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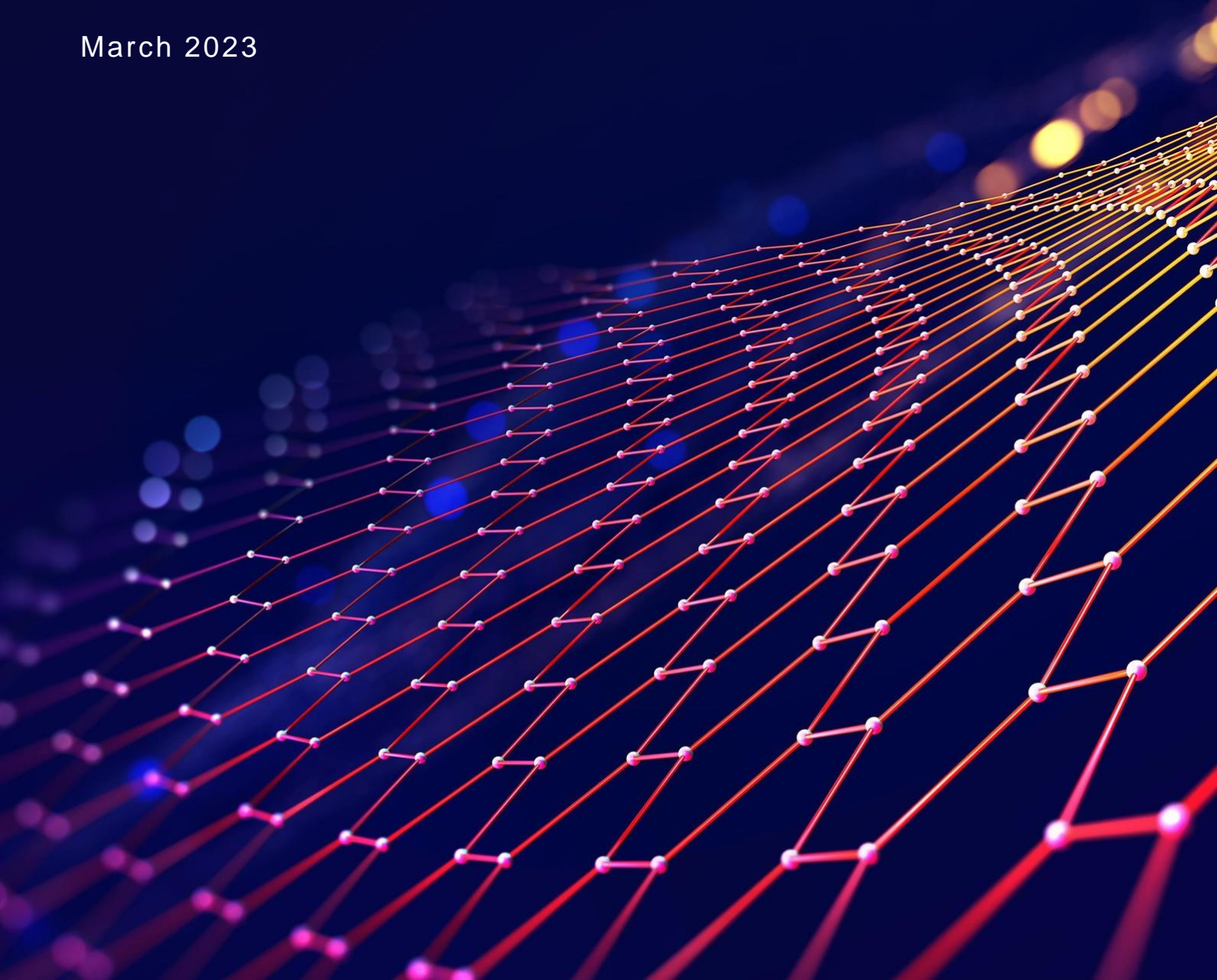
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In collaboration with
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Information Technology

DIGITALIZATION AS A DRIVER OF ECONOMIC RESILIENCE IN SAUDI ARABIA DURING COVID-19

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Foreword

Digitalization as a driver of economic resilience in KSA during COVID-19

Over the past two years, the COVID-19 pandemic has accelerated digital transformation and put the world firmly into the age of the Fourth Industrial Revolution. From autonomous vehicles to biotechnologies, technological breakthroughs in the digital, biological and physical spheres have placed Fourth Industrial Revolution (4IR) technologies at the heart of digitalization strategies around the world. These innovations, if governed well, can power economic growth and address pressing social and environmental challenges. It is the only way to thrive in the future economy.

However, regulation can struggle to keep pace with innovation, hindering the introduction of new ideas, products and business models, while leaving citizens with outdated protections. A more agile, flexible approach to regulation is needed to seize the potential of the Fourth Industrial Revolution to change lives for the better. The opportunities are certainly huge.

We have seen that just one of the technologies, artificial intelligence, is projected to increase global GDP by about 15% this decade. Similarly, 5G, the next generation of mobile and internet technology, is expected to generate another \$13 trillion in global economic value and 22 million jobs by 2035.*

Countries that placed digitization at the heart of economic and political strategy were not only able to navigate the pandemic better but also were better prepared for the next transformation. No better example can be seen than Saudi Arabia. Under the leadership of HE Abdullah Alswaha, Minister of Communications and Information Technology, and guided by the vision of H.R.H. Prince Mohammed bin Salman, the Kingdom was able to reap significant dividends from the investments made prior to the pandemic. It was heartening to see that Saudi Arabia's digital readiness allowed for the creation of a thriving digital economy and helped to reduce the impact of the pandemic on overall economic growth. I was particularly pleased to see there was a surge in e-commerce transactions and that close to 98% of Saudi students were able to shift seamlessly to online learning.

However, this is not the time for complacency. We have seen that it is not always easy for governments to discern how to incentivize and regulate new technologies and emerging industries, as the pace of change is so fast that only a few can keep up. Therefore, it is crucial for all stakeholders in society to continue to work together to ensure that technological transformation is a force for good, and that it benefits all of us.

This is why the World Economic Forum launched the Centre for the Fourth Industrial Revolution network in 2018. Today we are present in 16 countries, including our centre in Saudi Arabia, working with governments, companies and experts on issues of technology adoption and governance. In serving as a focal point for cooperation, these centres are creating positive feedback loops that drive impact on critical global challenges related to technology, the environment and people.

* <https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html>
https://www3.weforum.org/docs/WEF_The_Impact_of_5G_Report.pdf



Børge Brende
President of the World
Economic Forum

Executive Summary

Investments made in KSA's digital transformation prior to COVID-19 have paid dividends during the pandemic. Because of its continued investment in the digital transformation space, KSA was able to respond rapidly to the challenges presented by COVID-19. For example, in May 2020, KSA launched Tawakkalna, an instrumental application for KSA's fight against COVID-19, which now has over 20 million users.

COVID-19 has accelerated digitalization globally, entailing Paradigm shifts in work, retail, and e-learning became paramount. In KSA, 65% of Saudis shifted to remote working; e-commerce experienced 60% growth; the number of orders made through delivery apps reached 26 million in 2020; an increase of 250% compared to the previous year; and 98% of Saudi students moved to online learning.

Sources of resilience in digital readiness

Prior to the pandemic, KSA already had one of the best telecommunication networks worldwide. According to the International Telecommunication Union, virtually every Saudi already had mobile cellular network coverage and internet access. KSA's levels of access exceed those in most European countries, including France and the UK.

KSA's investments in digital infrastructure and proficiency have not only enabled the development of a robust digital economy, but have also helped manage the economic impact of the pandemic. Economic analysis shows that its digital infrastructure reduced the pandemic impact on GDP per capita (adjusted by Purchasing Power Parity—PPP) by 0.54 percentage points.

Not only has KSA's digital readiness reduced the magnitude of the shock, but it even produced a number of improved outcomes during the international crisis. For instance, a World Bank survey found that more than 66% of teachers in KSA believed their students' academic progress increased during the period in which they were able to learn from home.

Associated economic benefits are reflected in the figures for 2020, during which virtually all sectors in KSA increased ICT expenditure, including energy, manufacturing, retail banking, mining, communication, retail, travel and leisure, and utilities. The ICT market grew by 6% to USD 31.2 bn. Advanced mobility services (explained in 2.4.2) enabled KSA's home delivery services to grow by three-fold compared to pre-lockdown levels.

Certain new consumer behaviors will persist beyond the pandemic

Given the seemingly sustainable changes in Saudi consumer behaviors during the pandemic, remote working, online retail, and e-learning are projected to grow in the coming years. The e-commerce market in KSA is now projected to grow by 25% in the period 2020 to 2025, reaching a market size of SAR 57 bn. By 2025, the number of e-commerce users is expected to be 34 million, or 91% of the population. Similarly, education is projected to grow by 15% between 2021 and 2029, with a growing global trend in online-based upskilling and mentoring propelling high levels of annual growth.

KSA's renewed commitment to continued digital transformation

KSA will continue its digital transformation efforts across all its economic sectors as outlined in its Vision 2030, and this transformation can be potentially accelerated by considering three pillars: (1) ensuring that enablers of the digital ecosystem are developed further. (2) promoting new technologies in key sectors; and (3) introducing Public-Private Partnerships focused on critical aspects of the digital transformation.

Executive Summary

(Cont'd)

Digital enablers: The pandemic highlighted the importance of digital infrastructure in accommodating new ways of working, living, and learning. Such adaptability will be further facilitated by the introduction of next-generation networks that provide higher bandwidth and improved internet speeds. This will ensure that over 90% of the country is covered by high-speed broadband. At the same time, the digital infrastructure will be upgraded so that it is compatible with 5G and the Internet of Things (IoT), and also ensures its readiness for any further advancements.

KSA will ensure that its citizens acquire a strong level of digital proficiency which will enable them to benefit fully from the digitally transformed environment. This includes helping 100,000 young Saudis to become software programmers.

KSA's regulatory bodies will continue to adapt regulation as emerging technologies give rise to new business models building on the successes of its regulatory sandboxes, dynamic regulatory framework, and user cybersecurity, all of which showed their strengths during the pandemic. This will further strengthen business and consumer confidence in the trustworthiness of KSA's digital transformation.

New technologies: Technological innovations will play a key role in accelerating the digital transformation of different economic sectors. KSA is committed to continued support and investment in satellite technology, AI, Big Data, nanotech, and robotics – technologies that will make enormous contributions to the transformation of the economy and society.

Public-Private Partnerships: Public-Private Partnerships will play a crucial role in accelerating KSA's digital transformation. Newly created partnerships will focus on innovative and collaborative projects and will benefit from the collaboration and support of academia, civil society organizations, and public and private sector actors



Introduction

The COVID-19 pandemic created immense hardship around the world, overwhelming healthcare systems, shutting offices, factories, and schools, and disrupting supply chains. Worldwide, the virus has resulted in the single biggest loss of life due to disease since the flu pandemic of 1918-20. Governments responded rapidly to the challenges, at a magnitude rarely seen in peacetime, rethinking and reshaping systems in a matter of weeks, especially those of healthcare, government, finance and regulatory control. While the full global economic consequences of the pandemic are yet to be estimated, it is nonetheless evident that the impact from the pandemic has reduced productivity, led to widespread business closures, and permanently changed supply chains.

The economy of KSA showed increased resilience during COVID crisis, partially because of the role played by the digital economy. This report offers an overview of the digital transformation efforts in KSA and how it helped to mitigate the impact of COVID-19 in three main sections:

Section 1 provides an overview of the COVID-19 crisis' impact on digitalization and the use of digital technologies.

Section 2 analyses KSA's digital readiness, and its impacts on KSA's economic resilience during COVID-19.

Section 3 discusses KSA's plans to continue accelerating the country's digital transformation and how this will further enhance its economic resilience.



1

COVID-19 accelerated digitalization and the drive for digital technologies

This section provides an overview of the accelerated adoption of digital services by consumers and new business models by corporate entities against the backdrop of lockdown.

One lasting impact of COVID-19 has been to accelerate digitalization globally. Due to the pandemic, consumers had to quickly adjust their lifestyles in response to the various restrictions imposed to limit the spread of the disease. Lockdowns impacted private and public entities alike, with remote working being introduced or expanded. This shifted retail largely online, and e-learning became a necessity.

These shifts extended the use of digital services and digital communication globally, as has also been the case in KSA. Tawakkalna, the official Saudi Contact tracing application, for example, was launched in May 2020 to limit the spread of COVID-19. It now has over 20 million users¹.

The investment made in KSA's digital transformation prior to COVID-19 reaped many rewards during the pandemic where consumers and businesses benefited from the digital services. For example, the number of orders made through delivery apps in the country reached 26 million in 2020, an increase of 250% compared to the previous year².

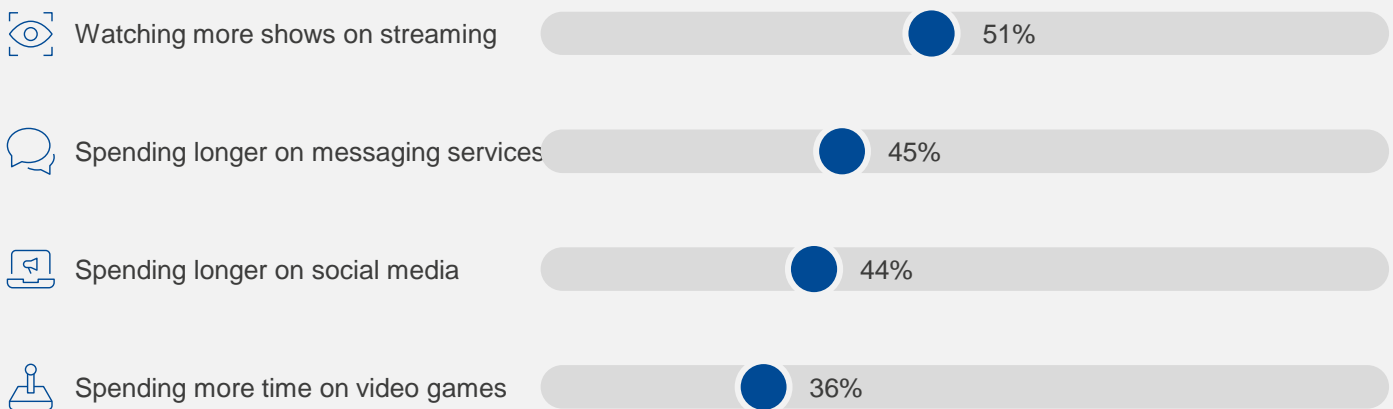


1.1 National lockdowns accelerated consumer adoption of digital services

National lockdowns and homeworking during the pandemic have revealed the importance of KSA's digital transformation. The restrictions have accelerated adoption and have expedited the evolution towards a more digitalized lifestyle. Digital services have proved invaluable for a wide range of activities, such as staying in touch with family and friends, shopping and working. This has resulted in a near-universal take-up of digital services in KSA.

The trends observed in KSA are also seen elsewhere in the world. For instance, during March 2020³, at the first implementation of the COVID-19 restrictions, the Global Web Index survey⁴ found that respondents were spending more time using digital services than prior to the pandemic (as highlighted in Figure 1).

FIGURE 1 Increase in digital use during the pandemic



Worldwide, the lifestyles changes spurred by the pandemic created unprecedented demand and high growth in specific digital services. One platform that benefited greatly from this was the Zoom video-conferencing service, which saw its customer numbers grow by over 350% in April 2020 alone. Likewise, global internet traffic increased significantly during the lockdown,

with year-on-year growth of ~30% between March and April 2020⁵.

In KSA, average daily data consumption rose by 33%⁶, video-on-demand grew by over 6%⁷ in the first few months of 2020, and the Saudi online gaming community increased by 10% during the year (see Figure 2)⁸.

FIGURE 2 The growth in adoption of digital services in Saudi Arabia in 2020



1.2 The pandemic also triggered changes to business models

The pandemic also brought about changes to business models due to the shifts to remote work, online shopping, and online education. Around 98% of KSA's students were able to join the online schooling platform⁹. Furthermore, over 95% of businesses operated or switched to online trading during the pandemic.

Remote work

In KSA, the transition to remote working built on the existing trend of remote working where a significant number of employees and employers had previous experience of remote working. An Ipsos¹⁰ survey suggests that 44% of Saudis were already teleworking prior to the pandemic, with around 65% saying they were doing more work from home following the outbreak of the pandemic.

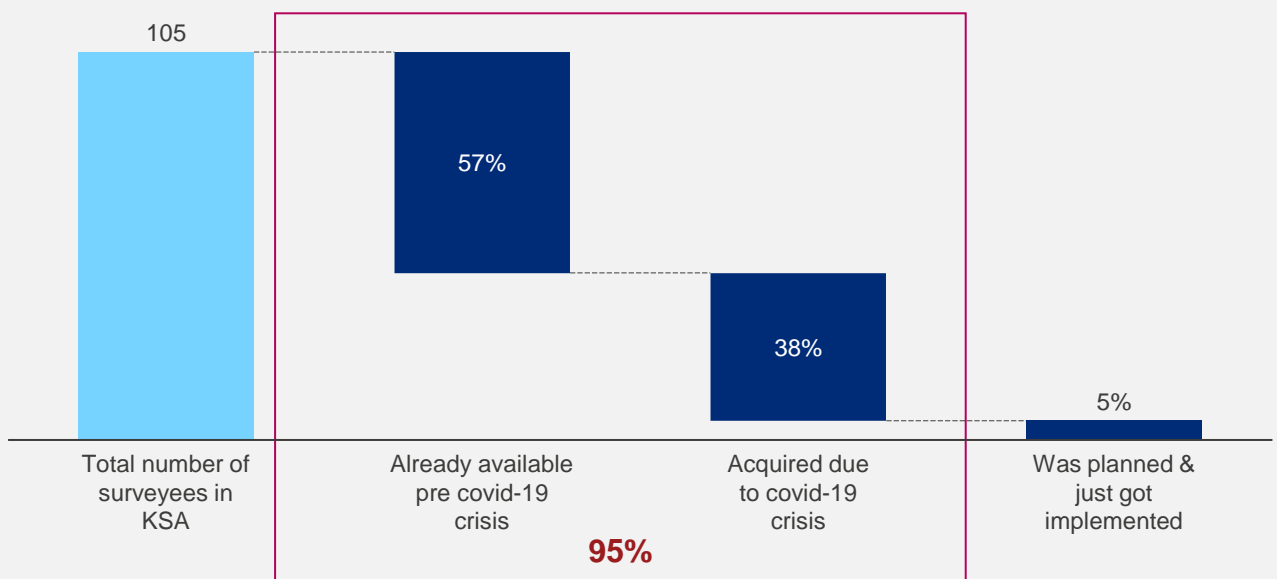
Online retail

Globally, the retail market was one of the sectors most affected by lockdowns. Retail had to rapidly adapt its business model to convert in-store shopping to the online equivalent. Shopify, for instance, which acts as a host site to independent online stores, reflected this shift in strong growth. In Q2 2020, Shopify's global revenues rose 97%, mainly driven by a rapid increase in new

online stores¹¹.

In KSA, there has been a similar shift to online shopping. E-commerce retail sales rose 60% year-on-year in 2020, reaching SAR 19 bn¹². Although digital sales were growing strongly even prior to the pandemic, mobility restrictions accelerated the shift from in-store to e-commerce: some 38% of KSA's merchants stated that they set up an e-commerce platform during the crisis¹³. The number of merchants in KSA operating e-stores rose from 57% prior to the pandemic to 95% today (Figure 3). Retailers also introduced a range of new services as part of their online shopping offering (such as same-day delivery) to attract additional consumers.

FIGURE 3 Did you set-up an e-commerce platform in response to the current COVID-19 crisis?¹⁴



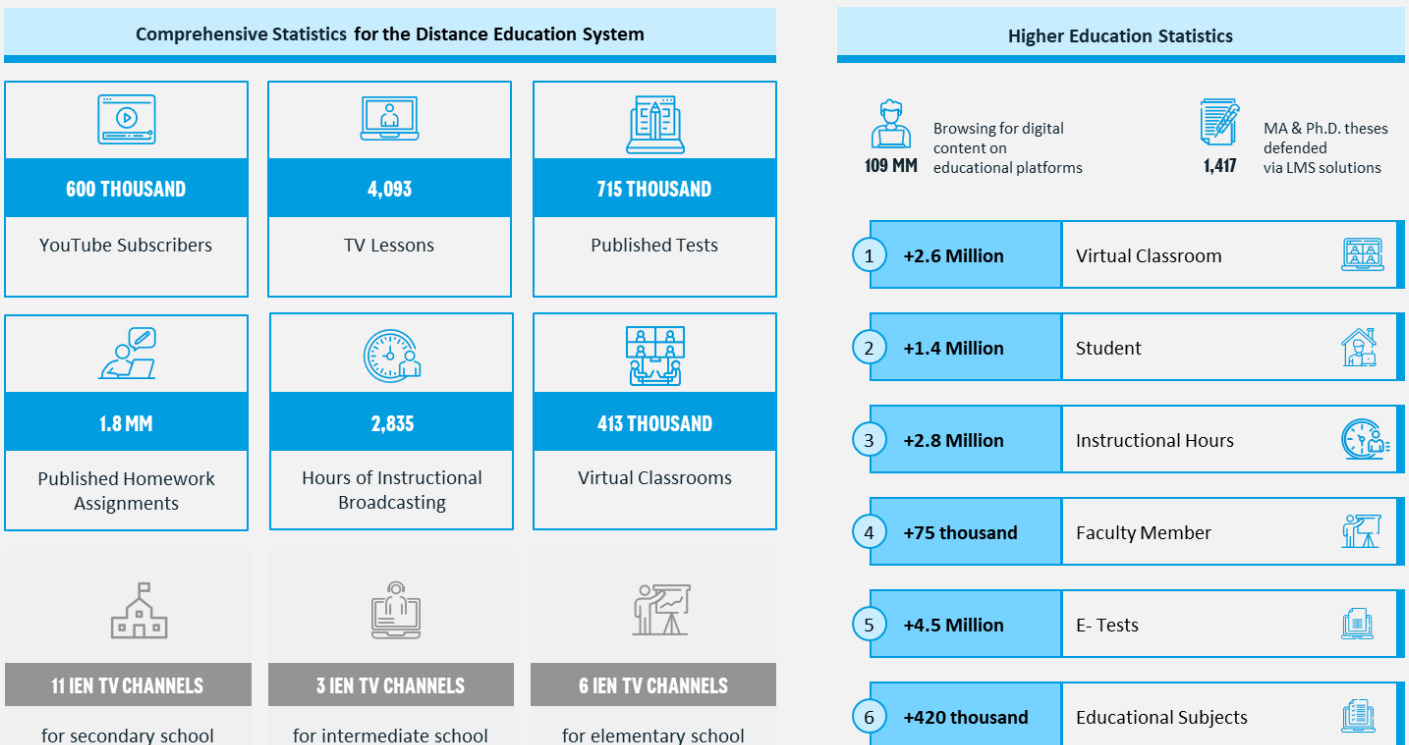
Online education

Education was amongst the most profoundly affected sectors globally. Schools and colleges were forced to shift from traditional classroom teaching to e-learning models using video conferencing platforms like Zoom, Google Meet, and Microsoft Teams. Blackboard, a Learning Management System (LMS), had long been used in many universities around the world prior to the pandemic, including in KSA, and it was quickly adopted as leading platform for online learning during the pandemic. Along with live online teaching, asynchronous platforms such as edX enjoyed increased enrolments, contributing to the digital mix in education systems. edX¹⁵ responded to the pandemic by giving free access to the core resources on its platform; this provided support to educational institutions facing resource and technology constraints in the sudden shift towards online teaching and learning.

In KSA, the Ministry of Education launched several digital initiatives¹⁶ to respond to

students' needs during the pandemic. Previous exposure to online learning systems by the Ministry prior to the pandemic facilitated the transition to digital learning. This is best illustrated by the duration that the Ministry required to respond following the announcement to suspend classroom attendance on 9th March 2020, whereby it introduced educational channels to broadcast lessons to students within ten hours of the announcement. Distance education programs and technologies, including a YouTube channel that witnessed high viewership levels, were also developed. During the pandemic, 98% of students in KSA logged into the "Madrasati" platform, a local bespoke online learning platform¹⁷. Also, the solutions produced by the LMS enabled 1,417 students to defend their Master and Ph.D. theses during 2020 (Figure 4). More than 66% of teachers in KSA surveyed by the World Bank stated that they believe their students' academic progress increased during the online learning¹⁸.

FIGURE 4 Saudi Arabia Ministry of Education's digital initiatives to support Education during the pandemic



2

Saudi Arabia's digital readiness ensured its economic resilience during the COVID-19 crisis

KSA's targeted investment in digital infrastructure over the past five years, along with its dynamic approach to digital regulation and education and its focus on improving Saudi citizens' digital skills, have together enhanced national digital readiness. Consequently, KSA's economic resilience partially mitigated the negative economic impacts of the COVID-19 crisis.

Analysis shows that the country's digital infrastructure readiness reduced the impact of the pandemic on 2020 GDP per capita (PPP) by half a percentage point (0.54 pp), limiting the contraction in the economy.



2.1 KSA's investments in digital infrastructure helped it to digital leadership

“ This section analyses KSA's digital readiness in terms of digital infrastructure, regulatory approach, and digital proficiency. It discusses how KSA's digital readiness helped mitigate COVID-19's negative economic impact, including a sectoral perspective.

KSA's focus on digital transformation has propelled it to the forefront of digital nations. This is the first plank in its digital readiness during COVID-19.

As a part of its digital transformation over the past five years, the government of KSA focused on developing its telecommunication and digital infrastructure, increasing coverage across KSA and boosting internet speeds. By promoting extensive network coverage in coordination with the private sector, KSA has made strides toward digital inclusion. For instance, as early as 2007, KSA's ICT regulator Communications and Information Technology Commission (CITC) had created the Universal Service Fund to implement high-speed wireless broadband projects for remote areas. As part of this initiative, CITC and Zain KSA signed an agreement to improve coverage for 800,000 individuals in 3,900 villages¹⁹. In 2017 the government launched a nationwide initiative to increase fiber to the home (FTTH), expanding coverage from 1.2 million households in 2017 to 3.5 million in 2020 (~66% of all households)²⁰.

The enhanced coverage resulted in KSA enjoying one of the best telecommunication networks globally ahead of the COVID-19 outbreak. According to the International Telecommunication Union²¹, virtually every Saudi had mobile cellular network coverage

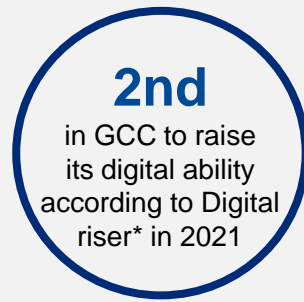
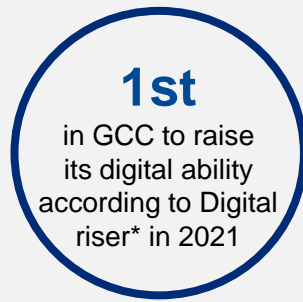
(99.99%) and a similar number of households enjoyed internet access (99.18%). The latter level exceeds that of the most developed European countries, such as France, and the UK (which have 84% and 92% coverage, respectively).

In parallel, KSA has continuously improved its mobile internet quality. KSA's government bodies, regulatory and executionary, worked together to maximize the spectrum for mobile operators. KSA ranked second among G20 countries in its frequency band allocation for mobile services in 2019²². Mobile internet speeds have likewise increased fivefold, from an average of 12 Mbps in 2017 to 59 Mbps in February 2020. Even during the pandemic, KSA continued to invest in accelerating its 5G rollout in order to further increase mobile internet performance. This allowed for more than double speeds to 147 Mbps by Q2 2021. At the time of writing, KSA enjoys the most widely available 5G network in the world (Figure 5)²³. Saudi internet users are connected to 5G 37% of the time, compared to 22% of the time in South Korea, 21% in the USA, and 4% in the UK (Figure 6).

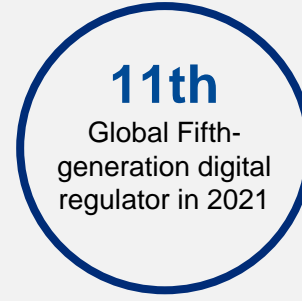
The exceptionally high-quality of the network developed by KSA has facilitated its citizens' shift to a digital economy and newly digitalized lifestyle during the lockdown^{24 25}.



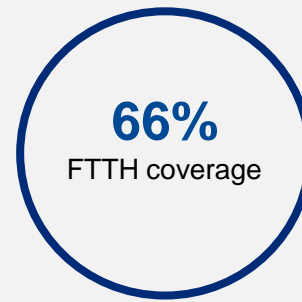
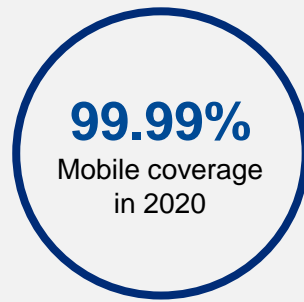
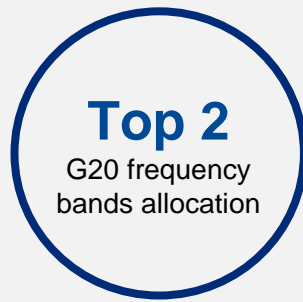
KSA is a top digital country



KSA is a leader in digital regulation



KSA is best-in-class in coverage

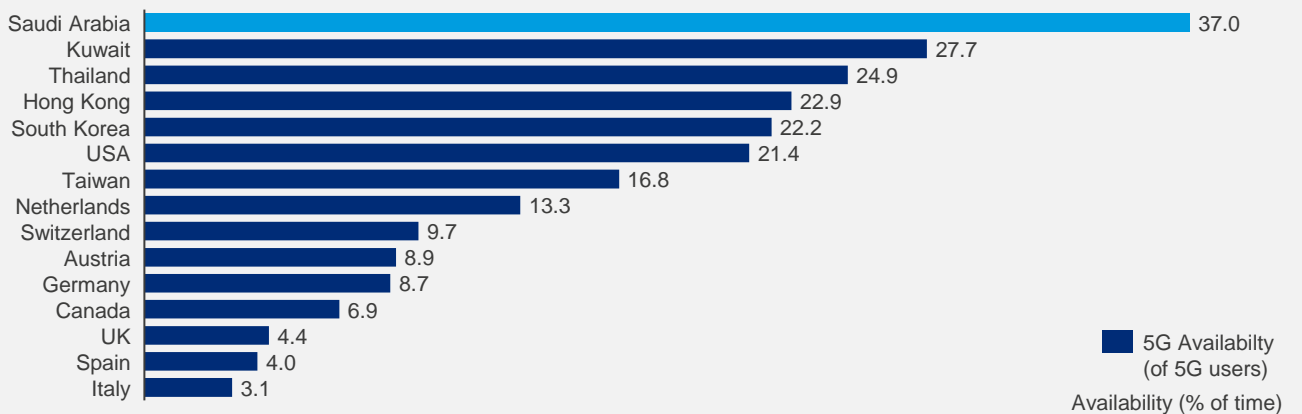


KSA is a leader in network speed



*Digital Riser measures the two core dimensions of digital competitiveness: a country's ecosystem and its mindset
Source: Digital Riser 2021 ; Digital Competitiveness Ranking 2021 ; Fifth generation regulator benchmark 2021 ; CITC ; ITU ; OpenSignal

FIGURE 6 | 5G connectivity – proportion of time 5G users are connected to 5G networks



2.2 KSA's dynamic regulatory approach for digital services enabled flexibility

The second plank in KSA's digital readiness has been the government's dynamic approach to digital regulation. This flexibility has enabled KSA to update its regulation as required. The pillars of this approach are to support digital readiness and to respond to the demands of COVID-19²⁶.

The dynamic regulatory approach adopted not only paved the way for the KSA's digital transition but also facilitated its COVID-19 crisis management. It has spurred past changes to digital regulation, such as removing restrictions on VoIP services in 2017²⁷, several years prior to the pandemic. Many applications, such as Skype, Facebook and WhatsApp, were already part of Saudis' daily lifestyles, which made COVID-19 isolation measures more manageable for Saudi citizens.

Additionally, the Regulatory Sandbox concept introduced in 2019 helped accelerate the development and launch of new digital services. While protecting consumers, the Regulatory Sandbox enabled local and international firms to deploy their solutions more efficiently than under the usual regulatory processes³². Similarly, the revised regulatory framework for cloud services

introduced in December 2020²⁸ reduced the compliance burden. This provided strong support to the delivery of IT services, benefitting Saudi SMEs. All these regulatory changes have been important in facilitating a smoother transition during the COVID-19.

During the COVID-19 crisis, KSA responded to the immediate business needs by limiting the negative impacts of the pandemic whenever possible. For instance, it fast-tracked the issuance of licenses for local and international parcel transport services, issuing 24 licenses in 2020 compared to 6 in 2019²⁹. This enabled retailers and restaurants to meet the increased demand for home deliveries.

KSA's dynamic regulatory environment has led the International Telecommunication Union (ITU) to classify KSA as a fifth-generation (G5) digital regulator alongside other world-class digital economies³⁰. In its G5 benchmarking, the ITU ranked KSA as 1st among GCC countries, and 6th amongst G20 countries. It achieved this status two years ahead of its 2023 target date (as stated in its ICT Sector Strategy 2021).

2.3 A key focus of KSA is to upgrade its citizens' digital proficiency

The third plank in KSA's digital readiness during COVID-19 has been its focus on raising its citizens' digital proficiency. Workers' skills impact both how readily digital technologies are adopted and how effectively they are used³¹. With remote working becoming the new norm for many jobs during COVID-19, KSA's digital-ready workforce has been crucial for increasing efficiency in telework.

KSA has been investing substantially in enhancing its citizens' digital skills, resulting in KSA assuming the 6th rank in the "Expenditure on Education" sub-pillar in the 2021 World Digital Competitiveness ranking. As part of this approach, KSA has launched several initiatives over the past several years to enhance its digital proficiency. MCIT has initiated its Future Skills Program³² to provide intensive training in digital skills. Digital education both supports the process of digital transformation while increasing employment opportunities in the ICT sector.

MCIT has also created the Saudi Digital

Academy, which aims to build national digital capabilities across modern technologies. In partnership with prestigious academic institutions, such as MIT and Imperial College, London, the Saudi Digital Academy's remit includes preparing Saudi nationals for jobs in the Fourth Industrial Revolution. The Academy's educational "camps" have covered leading-edge topics such as blockchain, cybersecurity, and cryptocurrency. Since its inception in 2018, MCIT's Digital Giving Initiative³³ has raised digital awareness and improved digital literacy, delivering over 1,000 training courses to 12 million beneficiaries.

KSA has more recently launched a Digital Knowledge Platform called "ThinkTech". The platform encompasses projects that explore new technological developments and raise digital awareness. To date, it has delivered digital content to more than 3.0 million users and served 100,000 event participants through its "Future Trucks" and "Virtual Labs" initiatives.

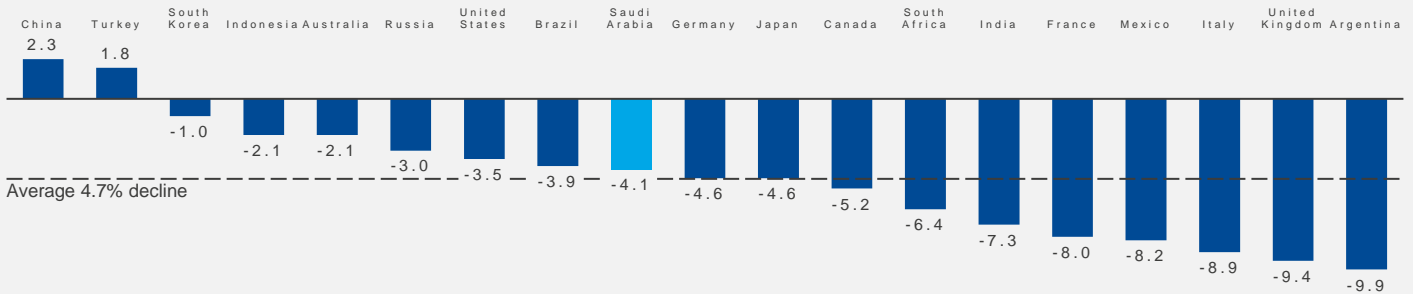
2.4 KSA's robust digital readiness helped mitigate the negative economic impact of the pandemic

“ KSA's digital readiness helped mitigate Covid-19's negative economic impact

The three planks of KSA's digital readiness not only enabled the development of a robust digital economy, but they also helped mitigate some of the negative economic impact of the pandemic. This is

demonstrated by KSA's decline in GDP being limited to -4.1% in 2020, below the average for the G20 countries of -4.7% (Figure 7), and less than half that seen in Italy or the UK.

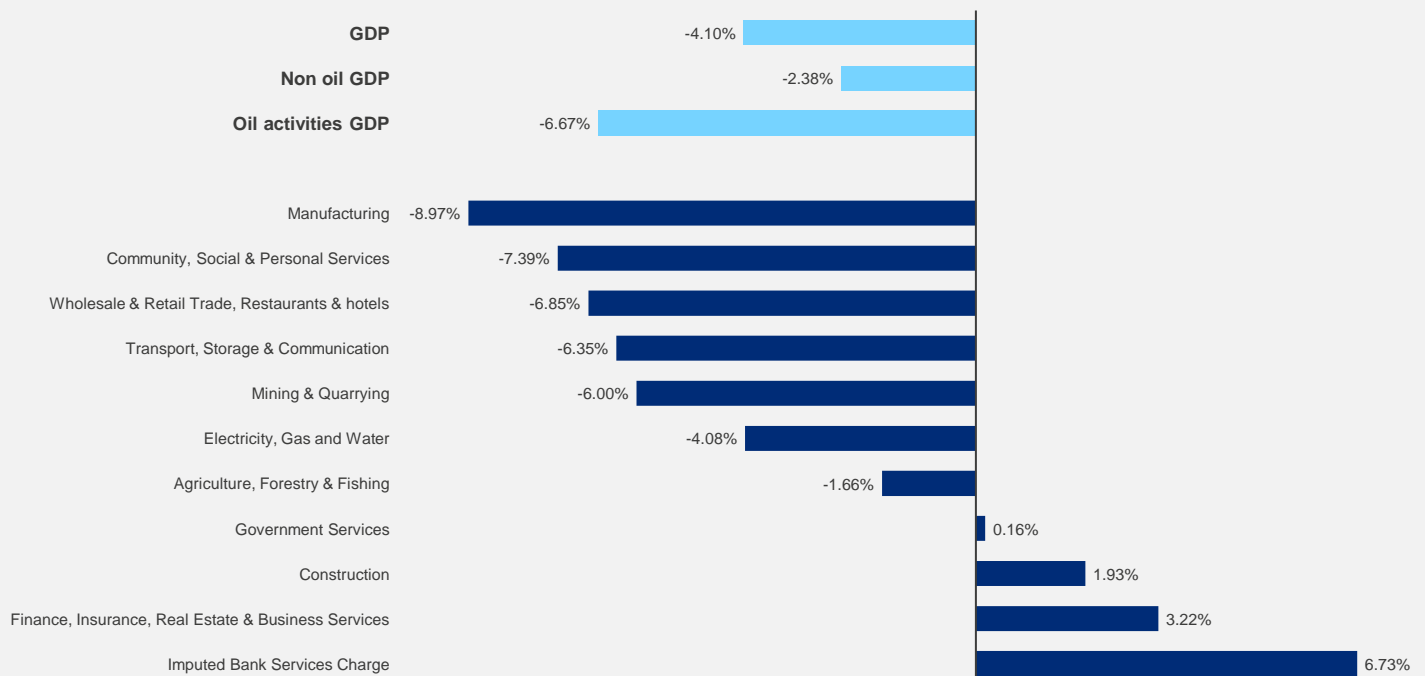
FIGURE 7 GDP change in G20 countries (YoY 2019-2020)



Zooming in on the effects of COVID-19 on KSA's economy, it is evident that the petrochemicals sector, which has historically dominated macroeconomic outcomes in the country, has suffered more than other sectors. In 2020 there was a 75% decline in oil prices, which caused KSA's oil activities to contract by -6.67%. However, non-oil activity declined at about only a third this rate, by -2.38% (Figure 8).

Within the non-oil economy, the sectors most dependent on the mobility of people were among those hardest hit, including manufacturing, community, social and personal services, wholesale, retail trade, restaurants and hotels, and transport, and storage and communication (Figure 8). Only four sectors managed to maintain growth in 2020: bank services charge, finance, insurance and business services, construction, and government services.

FIGURE 8 Saudi Arabia GDP and sector growth (YoY 2019-2020)



“ Strong digitization trends supported an increased ICT spending in the sectors most contributing to the ICT market.

The negative economic shock of COVID-19 would have been of larger magnitude had it not been for the economic resilience provided by the country’s digital transformation. This added resilience has three main aspects to it: (1) the sustained growth of the core digital economy

represented by the growing ICT market size, which grew to USD 31.2bn in 2020 (Figure 9); (2) the role of mobility technology in the pandemic; and (3) the leverage of KSA’s digital infrastructure to mitigate the effects of lockdowns.

FIGURE 9 ICT market size across all sectors in Saudi Arabia (USD BN)



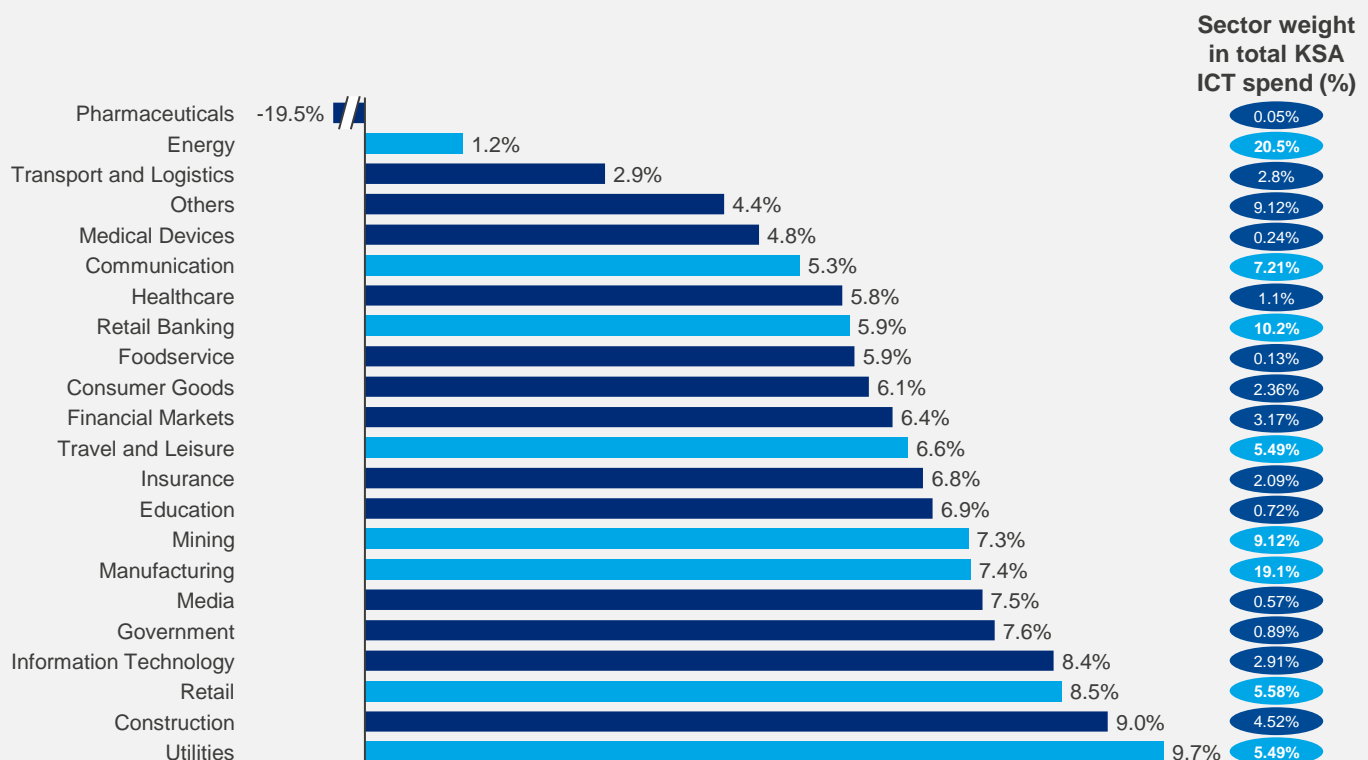
Source: IDC, GlobalData

2.4.1 ICT market growth

There are three components that comprise the ICT market’s contribution to GDP: incremental ICT spending across all sectors, the incremental value added by ICT sector labor, and the incremental value of ICT sector capital expenditures to acquire, upgrade, maintain assets.

In terms of spending, almost all Saudi economic sectors increased their ICT expenditure during the COVID-19 crisis. Several sectors undertook particularly significant digitalization efforts during the pandemic, including energy, manufacturing, retail banking, mining, communication, retail, travel and leisure, and utilities (Figure 10)³⁴.

Figure 10 ICT spending growth by sector, % change 2020, year on year



While the energy sector's ICT spending increased by 1.2% year-on-year in 2020, ICT spending in the manufacturing sector grew much more strongly, by 7.4% year-on-year, where ICT applications proved central to maintaining some level of production and avoiding disruption due to the increased risk of stock shortages.

One key sector worth noting is the retail banking, which increased its ICT spending by 5.9% in 2020. Most of the challenges of the sector during the pandemic centered on maintaining business continuity and serving clients through digital channels, as many moved to a remote work environment. Nearly 68% of Saudis³⁵ tried a new banking payment method during this period that they would otherwise not have tried. The proportion of contactless transactions rose by 25% between January 2020 and December 2020³⁶. The banks increased their investments in digital wallets, digital channels, and platforms to respond to these new customer behaviors and to better serve their customers.

Communication was one of the few sectors to benefit globally from the COVID-19 crisis. This holds true in KSA, where the pandemic accelerated significantly the adoption of digital communication tools, as discussed in Section 1. ICT spend increased by 5.3% in 2020.

Retail also increased its ICT spend in 2020, by 8.5%. This was due largely to the need to respond to consumers who shifted their purchases from shopping malls to online stores. In consequence, retailers' digital channels enjoyed buoyant growth during the pandemic, as shown in Section 1. For instance, the grocery retailer BinDawood announced that its average online sales rose by 200% over a 10-day period, with its average order value increasing by 50% since the escalation of the pandemic in March 2020. Traditional merchants had to adapt quickly to avoid revenue losses and business closure. Those that rapidly integrated digital options into their customer journeys fared better.

Travel and leisure, which includes hospitality, tourism and entertainment sectors, increased ICT spending by 6.6% in 2020, fueled mainly by the entertainment sector.

The hospitality and tourism sectors, which are usually highly dependent on people visiting physical venues, were unable to use digitalization to mitigate COVID-19's effects. In general, Riyadh hotels recorded an occupancy rate of 49% in 2020 compared to 60% in 2019. Within this, the pandemic changed customer behavior even in hotels, moving people towards digital and touchless technologies, which led the sector to increase its ICT investments. For instance, mobile keys enabled customers to avoid contact with staff members and other guests. In leisure, KSA worked to develop its virtual entertainment sector, holding a virtual 12-hour music festival in June 2020, for instance. KSA's gaming sector saw very substantial growth during the pandemic, growing by 41.1% year-on-year in 2020.

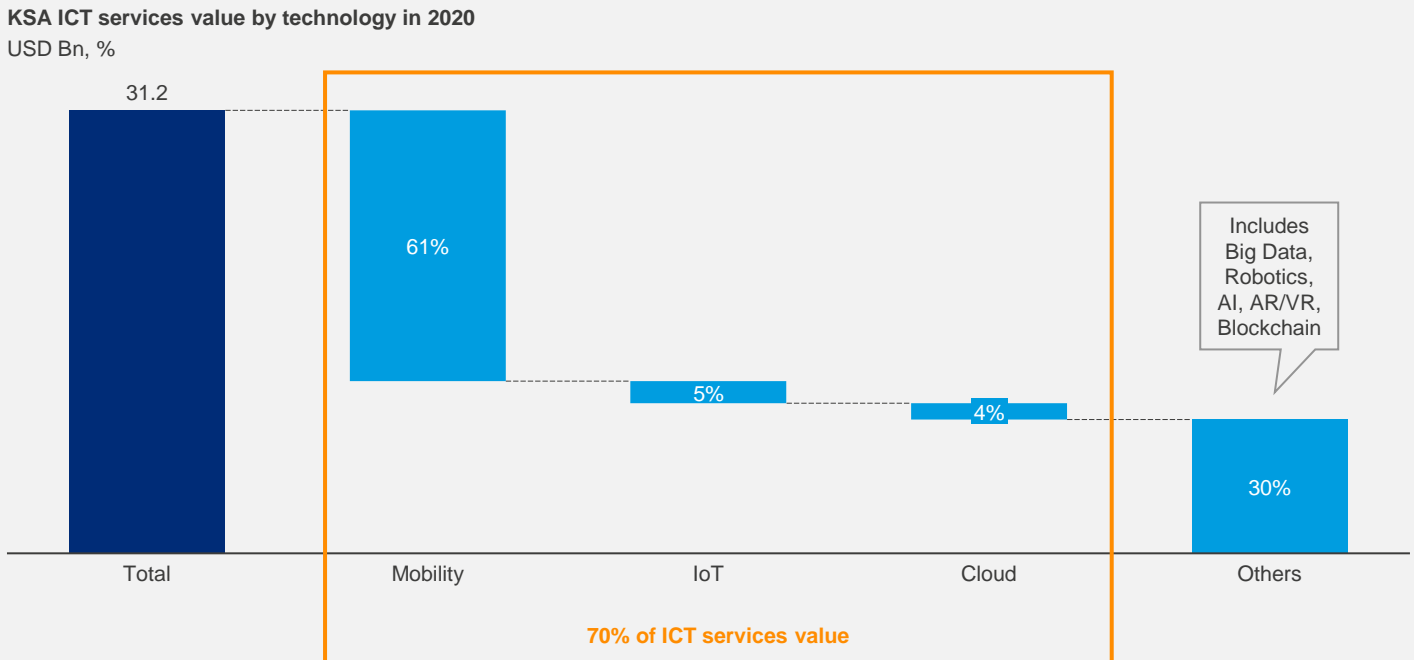
Lastly, utilities witnessed the highest growth in ICT spend, with a 9.7% year-on-year rise. This was powered by the development of digital services and online tools to enable individuals to manage consumption and bills.

BOX 1 Selective zoom in on sectors

2.4.2 | Mobility technology's major contribution to ICT market growth

Mobility technology comprises the intelligent transport systems and mobility networks that are transforming traditional mobility options and creating new modes of transportation, integrated with digital solutions and artificial intelligence in the burgeoning context of the IoT (the integration of physical objects embedded with sensors, software, and other technologies so that they can connect and exchange data with other devices through communication networks, including the internet). Mobility technology made the largest technology-related contribution to ICT market growth, accounting for over 60% of the total value (Figure 11). The availability of advanced mobility services during the pandemic enabled KSA's delivery services to grow to three times the size of its pre-lockdown levels³⁷.

Figure 11 | Saudi Arabia ICT services value by technology in 2020, (USD Bn, %)



Source: IDC, GlobalData

The contributions of the IoT and Cloud services to this growth, while significant, were much smaller, at 5% or less.

During the pandemic, IoT solutions found a new application in the remote monitoring of health, which enabled experts to gather data that enabled them to make better forecasts about the course of the pandemic. The COVID-19 crisis also encouraged businesses to adopt customer-centered IoT solutions, as Saudis increased their usage of digital services. A CITC forecast suggests that 82% of medium and large Saudi companies will have adopted at least one IoT solution by the end of 2022³⁸.

The third contributor to ICT growth is from cloud services, including the infrastructure, platforms, and software hosted by third-party providers and that is made available to users through the internet. Due to the increase in digital services stimulated by the pandemic, Saudi firms have started adopting global hyper-scalers' cloud services to scale their operations, in order to reduce costs or otherwise optimize resource use³⁹.

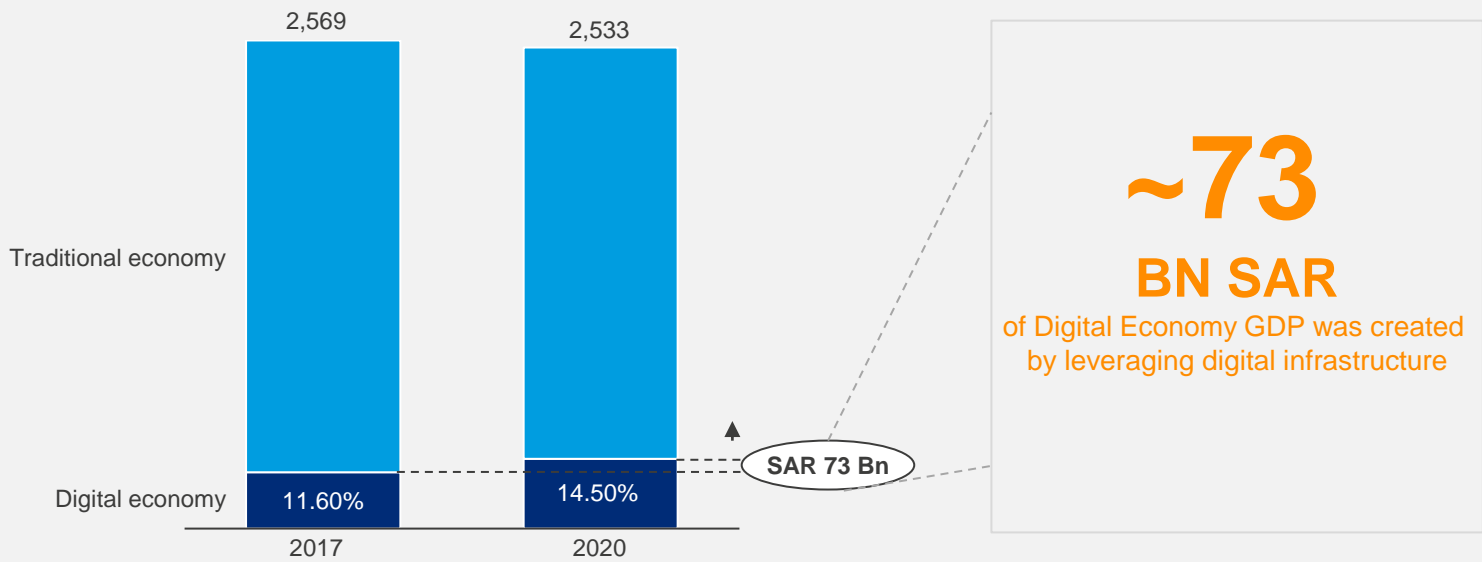
2.4.3 Soundness of the Saudi Digital Economy

Digital infrastructure's role in Saudi's economy is clear through the enablement of the digital economy. The digital economy played a significant role in uplifting the KSA's GDP between 2017 and 2020. In 2017, digital economy contribution was at 11.6% of GDP compared to a 14.5% in 2020. It generated an estimated value of ~SAR 73 Bn to the Saudi's economy. This value reinforces the importance of a strong digital infrastructure in the Kingdom. The investments made by KSA over the years have reaped its benefits.

Figure 12 KSA GDP Distribution Between Traditional and Digital Economy

KSA GDP

(Bn SAR at constant price)



Source: General Authority for Statistics, MCIT TFC team

2.4.4 Digital infrastructure's benefits in mitigating the pandemic's economic impacts

An ITU study reveals that countries with the best infrastructure for connectivity were more able to offset the negative economic impacts of COVID-19. This highlights the direct correlation between the number of deaths due to COVID-19, national levels of fixed broadband (FBB) penetration, and the extent of the fall in GDP per capita (adjusted PPP). The starting premise is that an increase in COVID-19 deaths negatively impacts a country's GDP per capita, as shown in Figure 12⁴⁰. The ITU study measured the extent to which similar increases in COVID-19 deaths had different levels of negative impact on the GDP of a country, depending on its FBB penetration level. The important implication of this relationship is that

countries with higher FBB penetration saw a lower economic impact, in terms of GDP per capita (PPP), compared to those with lower FBB penetration⁴¹. Because of the strength of the correlation, and based on the triangulation of these three factors, an estimate of the likely fall in GDP in a country is possible.

By mapping KSA's FBB penetration levels in 2017 and 2019 to the study brackets (Figure 12), we can extract the coefficients corresponding to the GDP per capita change per 1% increase in COVID deaths for each FBB penetration level: -0.024% for 2017 and -0.021% for 2019⁴².

FIGURE 13 Relationship of contraction in quarterly GDP per capita (PPP) to each 1% increase in COVID-19 deaths by level of fixed-broadband penetration



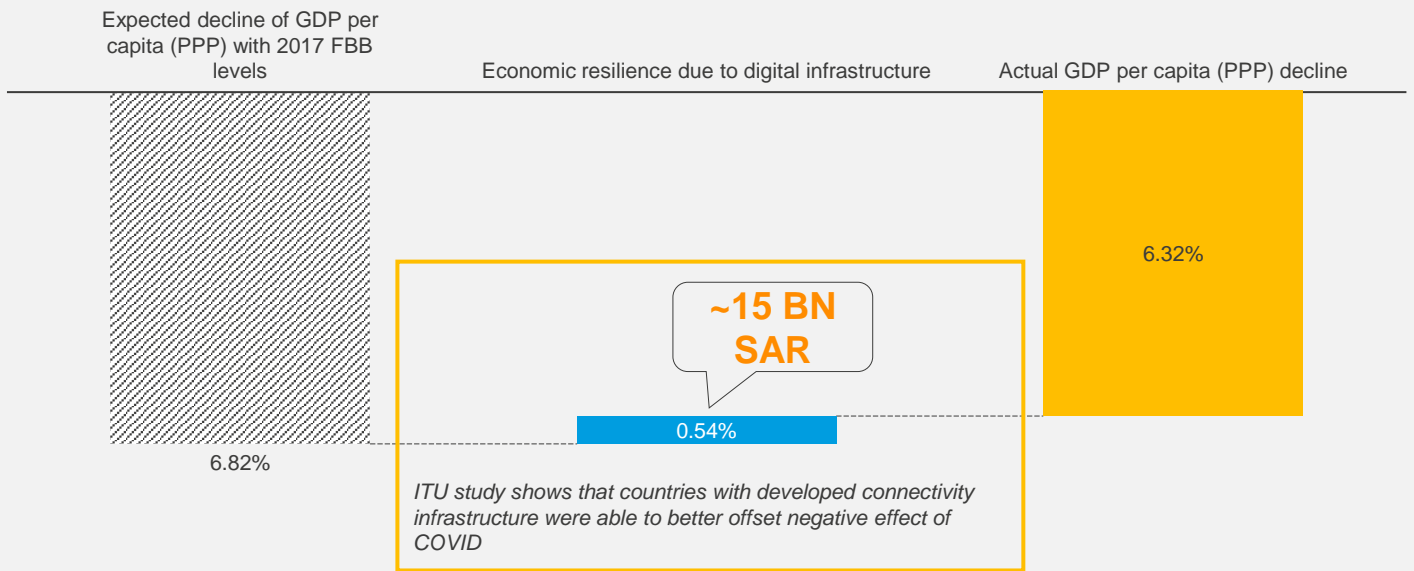
The actual GDP per capita (PPP) decline in 2020 was 6.32%. However, if KSA would have FBB penetration at 2017 level, based on the formula of the ITU study, the estimated fall of GDP per capita (PPP) would

be -6.82%⁴³. Based on this analysis, it can be inferred that KSA's investment in FBB helped mitigate the fall in GDP per capita (PPP) by 0.54 percentage points (Figure 13)⁴⁴.

FIGURE 14 Simulation of Saudi Arabia's 2020 GDP decline with different levels of FBB penetration

Simulation of GDP per capita (PPP) savings via digital infrastructure and digitalization

% YoY change, 2020



Source: ITU ; Statista ; FTTH Council MENA ; Oliver Wyman analysis

3

Accelerating KSA's digital transformation to enable greater economic resilience and faster economic growth

This section presents a perspective on the future of consumer behaviour and the digitalization of society. It also discusses KSA's commitment to drive further adoption of digital services in the future.

KSA's digital transformation is moving at a rapid pace. The pandemic has brought about fundamental changes to our digital behaviors while new technologies will further bolster digitalization.

KSA's public sector intends to collaborate with the private sector to accelerate this digital transformation. This collaboration will

support the rapid adoption of digital services, including through continuous investment in digital infrastructure, the further development of nationwide digital proficiency, and a continued dynamic approach to digital regulation. Moreover, the collaboration between the public and the private sector will support continued technological research and innovation in digitalization.



3.1 Certain pandemic-driven consumer behaviors will persist beyond COVID-19

The pandemic has considerably affected people's behavior as workers and consumers. As accentuated earlier, the world has witnessed new trends in remote working, widespread use of e-commerce, and changed consumer behavior. Once countries fully adapt to consequences of the pandemic, shifts in consumer behaviors are likely to shape a new way of living for years to come.

The new post-pandemic norm is likely to comprise a hybrid model of remote working. Some 48% of employees surveyed in 2020 expected to continue working remotely after COVID-19⁴⁵. In response, a large range of companies have introduced flexible work policies. In KSA, such policy changes were adopted by the leading telecommunication operators such as STC and Cisco KSA⁴⁶.

Cisco even paid for employees' home broadband connections⁴⁷.

The shift in consumer behavior⁴⁸ that drove the rapid adoption of e-commerce during the pandemic is expected to persist. As a result, the e-commerce market in KSA is projected to continue to grow, increasing by 25% in the period 2020 to 2025 to reach a market size of SAR57 bn.⁴⁹ The number of e-commerce users in KSA is expected to grow to 34 million by that point⁵⁰, reaching 91% of the population⁵¹.

In education, the growing trend in online-based upskilling and mentoring is propelling high levels of online coaching software market growth globally, with expected annual growth of 15% in the period 2021 to 2029⁵².

3.2 Further digitalization will be fueled by new technologies

The rising global adoption of new technologies by society and multiple industrial sectors will further drive digitalization. With the onset of the metaverse, for instance, it is likely that digital transformation will expand, resulting in additional interactions becoming purely digital. In recognition of this shift, Facebook is renaming itself as Meta⁵⁴.

In KSA, the demand for digitalized services continues to rise. According to a 2021 survey, 90% of consumers in the country are actively looking for ways to simplify their lives, and digitized immersive experiences

are the most sought-after means through which to save time and provide convenience⁵⁵.

The demand for metaverse-related services is likely to drive digitalization in a range of sectors, including retail, e-learning, route navigation, and home entertainment. KSA has already started adopting digitally immersive experiences at large scale to cater to this emerging demand. For example, the new smart-city NEOM has launched a digital twin metaverse platform called XVRS⁵⁶.

3.3 KSA will continue to support the rapid adoption of digital services

KSA digital transformation efforts allude to a commitment towards adopting further digitalization to support all economic sectors. This transformation will be accelerated through its focus on three areas, as explored below, specifically by: (1) ensuring that all the enablers of the digital ecosystem are

developed in tandem; (2) promoting new technologies in key sectors); and (3) introducing public-private partnerships focused on critical aspects of the digital transformation.

3.3.1 The three main enablers of the digital ecosystem

During the pandemic, KSA identified three main enablers of the digital ecosystem that underpin its digital transformation. These are digital infrastructure, digital proficiency, and digital regulation and protection.

Enabler	Context	Initiatives
Digital infrastructure	Needed to meet increased demands on bandwidth and internet speeds	<ul style="list-style-type: none"> – ICT commitments in Saudi Vision 2030 – National broadband plan – Hyper-scale data centres
Digital proficiency	Needed to increase digital services adoption by users	<ul style="list-style-type: none"> – Skills development program for ICT workforce – Tuwaiq Academy – Partnerships with tech giants
Digital regulation and protection	Needed to adapt to new business models and build consumers' trust and confidence	<ul style="list-style-type: none"> – CITC regulatory sandbox – Personal Data Protection Law – National Data Management Office

Digital infrastructure

The pandemic underlined the importance of digital infrastructure in accommodating new ways of working, living, and learning. This adaptability will be further facilitated by the introduction of next-generation networks which provide higher bandwidth and improved internet speeds.

KSA is committed to continuing to develop its digital infrastructure, as outlined by Saudi Vision 2030's ICT pledge⁵⁷. The country has already accelerated its rollout of 5G to ensure that there is a high-quality network for the most demanding solutions⁵⁸, increasing the number of areas covered in 2021. As part of the second phase of the National Broadband Plan, KSA aims to ensure that over 90% of the country is covered by high-speed broadband. The country will upgrade its digital infrastructure to be fully in line with the requirements of 5G

and IoT.

In 2021, MCIT announced four new initiatives to develop hyper-scale data centers, which will provide low latency and high-speed data processing. The investment – budgeted at ~SAR 68 bn – will create an estimated capacity of 1,300 MW. The centers will leverage environmentally friendly and renewable energy generation projects currently under development across the country⁵⁹. The new data centers will position KSA as the major data hub in the region, able to serve the region's needs through hosting the most critical platforms and content.

The development of strong local storage, processing, and networking infrastructure will ensure that KSA is well-positioned to mitigate future economic shocks.

Digital proficiency

For KSA's digital infrastructure to achieve its full potential, its citizens will need to acquire a strong level of digital proficiency. Without the required skills, the population would not be able to play a role in the digitally transformed environment.

As outlined in Saudi Vision 2030, KSA has developed several initiatives at a cost of SAR 4.5BN to close the digital proficiency gap. These initiatives include fast-tracking the skills development of its ICT workforce and enhancing citizens' digital literacy and improving the digital skills of 100,000 young Saudis by 2030. Additionally, the Tuwaiq Academy, established in 2020, aims to empower 100,000 programmers by 2030.

Alongside its commitment to improving digital skills, it will become increasingly important for KSA to adapt to the globalized, competitive job market. In August 2021, KSA announced partnerships with several multinational corporations, including Amazon, IBM, Cisco, Oracle, Informa, and Microsoft to create digital capability centers. The goal of MCIT's ICT Strategy 2023 is to create more than 25,000 quality jobs in the ICT sector.

Digital regulation and protection

The pandemic highlighted the successes of KSA's Regulatory Sandboxes, its dynamic regulatory framework, and its user cybersecurity as three key enablers of digitalization. Its regulatory environment was successful in enabling the government and retail and education providers to adapt to the rapidly changing circumstances of the pandemic. One example of how this regulatory flexibility is aiding the digital transformation is seen in the success of CITC's regulatory sandbox, which was set up to support the growth of KSA's delivery

application ecosystem⁶⁰.

To ensure that suitable regulations are in place to enable the development and deployment of such technologies will help build consumers' confidence in the trustworthiness of KSA's digital transformation. As such, regulatory bodies will need to continue to adapt regulation as emerging technologies give rise to new business models and value chains.

Additionally, the regulation of personal data will play a key role in building this confidence. Such regulation is crucial for ensuring the protection of privacy, to regulate data sharing, and to prevent the misuse of personal data. KSA has already embarked on putting in place such protection by introducing a Personal Data Protection Law, which entered into force on March 23, 2022. The new law is designed to regulate the collection, processing and use of personal data⁶¹. This is expected to have a major impact on the digitalization of key economic sectors. One example of how it will achieve this is in addressing the challenges around patient's data availability. This has potential to significantly improve the quality and adoption of telemedicine. The Saudi Data and Artificial Intelligence Authority (SDAIA) has in addition established a National Data Management Office to develop the regulatory frameworks needed for the ethical use of data and AI⁶². Such regulation will continue to be prioritized and adapted to ensure data is secure at all levels of service provision.

KSA has also recognized the need for increased cybersecurity. In order to enable future growth and prosperity, its National Cybersecurity Strategy seeks to ensure that its cyberspace is safe and reliable⁶³.



3.3.2 New technologies will play a crucial role

In addition to the three essential digital ecosystem enablers, technological innovations are also likely to play a key role in accelerating the digital transformation of a number of economic sectors. Continuous research into satellite technology, AI, Big Data, nanotech, and robotics, to name just a few of the new and emerging technologies, can make enormous contributions to the transformation of the economic and society.

The following are a few examples of the potential applications these new technologies could make to various sectors:

- **Wholesale and hospitality:** Investment in virtual touring and touchless technologies could aid the recovery of these sectors, which were hit badly in the pandemic, as well as help ensure their future resilience.
- **Food supply chains:** Breakthrough technologies could be integrated into agribusiness, farming, and e-commerce. Blockchain, for example, can bring transparency to supply chains by enabling buyers and sellers to trace agricultural goods throughout the entire production process from farm to table.
- **Finance and business services:** The finance sector will benefit from IoT integration and shared ledgers like those enabled by blockchain. Advances in AI and robotics could also make customers' interactions with technology far more natural.

- **Healthcare and education services:** Epidemics will continue to threaten healthcare providers and public health institutions. However, it is possible to mitigate the impact of such outbreaks by harnessing Big Data and AI to improve both epidemic management, including tracking incidence. In the education system, virtual reality products could create an immersive digital world, enabling students to interact in virtual 3D spaces that enhance their learning experience.
- **Government services:** The pandemic accelerated the digitalization of a range of public services. Further technological advances will improve how governments can deliver such services. For instance, AI and Big Data analytics can be applied to speed up financial fraud investigations.
- **Manufacturing:** Digitalization can reduce the risks of disruption during production. For example, IoT technologies can be used for predictive and proactive maintenance, real-time monitoring, resource optimization or efficiency analysis.

Digital innovations have the potential to radically enhance a variety of different economic sectors, disrupting current business models. With good infrastructure, well-trained human capital, and a robust regulatory framework, KSA should be in an excellent position to achieve its goals in digital transformation.



3.3.3 Public-Private Partnerships can accelerate the digital transformation

Public-Private Partnerships can also play a critical role in accelerating KSA's digital transformation, pooling the resources and expertise of academia, civil society organizations, and private sector actors, each of whom can provide valuable perspectives on new initiatives and regulation.

Public private partnerships can provide benefits to all parties. Governments benefit from offloading the cost of funding and the project risks, attracting private investments into the economy, while acquiring private sector expertise and improved operating efficiency. The private sector, in return, is empowered to do what it does best, and improve the efficiency and quality of services.

Focus needs to be given to four critical areas to ensure public-private partnerships programs' success:

- **Transparent and aligned objectives:** Each project should be aligned with KSA's national strategic objectives. The government needs to agree on which benefits it intends to capture in its partnerships with private sector entities. It will need to define each operating model according to the nature of the partnership.

- **Unified legal and regulatory framework:** All contracts and agreements need to be thoroughly watertight, with effective resolution systems to ensure that all parties receive equitable outcomes from the partnership.
- **Clear governance and monitoring mechanisms:** Clear separation between the regulatory body and the partnership entity's owners is essential to eliminate potential conflicts of interest.
- **Comprehensive communication strategy:** The communications should be designed to highlight expectations that are realistic, to underline the desired goals and outcomes of the partnership, and to celebrate successes.

KSA launched its Advisory Groups Initiative in 2021 in order to enhance communication and cooperation between the government and the private sector actors in the development of a competitive ICT sector. The National Transformation Program, started at the same time and now in its second phase, also aims to enhance collaboration between the public, private and non-profit sectors in support of the ongoing digital transformation and KSA's Vision 2030⁶⁴.



Conclusion

KSA's digital transformation has made it the global leader of digital access. Investments made in the country's digital prowess not only allowed KSA to adjust quickly to the new circumstances of COVID-19, but also addressed the long-term behavioral shifts of individuals and businesses. KSA's digital infrastructure, adaptable regulatory regime, and high levels of digital proficiency affirmed their value in 2020, allowing for a continuation of many activities in e-commerce, working from home, and online education. As such, KSA has successfully mitigated some of the worst consequences of the economic impact of the pandemic. Overall, the country's digital infrastructure mitigated pandemic-induced negative impacts on GDP per capita (PPP) by around 0.54%. KSA will further accelerate its ongoing digital transformation through renewed focus on three areas: digital enablers, new technologies, and public-private partnerships.

Digital enablers will further increase digital resilience through the introduction of next-generation networks to provide higher bandwidth and improved internet speeds. Over 90% of KSA's landscape will be covered by high-speed broadband compatible with 5G and IoT. This coverage will support citizens in acquiring a strong level of digital proficiency, prompting 100,000 young Saudis to become software programmers. In parallel, the improved coverage will build on the successes of Regulatory Sandboxes, dynamic regulatory frameworks, and user cybersecurity, all of which proved resilient during the pandemic.

New technologies are anticipated to be transformational to both the economy and society in KSA. As early as 2007, KSA had created the Universal Service Fund to implement high-speed wireless broadband projects for remote areas. In 2017 the government launched a nationwide initiative to increase (FTTH), expanding coverage from 1.2 million households in 2017 to 3.5 million in 2020 (~66% of all households).

Public-private partnerships will play a crucial role in accelerating KSA's ongoing digital transformation. For example, the National Transformation Program aims to enhance collaboration between the public, private and non-profit sectors in support of the ongoing digital transformation and KSA's Vision 2030.

To conclude, the adaptability of KSA in the face of COVID-19 has been profound. Numerous studies and figures have captured the impact of KSA's adaptability quantitatively. For instance, e-commerce grew by 60% overall, App-based home delivery business increased three-fold, 65% of Saudi employees shifted to remote working from home, and almost all Saudi students moved to online learning. Moreover, the impact of KSA's adaptability can be assessed qualitatively as well: a survey from the World Bank found that over 66% of teachers in KSA believe that their students' academic performance increased during the period of the pandemic.



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