment benefits, including cashback on online purchases; and merchant discounts offering a variety of opportunities for individuals and enterprises. Table 15 demonstrates the mapping of e-commerce in Egypt.

Table 15. Mapping of e-commerce in Egypt

	Current Status	Potential Impact
Consumers	<ul style="list-style-type: none"> • Low level of e-commerce transactions. • Lack of universal access to high-speed Internet, especially among rural areas and underprivileged communities. 	<ul style="list-style-type: none"> • Access to a larger pool of products and services. • Greater transparency. • Better flexibility. • More options.
Retailers	<ul style="list-style-type: none"> • A limited number of MSMEs have a presence online. • Limited opportunities for MSMEs given the lack of appropriate ICT infrastructure. • Lack of qualified human capital capacities hired by MSMEs as well as larger enterprises. 	<ul style="list-style-type: none"> • Wider consumer base, locally, regionally, and internationally. • Ability to better understand consumer preferences, needs, and behaviors through data analytics. • Direct outreach to markets through different digital channels including social media. • Improved efficiency. • More business opportunities.
Producers	<ul style="list-style-type: none"> • Limited ICT infrastructure and Internet connectivity. • Scarce resources to invest in digital transformation. • Limited human capital capacities hired. • Lack of awareness and understanding of the prospects of digital transformation. 	<ul style="list-style-type: none"> • More efficient local, regional, and global value chains. • Direct communication and exposure to consumers and markets locally, regionally, and internationally. • Greater visibility and positioning. • More level playing field. • Global marketplace.

Enterprises in Egypt can leverage digital platforms to increase their competitiveness along the GVCs; they can take advantage of the growth opportunities provided by digitalization to increase their share of global markets and sustain their domestic market position.

As indicated earlier, the pandemic has caused the shift to digitalization to accelerate and therefore more enterprises are now taking payments online and adapting their services to be more digitally friendly. However, the challenge remains that most enterprises have not moved online, which has pushed the CBE – in collaboration with Amazon Payment Services and other partners – to launch an initiative to move more MSMEs online and help them secure online revenues, offer services that are more attuned to consumer preferences, and, ultimately, contribute to a more robust job market and digital economy. The initiative involves the cancelling of all administrative and account fees that MSMEs bear in order to activate electronic collection services via e-commerce (Abdallah, 2021). The objective of the initiative, which was initially planned to expire in June 2021, is to increase the number of enterprises activating electronic collection services online,

whether through websites or mobile applications. The initiative is integral to a diversified portfolio of programs and initiatives launched by the CBE to spread awareness about the benefits of e-commerce, increase online sales for different enterprises, and offer a variety of payment platforms for consumers to help advance e-commerce and help enterprises secure their business transactions regardless of possible disruptions in the retail business; all to help take solid steps towards a digital economy.

Legal and regulatory framework

Except for a draft electronic transactions law, which is aimed to cover the gap in regulating e-commerce, there are non-codified scattered laws regulating the matter with little regard to the international aspect of e-commerce. The main pertinent laws and regulations include:

- *Electronic payments:* The FRA has regulated electronic funding and collection transactions for microfinance associations and enterprises, enabled micro-finance prepaid cards, and authorized the electronic issuance and payment of insurance policies premiums and collection of compulsory insurance's premiums by electronic payment companies. Prior to the issuance of the new CBE law, the CBE had issued several regulations on mobile payment services, contactless payments, and technical payment aggregator and payment facilitators. With the CBE law, the foundation has been laid for digital banks (which should operate under the same licensing requirements as traditional banks with the possibility of being exempted from the minimum capital requirement) as well as PSOs and PSPs; the latter two must obtain CBE license to deliver services in Egypt, regardless of their location. They are under extensive compliance and notification requirements and are duty-bound to observe several of the rules governing banks. The CBE has broad powers to establish and operate payment systems without being limited by the provisions on PSOs and PSPs, which can raise questions of competition between public and private operators. The CBE may declare any payment system a systemically important payment system, whether on its own accord or upon a PSO application, and, thereby, subject any such operator to additional obligations to be determined by said decree.
- *Consumer protection:* Law 181 of 2018 introduces the concept of remote contracting and provides safeguards for the conclusion of transaction and product liability. However, and as mentioned above, the law excludes banking, financial and capital market services, newspaper and periodical subscriptions, booking transportation and hotels from its scope. Additionally, matters related to financial consumer protection is left to the CBE and FRA.
- *Data protection:* Law 151 of 2020 covers direct electronic marketing by requiring marketing entities to provide data on their identity, addresses, clear purpose of the marketing communication, obtaining the data subject's consent, and allowing the existence of clear opt-out mechanisms to withdraw consent at any time. It also sets timeframes for keeping underlying documentation.

- *Taxation:* The VAT Law 67 of 2016 enables VAT collection from online platforms. It is worthy to note, however, that income tax law 91 of 2005 does not fully cater to digital realities as it misses opportunities to tax companies not incorporated under Egyptian law or with no headquarters in the country as well as online advertisements.
- *Electronic signature:* Law 15 of 2004 grants electronic signatures the same evidentiary power as wet ink signatures if they meet the statutory certification requirements. The law is mostly used for government digital platforms with very little uptake in B2B or B2C transactions due the complex certification requirements.
- *Competition:* The Egyptian Competition Authority (ECA) lacks essential regulatory tools under Law 3 of 2005 (ECL), such as directly fining violators or imposing ex-ante merger controls (although an amendment authorizing the latter has been approved in principle by the Parliament in February 2021). Additionally, the competition framework is fragmented with exclusive jurisdiction for CBE for matters covered under the new CBE Law and competing jurisdiction between the ECA and NTRA.

Policy recommendations

E-commerce has the potential to serve as a key pillar in economic growth in several industries and help create jobs, especially among segments that have high unemployment rates such as youth and women. It also helps advance export competitiveness and enhance productive capacity with an eye on modernizing the ICT infrastructure to allow for seamless digital processes and the establishment of an adequate and conducive legal and regulatory environment to address the emerging technology innovations of the Fourth Industrial Revolution such as AI, wearables and mobile devices for payments – with an emphasis on electronic payment systems, digital signatures, consumer protection and data protection. Further, it helps invest in research and development with an emphasis on innovation in online retailing, advance human capital capacities in digital skills, link local-based manufacturers to global digital marketplaces, invest in enabling technologies by both the government and the private sector, and leverage e-commerce to incentivize the formalization of the informal sector.

3. Healthcare

One of the positive effects of COVID-19 is the accelerated and increased investment and emphasis on healthcare services, particularly telehealth and healthtech. Egypt will probably need to invest around USD 10 billion in new hospital beds alone, so the room for growth is surely there (World Bank, 2020d). In general, Egypt needs better healthcare infrastructure, whether it is driven by the government or the private sector.

According to the Global Digital Health Outlook 2020, the digital healthcare market will be valued at around USD 235 billion in 2023 with reliance on AI and ML that offer a variety of solutions. This can tie well with Egypt's goal to have 7.7 percent of its GDP derived through AI by 2030 as part of the government's national AI strategy, which aims to integrate advanced technology platforms across different sectors, including healthcare (MCIT, 2021). AI can result in significant cost-saving by replacing diagnostics procedures previously carried out by healthcare workers, which can help hospitals better utilize available human capital. In Egypt, huge amounts of medical data are being generated every day in hospitals, healthcare units, clinics, pharmacies, and labs, in addition to data generated by different consumers. The key is to make efficient and timely use of such a massive repository of available data using cloud-based systems for medical records. Therefore, integrating cloud-based data systems that include, but are not limited to, medical history, diagnoses, treatments, and past appointments could be a game-changer for the industry and could be used for advanced data analytics and accessed in real-time, leading to lowering costs and improving access to different healthcare services.

Telehealth fostered healthcare in rural Egypt, especially during the pandemic, with its wider reach compared to conventional methods. Healthtech and wellbeing is gaining momentum in Egypt with platforms such as Vezeeta and Yodawy representing innovative tech start-ups that are helping to transform the healthcare industry and demonstrating the wealth of prospects that could be created for the private sector (World Bank, 2020d). Therefore, Egypt has launched a series of reforms to support start-ups and grow private investments in the healthcare sector.

For healthcare start-ups, the pandemic and the various challenges it caused provided the opportunity to disrupt the status quo and improve patients' care. For example, since the beginning of the pandemic, an innovative app called 7keema provided home-based nursing care to more than 2,500 patients, including setting up intensive care units in many private apartments and residences. In June 2020, healthtech start-up O7 Therapy was launched to capitalize on the opportunity created because of COVID-19 and used its online platform to link individuals suffering from mental health issues like anxiety and depression with certified therapists. Besides, the Cleopatra Hospitals Group launched a telehealth platform in June 2020 to help treat people with mild to moderate cases of COVID-19; demonstrating the power and outreach capabilities of remote healthcare and its possible impact on closing the divide in the quality of care between urban and rural locations and highlighting the possible change that could affect the entire healthcare sector and, consequently, the economy (IFC, 2021).

In 2018, Egypt issued the Universal Healthcare Law 2 of 2018, with a digitalizing scheme that was initially launched in Port Said, Luxor, and Ismailia, creating a database and identifying patients with their national ID number to allow doctors and patients to share test results as needed and connect doctors and pharmacies to available medications and possible recommendations and referrals (Abdel-Hafez, 2020). Further digital transformation efforts resulted, according to the

Ministry of Health and Population (2021), in the creation of a database that lists all patients in Egypt suffering from diabetes as well as offering the ability to prioritize healthcare services for COVID-19 patients, especially those with pre-existing medical conditions. The social structure has presented some interesting and unique challenges to digitalization, such as the preference of having same-sex doctors for females, along with the frequent lack of official documentations and how to bypass that to offer a proper healthcare service, coupled with ensuring privacy to protect polygamous husbands with wives living in different locations, in addition to the need to adopt differential coding for large tribal families (Abdel-Hafez, 2020).

The outlook for the healthcare sector is quite positive. The pandemic is expected to increase investments, mostly through foreign investors, with the government announcing an initial USD 63.5 million in extra funding for the health sector since the pandemic hit (MoPED, 2020b). The sector is expected to grow significantly and should see a major disruption during the next few years for healthcare stakeholders and patients, which can be reflected in opportunities created for start-ups and MSMEs. Healthcare service providers would seek more online presence to reach out to patients through innovative technologies. As for the patients, they would learn to try out different services on the go. During the pandemic, new apps were developed to help manage the crisis, such as contact tracking to help track people who have been in contact with others diagnosed with COVID-19 (Kende, 2020). Many of these apps are international and some are being made available locally. However, domestic services that are adapted to the local context are also needed, which can be built on existing healthcare online services not just to address the pandemic, but also to help with long-term health issues.

The growing number of tech-based healthcare start-ups comes as Egypt is increasing its investments in its healthcare ecosystem, including announcing plans to roll out universal healthcare coverage by 2032, which is expected to further fuel the sector's growth. The coverage is an effort that would help create multiple prospects for healthcare start-ups with their innovative solutions and applications. Today, there are more than 100 start-ups in Egypt promoting innovation in healthcare and reflecting the growing demand (World Bank, 2020d). Many of these providers of healthcare services have embraced remote healthcare and helped contribute to combating the pandemic, especially in rural areas, to help close the divide in healthcare services provided in urban settings.

Legal and regulatory framework

The regulatory framework has yet to catch up with online applications selling medication or providing medical advice. Pharmacists and some medical practitioners have raised issues about quality control (such as expiry date), and possibility of illegal drug use...etc. This is clearly an area where legal intervention is needed to ensure that any such app is compliant with laws and regulations and subject to proper inspection mechanisms without imposing excessive requirements.

4. Agriculture

Agriculture is the third largest economic sector in Egypt, with 23.8 percent of total employment and a contribution of 11.2 percent of the country's GDP, even though only 3.8 percent of the land is cultivated (ECES, 2020). It is a primary sector for employment, growth, poverty alleviation, food security, and export promotion. The sector is a large employer of women; with 24.6 percent of the total employment and 45 percent of the total women in the workforce in Egypt, demonstrating its potential to enhance the socioeconomic conditions of women farmers. The sector employs over 55 percent of all jobs in Upper Egypt. Although the sector accounts for about 20 percent of total exports and foreign exchange earnings, Egypt imports about 40 percent of its food requirements and incurs a total food import bill of USD 2.5 billion per year (FAO, 2021). This low productivity was highlighted in the World Bank's Enabling the Business of Agriculture Report (2019) where Egypt scored 47.06 out of 100 in terms of enabling the agricultural sector, with the primary problems being water, protecting plant health, sustaining livestock, and accessing finance. In order to help upgrade the sector, reforms are required to significantly improve productivity and efficiency. Examples include connectivity to access wider markets; investing in improving the skills of farmers, including access to information and knowledge; improving logistics to rationalize the use of resources and minimize waste through better coordination; access to value chains; and facilitating access to finance through banks and non-bank financial institutions.

Adopting digital tools, including AI, can help remedy some of these issues and transform the sector. There are currently some efforts through collaborations between the Ministry of Agriculture and MCIT that cover automating land agriculture possession, farmer smart cards, crop recognition through satellite and AI, smart assistants to farmers, digitalizing agriculture documents, and creating electronic archiving. This is in addition to transitioning to more modern irrigation systems, without clear indication, however, on the type of technology to be used (MCIT, 2021).

Digitalization could accelerate the transformation of agriculture with implications on increasing farmers' income and their overall agricultural output. It can also create job opportunities through cultivating more land compared to the status today and to better serve the needs of the society (Goedde et al., 2021). Using precision agriculture can improve exportable products in high-end farming in terms of conformity to global regulations and specifications compared to traditional methods of monitoring and production. This includes using AI to analyze weather and soil conditions, temperature, and water usage to help farmers optimize planning to generate higher yields by identifying the best crop choices and how to maximize the use of available resources. Other AI solutions can help cut costs while significantly increasing harvest yield and quality by deploying remote sensing, cloud computing, and using simulation modeling. Using the nascent technology of cellular agriculture has the potential of achieving a green and sustainable economy while contributing to food security and encouraging localized production; leading to less land and water used and a feed-free approach with expected cost reduction and fewer carbon emissions.

As for low-end and small farmers using traditional agricultural practices, which represent 80 percent of the farmers, simple digital and connectivity tools can still offer a wide range of opportunities, including using mobile phones to educate, inform, and empower them and help them change the way they work by getting access to crucial information through mobile Internet as well as the use of sensors that enable real-time data collection on the pricing of goods at the local level, weather alerts, and the efficient management of resources and the applications of the IoT to enable smart agriculture, such as irrigation systems and value chain management. Besides, cultivating an omnichannel culture could benefit farmers by providing speed, convenience, and human interaction while capitalizing on digital platforms (Fiocco et al., 2019). An indirect repercussion of using digital transformation and using more innovative and efficient ways to conduct their work is that it could help farmers keep their children at school instead of working in the field and therefore offer them a better opportunity to compete in the labor market by being better educated. However, traditional tech-based solutions in agriculture remain largely unexplored in Egypt today.

In June 2021, as part of the awareness and capacity-building process among farmers, a start-up competition focusing on digital agriculture was launched, with an emphasis on helping farmers take better decisions and minimize the waste of resources. The innovative competition hosted by Ain Shams University's iHub includes an incubation program aiming to help farmers come up with innovative and sustainable solutions while demonstrating the social implications as well as the inclusiveness of youth and women. The competition addresses the challenges of the agriculture sector, including water usage and production limitations, and offers data that can help farmers make more effective and timely decisions.

Legal and regulatory framework

It is not clear how the current digital transformation efforts will be reflected in the legal framework; digitalizing without addressing the lack of clear vision or the longstanding structural issues will have limited effect. Some of these issues include the lack of proper implementation of many agricultural laws for the non-issuance of executive regulations (such as contractual farming and agriculture insurance law); lack of sufficient incentives to invest in water-conserving technology (Kassim et al., 2018); air cargo handling; institutional conflicts of interest with the government being involved in professional associations; and small budget allocation for research and development (ECES, 2020). In addition, there is lack of coordination between the different stakeholders, especially those concerned with the agricultural policies. All this is leading to lower productivity levels of agricultural crops. Digital transformation could benefit the agriculture sector and offer several opportunities for its stakeholders, but any digital legal solution will only be as good as the institutional framework underpinning it.

5. Manufacturing

Egypt has a diverse manufacturing sector with several key industries including food, textiles, chemicals, pharmaceuticals, construction material, and more, with a variety of steps taken to

improve the infrastructure and ease access for different markets to advance exports (FEI, 2020). However, Egypt's participation in the GVCs is low; exports are mainly downstream and centered around primary commodities and less sophisticated products. The move upstream to higher value-added and complex manufacturing activities is impeded by several elements, including the associated costs as well as the lack of availability and quality of inputs, technology innovations, and efficient transport and logistics services (World Bank, 2020d).

The target of reaching USD 100 billion in terms of exports by FY2024/2025 – in other words quadrupling Egypt's exports of USD 28.5 billion realized in FY2019/2020 – would require a nationwide strategy along with the development of the associated policies that would identify the comparative advantages Egypt has, what markets to target, and how to achieve such an ambitious goal. However, a starting point would be to embrace the value-chain mindset, including the formulation of industrial clusters with enterprises whose businesses are interconnected and complement each other. Besides, there is a need to provide the enabling environment in terms of transportation and logistics essential to support such target growth in the volume of exports. The increasing interdependency of supply chain stakeholders is the result of several business trends that have emerged in the last three decades, including process and product specialization, outsourcing, offshoring, and just-in-time and consumer-driven production. With design, production, and distribution processes scattered among a variety of entities, enterprises no longer compete in isolation, but rather as stakeholders in interconnected logistics and value chains – which is something that Egypt needs to address, especially with the growing importance of localization and onshoring.

The low enterprise adoption of the Internet in Egypt indicates a limited digital substitution of informal physical business activities such as the procurement of supplies or the distribution of products and services (Comminos, 2020). According to the World Bank, the limited digitalization of enterprises (mainly MSMEs) along with the logistics chain bottlenecks represent real impediments to the development of supply chain resilience (World Bank, 2020a). The manufacturing sector is the source of most innovations and advances in technology with implications on other economic sectors (UNIDO, 2020). To date, innovation-based manufacturing remains largely unexplored in Egypt, and introducing and benefiting from the advanced digital production (ADP) technologies as well as the emerging innovations of the Fourth Industrial Revolution – such as blockchain, robotics, and 3D printing – could help improve the quality and offer opportunities to accelerate innovation in manufacturing and increase the efficiency of industrial production processes as well as help create new industries; consequently leading to the emergence of new job opportunities in more skilled and knowledge-based sectors (UNIDO, 2020).

ADP technologies can help advance economic growth as well as safeguard the environment, which also contributes to realizing the SDGs. However, a prerequisite to adopting these new technologies is also the active participation and engagement in GVCs. Today, Egypt is considered one of the

latecomers based on its level of engagement with ADP technologies applied to manufacturing and is classified more as a user rather than a producer economy (UNIDO, 2020). However, the opportunity through digital transformation could be a game-changer and can help introduce more advanced technology-led manufacturing and, more importantly, green manufacturing and innovations; both can have multiple implications on the economy (MoPED, 2020a).

On this note, digital transformation has the potential to assist Egypt in attracting FDIs that can help leverage the local market through further automation, in addition to connecting to the GVCs for information exchange and business transactions with implications on creating more business opportunities and productive jobs and contributing to reducing the poverty levels given the free trade agreements Egypt has with the European Union, the United States, and the African Union (Oxford Business Group, 2021). Digital transformation offers enterprises the ability to target niche markets with tailor-made and personalized offerings while reaching out directly to consumers and allowing collaboration between various constituents, including consumers and suppliers, especially that the Internet is a profound driver of change for different industries with its ability to enable manufacturers to expand their geographical footprint and lower their distribution costs. Therefore, given the importance of digitalization, Egypt needs to significantly integrate automation, connectivity, and data analytics into its industrial projects. Digital transformation can surely help in logistics and value chains, including the possible use of track-and-trace applications, connected and integrated fleet management solutions, and monitored dashboards – which collectively enable further agility to the value chain.

Different types of enterprises will most likely be disrupted by digital transformation when considering their level of readiness. It all depends on whether the enterprise is well-established in terms of whether digital platforms and solutions are in place, including connectivity, collaboration tools, financial inclusion, and regulations. On this note, MSMEs might be more adaptive and flexible to accommodate different changes given their size and agility in changing their business models and adapting their online sales channels. However, if larger enterprises are digitally ready, they too can smoothly adapt to disruption. It is important to note that adapting to the digital environment is sector-dependent. For example, in healthcare, connected medical devices led to increased demand on telehealth due to the need for remote consultation and diagnoses, especially during the pandemic; while in logistics and supply chain, connected solutions and asset tracking have enabled the fast rerouting of supply chains to help fill gaps for medicine and medical equipment from product order and design to consumer delivery.

Legal and regulatory framework

Given that manufacturing cuts across many different businesses and industries, it is difficult to provide a comprehensive assessment of the regulatory framework governing its digital transformation. However, the opportunities in the sector demonstrate the need for policy interventions. Besides, it is worth noting that an integral element to manufacturing productivity –

besides the prospects enabled through digital transformation – are supply chains and logistics, as both play significant and enabling roles but also get affected by different stakeholders, including service providers, technology suppliers, and the different policies related to infrastructure and the business environment.

Policy recommendations

Given the development that took place since COVID-19 hit, universal connectivity is becoming integral to the infrastructure readiness and is becoming invaluable for inclusivity like water, electricity, and food. In order to increase their digital resilience, manufacturing enterprises must accelerate their migration to automated processes to enable the more efficient production of physical goods, the diversity of supply, assurance, and quality of service, and the role of trusted suppliers, among other elements. Additionally, both the government and the private sector must coordinate to strategize and formulate policies that can help make innovative technologies work for inclusive and sustainable industrial development (UNIDO, 2020). Accordingly, there is a need to develop a framework for digital infrastructure embracing new technologies, fostering demand, leveraging various projects and initiatives using ADP technologies, and strengthening human capital skills as well as research and development capabilities. The legal and regulatory framework should then be reviewed and simplified to align with the developed policies.

Conclusion

Technological innovation and digital transformation have the potential to transform businesses regardless of industry, size, or geographical location. It can also contribute to economic growth, job creation, human capital development, and poverty and inequality reduction. Therefore, as the pace of change accelerates, both policymakers and enterprise owners need to constantly innovate, adjust, be dynamic, and project future scenarios, trends, and business models to remain relevant, competitive, and agile in a rapidly changing economic environment.

Technology innovation is facilitating access to more markets irrespective of geographical locations and fostering opportunities through new digital business models, including contributing to GVCs through leveraging innovation and human capital talents, accelerating the development of new products and services, enabling new ways of remote working, and availing a broad portfolio of opportunities for a diversified and inclusive workforce, including women and youth. With a proper, well-thought, and implemented acceleration of digital transformation, Egypt could be better positioned to face the ongoing challenges as well as face future ones. The enterprises that will invest wisely in their digital capabilities will eventually emerge from the COVID-19 pandemic much stronger while benefiting from Egypt's large and growing market pending a conducive business environment.

To conclude, Egypt has shown some reasonable progress in the digitalization journey over the last few decades. Such progress could be described to include: (1) some clear and relatively advanced

adoption by segments of the society on an individual basis; (2) a growing and promising adoption by tech-enabled start-ups and through ICT-enabled services; (3) early-stage adoption of electronic government services; and (4) an insignificant ICT adoption level by private sector enterprises. Moving forward, with further universal dissemination of the ICT infrastructure and connectivity coupled with a growing level of ICT adoption, the potential impact of digital transformation on the economy in Egypt could be significant and a game-changer for the economy. However, as it stands, the associated evidence remains limited and requires further research to assess the repercussions of current and future disruptions on employment opportunities, MSMEs, productivity, and inequality, and to study the correlation between the adoption of digitalization and the implications on labor productivity and performance.

Overall policy recommendations

Digital transformation can play an invaluable part in development. However, given that the extent of the impact of digital transformation on economies and societies is not clear, it is invaluable that the government invests in infrastructure and devise the appropriate policies needed for a future that is more likely to be driven by a digital ecosystem. To undertake this journey – which has the potential to help in realizing more inclusive development, economic empowerment, job creation, and improving competitiveness – several integrated reforms must take place, including:

a. Developing and executing a well-coordinated multi-sector digital transformation strategy

- Developing a nationwide strategy for digital transformation to address the digitalization of public services with the aim of breaking the silos, reducing bureaucracy and red tape, and creating proper roles and responsibilities, with one overarching institution charged with ensuring alignment with the rapid digital changes, overall supervision, and follow-up on implementation.
- Removing or reducing duplication or fragmentation of roles (such as in competition and consumer protection) and strengthening already existing and/or creating collaboration mechanisms between different institutions in overlapping matters.
- Improving governance as a key enabling building block in digital transformation.
- Institutionalizing the involvement and engagement of the private sector (with adequate representation from enterprises from different industries and sizes), in the development of the digital reform agenda.
- Ensuring that actions and legislation implemented under the strategy effectively reduce digital divide and promote digital equity.

b. Developing an enabling legal strategy and environment for digital transformation

Developing a legal strategy, with proper impact analysis tools, that strikes the balance between fostering innovation to allow for business expansion and create proper safeguards to protect the interests of both the country and individuals. The strategy, and any laws issued or revised in the implementation should help:

- Encourage agile legal solutions that can cater to the rapid development in the ICT sector, such as framework laws that lay foundational principles, with ample flexibility for implementing regulations to provide for the details.
- Providing incentives and/or threats for self-regulation to fill gaps in case of delayed regulations.
- Mandating periodic updates of the legal strategy.
- Ensuring that the silo approach is gradually removed, and that more holistic solutions are developed.
- Establishing proper safeguards to protect Egypt’s national, financial, and cyber interests.
- Providing a clear and user-friendly framework for users that protects their privacy and helps them make informed decisions.
- Offering effective and rapidly enforceable consumer protection mechanisms that cater to different types of local and cross-border transactions without creating excessive requirements for small-value transactions.
- Ensuring that legislation does not add to the existing social divide, and, rather, works towards reducing it and mitigating its impact.
- Overhauling the dispute resolution mechanisms whether in or out of court with a view to enable amicable dispute resolution and, in the event of their failure, ensure that judicial and arbitral decisions are made expeditiously and enforced swiftly.

This goes together with the ongoing business reform environment, which needs to pay special attention to streamlining processes (as a prelude to effective digital transformation rather than automating existing red tape); reducing regulatory unpredictability; and promoting competitiveness.

Examples of the building blocks of this strategy include:

- Modernizing many outdated legislations covering fundamental matters such as ICT, intellectual property rights, and the electronic signature.
- Following modern trends of using simplified language in laws and regulations to improve access for laypersons and MSMEs and reduce the need for relying on legal professionals to understand basic rights and obligations.
- Reviewing existing laws considering the legal strategy with special attention to harsh and vague penalties.
- Codifying laws on digital transformation to improve transparency and access.
- Covering the legal vacuum on important matters such as e-commerce, data portability, logistics and distribution services.
- Aligning with international mechanisms and conventions (such as for taxes, cybersecurity, or labor) to form a unified front in a world without boundaries to deter tax evasion, labor exploitation, and anti-competitive practices.

- Revisiting the tax policy on digital payments to strike a balance between the government’s interests, thereby encouraging business formalization and deterring tax evasion.
- Improving and simplifying laws and regulations on digital financial services, especially for the unbanked, with emphasis on further simplifying digital KYCs as well as digital identity verification to allow and expand the delivery of digital financial services.
- Ensuring that the legal and regulatory framework effectively protects human rights by, for example, banning unethical surveillance, data harvesting, and algorithmic bias.
- Introducing proper social protection rules in labor laws for different types of digital activities that consider various sizes and forms of enterprises and the emerging employment types.
- Developing legislative and organizational frameworks for fintech and ensuring its alignment with the national development strategies.

c. Improving the ICT infrastructure

- Building a state-of-the-art digital infrastructure, including cloud computing, and providing access to publicly available data following a clear data governance model to regulate the sharing and ownership of consumer and corporate data to support the private sector, as well as multinationals operating in Egypt, in planning investments and operational decisions.
- Enhancing the telecommunications infrastructure on a regular basis to match global industry developments.
- Enabling a more cost-effective and efficient service through a one-stop-shop for all required permits and licenses.
- Introducing broadband universally across Egypt, including remote and underprivileged locations.
- Developing a plan for the deployment of 5G frequencies at reasonable prices.
- Allowing more private sector investment in different ICT-related aspects.
- Developing a plan to effectively integrate ICT across different economic sectors, including education and lifelong learning.
- Encouraging the private sector across different industries to develop its digital infrastructure while reducing the connectivity costs and taxes on access and technology devices, especially for MSMEs.
- Investing in human capital development through lifelong learning programs and primarily in digital and advanced ICT-related skills to expand the availability of qualified individuals to support the growing ICT and BPO industries given their implications on the lives and livelihoods and the economy at large.

d. Enhancing digital inclusion

- Formulating and adopting a policy framework for research and development focused on the business opportunities enabled through digital transformation.
- Ensuring that the legal framework supports cost-lowering safeguards (such as for accessing content and services), to ensure universal access and broader digital inclusion.

- Establishing clear and fair norms and regulations is essential to building trust in ICTs and availing an informed economy that serves the entire society, not only a certain segment or a select few.
- Designing policies and measures to provide support for the self-employed running MSMEs as well as informal workers, farmers, and artisans.
- Endorsing the transition to a cashless economy by adopting and integrating digital payment channels for the delivery of government and public services while revisiting the taxes on digital payments to encourage more people to use the services.

e. Improving the financial inclusion ecosystem

- Encouraging banks to invest in fintech innovations and collaborate with fintech start-ups.
- Ensuring the active inclusion of financial institutions in developing cybersecurity as well as avoiding and mitigating against cyber-risks.
- Promoting financial awareness to improve the society’s understanding of the opportunities presented through financial inclusion.
- Expanding the entrepreneurial ecosystem to create new engines and drivers of growth, job creation and improved living standards, as well as investing in tech-enabled start-ups that support digital transformation across different sectors and industries, including, but not limited to, local supply chains. This is in order to enable MSMEs to integrate into the formal economy, raise their quality, efficiency, and market access, and address the issues of procurement (for the private sector and government), logistics, transportation, distribution, and warehousing.

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