



# Digital KSA: Assessment and Way Forward for the Digital Economy

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# Contents

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Executive summary	3
1. Digital economy – SAR 200+ bn opportunity not to be missed	5
2. Digital KSA – Addressing the who, what and how of a successful digital economy	7
3. The way forward – Targeting key challenges and opportunities for KSA	12
Conclusion	15
Abbreviations	16
Annex	17
Authors and acknowledgements	18

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# Executive summary

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Digital transformation is undoubtedly the largest revolution of our time. Technology has evolved from being an enabler to becoming an integral part of today's economy, not only changing the way we work but also disrupting traditional business models and unlocking new ones. The "digital economy" encompasses purely digital sectors such as media, ICT and e-commerce, as well as traditional sectors impacted by digitalization to a larger or smaller degree.

The Kingdom of Saudi Arabia (KSA) is taking decisive steps towards digital transformation, as a key lever to achieve its vision 2030 goal of diversifying the economy and become less reliant on hydrocarbon resources. To this effect, it has set up the National Digital Transformation Unit, coordinating efforts across sectors and monitoring the overall progress of digital transformation in the Kingdom. The digital economy in KSA is estimated to have contributed 17.7 percent GDP in 2020 (SAR 449 bn) and expected to reach 19.4 percent by 2025 (SAR 586 bn).<sup>1</sup> A promising digital economy must be built upon not only the most innovative technologies, but also the confluence and coordination of 13 identified building blocks that establish the different stakeholders (who), necessary pillars (what) and enablers (how) to unlock the socioeconomic benefits of digital transformation.

This report analyzes KSA's current progress at each of the building blocks and outlines critical transversal areas for the Kingdom to keep focusing on. Several recommendations have been identified through an indicator analysis, comparing KSA with the rest of G20 countries, as well an analysis of country-specific initiatives and challenges. Proposed actions are based on international best practices and consider KSA's context:

- **Meet the skills requirements for the modern Saudi digital workplace,** bringing together educational institutions at all levels, as well as the public and private sectors, to identify, nurture and update critical skills for Saudi's growing Digital Economy job market. Enhancing the digital skills of education professionals, launching training programs for adults to enhance digital inclusion and promoting collaboration between universities and the private sector are successful initiatives in other countries to be leveraged in KSA.

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<sup>1</sup> National Digital Transformation Strategy 2019, NDTU

- **Update the required policy and regulations to facilitate digital transformation in KSA.** Ensure that the regulatory framework can maintain pace with technological developments, addresses the right challenges and is enforced despite the cross-border nature of technology. Cross-entity collaboration and involving all stakeholders in the decision-making process are key success factors, and countries such as the United Kingdom can be looked upon as examples in this field.
- **Nurture the digital innovation and start-up ecosystem in KSA.** With a young, digitally enabled population that represents a large local digital consumer base, KSA has a golden opportunity to develop both its broader and ICT-focused start-up ecosystems. Recommendations for KSA in this field include finding a unique value proposition, leveraging its strengths in fields such as oil & gas and smart cities, ensuring strong Intellectual Property (IP) protection systems and reducing red tape.

While these recommendations address critical challenges for KSA along the digital-economy journey, it is vital to understand that a holistic and coordinated implementation across all building blocks in the digital economy is key to ensuring KSA's success in today's and tomorrow's economy. Transversal initiatives will increase not only the chances of achieving the defined goals but also determine how fast KSA gets there.

# 1. Digital economy – SAR 200+ bn opportunity not to be missed

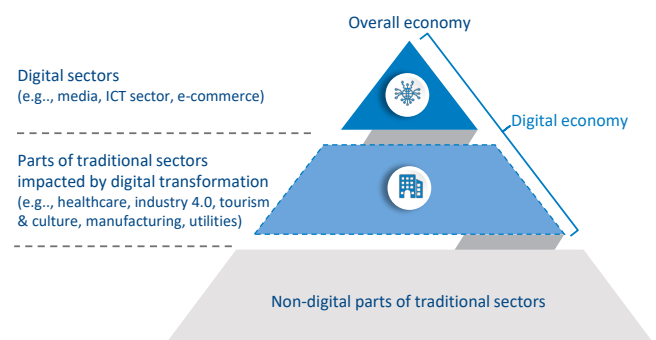
Digital technologies have exponentially transformed the way we live and work. As of today, virtually all sectors have been impacted by the digital revolution to a larger or smaller extent. Truly embracing technology is an imperative to ensure competitiveness and prosperity in the digital era.

The comprehensive use of technology unlocks multiple social and economic benefits. Firstly, digitalization enables inclusion, allowing, for example, small and medium-sized enterprises (SMEs) in KSA to sell their products and services online and compete on a global scale. Secondly, digital technologies contribute to increasing efficiency, in that companies and government entities can make better use of capital and labor by leveraging the speed, reliability and intelligence of digital tools. KSA's government has introduced multiple initiatives to improve efficiency in the way they interact with different stakeholders. For example, the "Meras" online platform provides entrepreneurs with all government services needed to start a business in one day. Thirdly, new digital technologies promote innovation and allow companies to challenge conventional business models. For example, the high-tech megacity NEOM is placing innovation at the core of city strategy and infrastructure, unlocking business opportunities and improving the lives of citizens. Adopting new technologies and finding innovative use cases across industries will be key for KSA to achieve its Vision 2030 goals of diversifying the economy and becoming a digitally enabled technology, trade and investment hub.

The pace at which digital technologies are evolving, as well as the increasingly important role they are playing in our society

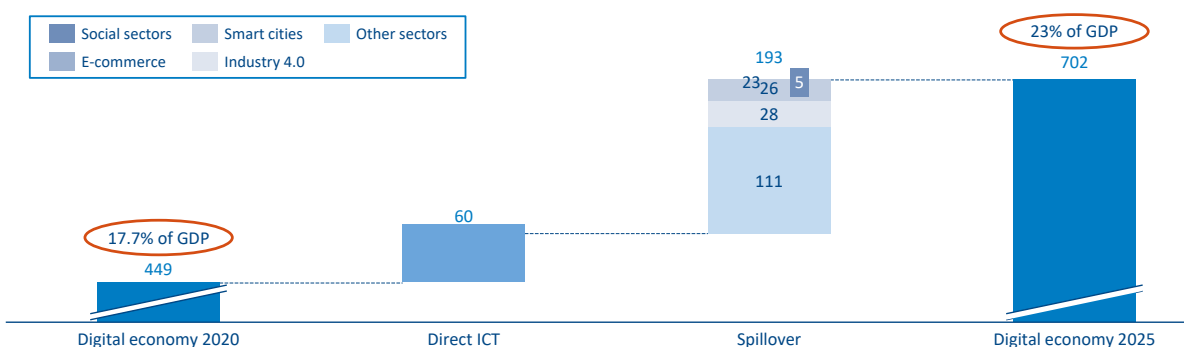
and economy, make it difficult to agree on a definition for "digital economy". For the purposes of this report, we will define it as "the economic and social output derived from the use of digital technologies across sectors". The digital economy encompasses purely digital sectors, such as media, ICT and e-commerce, as well as parts of traditional sectors impacted by digitalization (e.g., Industry 4.0) (see Figure 1). KSA has demonstrated full commitment to the development of the digital economy; it is one of the Kingdom's key objectives to unlock the potential of non-oil sectors and ultimately help grow and diversify the Saudi economy. Although the digital economy is estimated to have contributed 17.7 percent to KSA's GDP in 2020 (SAR 449 bn), it is expected to grow ~SAR 137 bn and reach 19.4 percent by 2025 (SAR 586 bn)<sup>1</sup> (see Figure 2). This presents Saudi companies with an opportunity to unlock revenues exceeding SAR 200 bn. Such a chance to strengthen the Kingdom's position as a regional and global economic leader cannot be missed.

Figure 1: What is the digital economy?



Source: Arthur D. Little analysis

Figure 2: KSA's digital-economy contribution to real GDP (in SAR bn)



Source: Arthur D. Little analysis



## 2. Digital KSA – Addressing the who, what and how of a successful digital economy

Digital transformation is the path towards successful development of the digital economy. In KSA, several sectors have been early adopters due to their economic and/or social impact. These include health, education, e-commerce, smart cities, Industry 4.0, tourism, culture, government and infrastructure. However, in addition to industry-specific initiatives, a transversal (i.e., cutting across all dimensions) approach must be taken to ensure common challenges and synergies can be addressed. **Thirteen transversal building blocks of a digital economy**, which will bring together the “who,” “what” and “how” have been identified as key to unlocking the socioeconomic benefits of digital transformation in KSA:

**Participants in the digital economy (“who”):**

These are the different stakeholders within the digital economy, with different needs and requirements. Four main groups are identified as separate building blocks from a participant perspective, which both consume and produce digital tools and content:

1. Individuals
2. Enterprises
3. Start-ups
4. Government

**Pillars for the digital economy (“what”):**

In order to create a digital economy, certain elements ranging from physical to softer ones must be made available to the identified stakeholders:

5. Infrastructure and devices
6. Data
7. Content and services
8. Skills
9. Trust and security

**Enablers for the digital economy (“how”):** Certain elements are key to provide the right environment for a thriving digital ecosystem:

10. Regulation
11. Innovation
12. Institutional frameworks
13. Funding, venturing, seeding

To clarify KSA’s current position in the transformation of the digital economy, relevant indicators for each of the building blocks have been measured and compared to those of the world’s leading economies: G20 countries<sup>2</sup> (see Figure 3).<sup>3</sup>

Figure 3: Ranking of G20 countries by building block in a Digital Economy






Source: Arthur D. Little analysis  
 Notes: (1) The European Union as a supranational entity has been excluded from the analysis

2 The European Union as a supranational entity has been excluded from the analysis  
 3 See Annex for detail of indicators by building block

On average, KSA ranks on the 10<sup>th</sup> position, aligned with national GDP per capita distribution – at USD 19,586,<sup>4</sup> where KSA ranks 10<sup>th</sup> among the Group of 20. However, individual analysis by building block using indicators as well as qualitative data allows us to identify key challenges, opportunities and best practices for KSA in the journey to a thriving digital economy.

In the following sections, the different building blocks are assessed and classified in three categories:

-  Advanced
-  On track
-  Lagging

## 2.1 Participants in the digital economy (“Who”)

### Individuals

In a digital economy, individuals play a key role on both the demand and supply sides, as they generate and consume data and pay for products and services. Wide-spread and deep adoption of digital technologies from an individual perspective allows the full potential of the digital economy to be unlocked. Several indicators show the average citizen in KSA is well connected to the digital environment. An estimated 68 percent of Saudis are active on social media,<sup>5</sup> mobile broadband penetration in the country is among the world’s highest (ahead of countries such as the UK and China), and 93 percent of the population has access to the internet.<sup>6</sup> Based on the aggregated score for individuals, KSA ranks fourth for individuals among G20 countries.

### Enterprises

Because it impacts both large corporations and SMEs, technology is redefining business models and transforming entire industries. Saudi enterprises must be able to not only adapt to but also lead this transformation if they are to remain competitive. Software spending as a percentage of GDP, which can be used as a proxy to measure digital transformation of enterprises, stands at 0.4 percent<sup>7</sup> in KSA (the eighth position among the G20 countries). This, together with other relevant indicators such as the proportion of technicians to the total

workforce<sup>8</sup> (for which KSA ranks 11<sup>th</sup>), shows that Saudi companies are working hard to embrace digital transformation.

### Start-ups

Digital start-ups are drivers of change in the digital economy, in that they develop and commercialize innovative solutions leveraging technology. KSA’s ICT start-up ecosystem is expanding, with the number of new start-ups increasing year on year and a growing supporting network of incubators and investors (both private and public). However, several elements are missing. Administrative processes are complex, the investor base has limited experience of working with entrepreneurs, and attracting talent is not easy. KSA ranks 13<sup>th</sup> among its G20 peers in terms of “Most start-up friendly countries,”<sup>9</sup> and no “unicorns”<sup>10</sup> have been developed in the country to date. KSA start-ups are primarily focused on replicating international successful business models, rather than creating and developing own IP. Moreover, its number of start-ups in “deep tech” sectors is below 15 percent. While the current business replication model is useful as a short-term solution to kick-start the ecosystem, it does not position the country as an innovative, leading start-up environment.

### Government

The Saudi government is playing a leading role in the Kingdom’s digital transformation, leveraging digital technologies to interact with citizens, improve services and promote ICT across all demographic segments. Initiatives such as the Kingdom’s ambitious e-government transformation program, Yesser, have allowed KSA to obtain an advanced position in the field of e-government transactions, where it ranked 36<sup>th</sup> among 193 countries in the most recent United Nations e-Government survey.<sup>11</sup> In addition, KSA ranks first compared to G20 countries in ICT use and government efficiency.<sup>12</sup>

4 World Economic Outlook database 2020  
 5 We Are Social and Hootsuite (2019) Global Digital Report 2019  
 6 International Telecommunication Union (ITU), ITU World Telecommunication/ICT Indicators database 2019  
 7 IHS Markit  
 8 International Labour Organization  
 9 VAP Group, Wharton School of Business, US News, Arthur D. Little analysis  
 10 Privately held start-up company valued at over USD 1 billion  
 11 United Nations e-Government Survey 2018  
 12 World Economic Forum, Executive Opinion Survey



## 2.2 Pillars for the digital economy (“What”)



### Infrastructure

Multiple elements to provide ICT services and solutions are required in a digital economy, ranging from mobile and fixed infrastructure and networks to data centers and gadgets such as smartphones and IoT sensors. The Saudi government is working alongside the private sector to modernize the ICT infrastructure, and the Kingdom is making significant progress with connectivity, as observed in key indicators.<sup>13</sup> As part of its national broadband plan, KSA has been investing in fixed-broadband networks. Approximately 60 percent of households are covered by fiber optics as of December 2020 (versus 23 percent in 2016), with average fixed-broadband speed of 79.6 Mbps as of Q4 2020 (versus 21.5 Mbps in 2016). In terms of mobile, 94 percent of the population is covered by 4G as of Q4 2020 (versus 77.3 percent in 2016) and KSA has been one of the first countries to launch 5G commercial services.

In addition to connectivity infrastructure, KSA is planning to address the exponential growth of data by building more data centers. In May 2018, the German business software giant SAP opened the first public cloud data center in the country, and Google has announced construction of data center infrastructure. The Kingdom’s strategic location positions it to become a major player as an IT-service and cloud hub, based on its access to international connectivity through the Red Sea and Gulf and centralized proximity to serve Europe, Asia and Africa.

Moreover, the Giga projects under development across the country, including NEOM, are being built leveraging the latest infrastructure and technologies, integrating data analytics and AI into all aspects of modern living through a network of sensors and other IoT devices.



### Data

Data is the fuel of a digital economy, and consolidation of open data platforms to ensure standardization and quality are key to leveraging technologies such as AI and extracting key insights. KSA has traditionally ranked behind regional peers such as UAE and Bahrain on international indicators such as open data readiness, implementation and impact.<sup>14</sup> However, KSA has recently launched several projects to address this issue. In 2019, the Saudi Authority for Data and Artificial Intelligence

(SDAIA) was established to define the national data and AI strategy and deliver impact through harmonized data policies, data analytics and AI innovation. SDAIA already has in place, several cooperation agreements with other government entities, providing communications solutions, innovative applications as well as trainings in the fields related to data management, analytics and AI. These efforts aim to increase transparency and leverage data for improved public service provisioning and innovation projects.



### Content and services

Content and services availability, including software and applications, digital platforms, and latest technologies such as 3D printing and robotics are vital to reaping all the benefits of the digital economy. While other elements, such as infrastructure, tend to be commoditized, content and services are becoming central elements of the digital economy, providing true competitive advantage for companies and countries. KSA is decently placed in terms of availability of local content online, being eighth among the G20 countries.<sup>15</sup> In terms of adoption of new technologies, KSA ranks ninth versus other G20 countries; its investment in technologies such as cognitive AI, 3D printing, AR/VR, robotics and Big Data analytics is growing year on year. The aggregate spending for these technologies has increased 21 percent from 2018 to 2020, reaching SAR 1,150 million.<sup>16</sup>



### Digital skills

The digital economy requires technology-savvy users in all demographic segments and skilled workforce across sectors that can keep pace with a rapidly changing environment. On the demand side, the Saudi government has implemented several strategies to upskill its citizens. One of the main objectives for the Ministry of Education (MoE) is the “shift to digital education in support of both teachers and students.”<sup>17</sup> Digital institutions such as the Saudi Electronic University (SEU), which offers online undergraduate and graduate degrees, are becoming popular choices – as of 2020, more than 25,000 students were enrolled. According to UNESCO, the proportion of youth and adults with ICT skills<sup>18</sup> in KSA is 31.43 percent, not far behind leading digital economies such as France and South Korea.

However, there seems to be insufficient coordination between educational institutions and employers. According to CITC,<sup>19</sup> only 47 percent of surveyed organizations in KSA considered

<sup>13</sup> Invest Saudi (Ministry of Investment)

<sup>14</sup> Open Data Barometer 4<sup>th</sup> edition, World Wide Web Foundation

<sup>15</sup> World Economic Forum, Executive Opinion Survey 2016-2017

<sup>16</sup> IDC, Arthur D. Little analysis

<sup>17</sup> Saudi Arabia National Transformation Program (NTP)

<sup>18</sup> UNESCO Institute for Statistics, 2018. This indicator relates to three types of ICT skills: using basic arithmetic formulae in a spreadsheet; finding, downloading, installing and configuring software; and writing computer programs using specialized programming language. The data is the computed averages of the three ICT skills. These refer to the proportion of youth and adults that have undertaken certain computer-related activities in a given period (e.g., the last three months)

<sup>19</sup> ICT Workforce in the Kingdom of Saudi Arabia Report, CITC

entry-level graduates recently hired were equipped with the necessary skills to fulfil their job responsibilities. Additionally, only 29 percent of Saudi employers offer apprenticeships or internships to make up for this skill shortage. Another key indicator is the number of apps developed per person,<sup>20</sup> for which KSA ranks at the bottom of the G20 group, and only above Oman compared to GCC countries. Better collaboration between the labor market and academia is required to establish skills for the modern workplace.



## Trust and security

If KSA is to reap all the benefits provided by digital ecosystems, in addition to addressing cybercrime and security threats, stakeholder perception of safety and privacy in digital environments also needs to be effectively addressed.

KSA is a known leader in cybersecurity, ranking first regionally and 13<sup>th</sup> globally in the Global Cybersecurity Index. However, despite this leading position, there is room for improvement in terms of trust – e-commerce is a case in point. E-commerce in KSA has been growing rapidly in recent years. Between 2014 and 2017, online-shopping penetration grew from 18 to 40 percent.<sup>21</sup> Nevertheless, the country still relies heavily on cash-on-delivery payments, partly given the lack of credit-card penetration among key target segments (women, youngsters and lower socioeconomic classes), but also due to cultural preference for receiving goods before paying for them. Although alternatives such as PayPal, Apple Pay, PayFort, PayTabs, Cashu, Hyperpay and STC Pay have been gaining traction in recent years, further trust in digital payments will be key if e-commerce penetration is to grow and processes are to become safer and more efficient. In addition to digital payments, difficulty of returning online purchases and lack of trust in the quality of online products hinder the growth of e-commerce, especially when the purchase is urgent.

To offset this lack of trust, KSA has taken initial steps such as launching “Istida”,<sup>22</sup> a website for recalling defective products that also provides interactive services to consumers and merchants.

The pandemic has boosted digital payments in Saudi, up 75% in 2020 compared to the previous year. Another signal of the shift towards digital payments is the significant drop in cash withdrawals (-30%) compared to 2019. Both are strong indications of the local population becoming more comfortable with online transactions and digital payments.

## 2.3 Enablers to develop the digital economy (“How”)



### Regulation

The regulatory ecosystem plays a major role in digital transformation, balancing economic and social benefits and limiting potential externalities. Despite the significant progress made in KSA, the current regulatory frameworks may lack the agility to accommodate the increasing pace of technological developments. Consequently, key areas such as e-commerce regulation are still far from mature. For example, the Kingdom ranks last among the G20 countries in e-commerce legislation, given its incipient regulation around consumer data, as well as privacy and data protection.<sup>23</sup> Key challenges for KSA will include defining impactful regulation capable of keeping pace with constant evolution of technology.



### Innovation

Innovation in the digital economy consists of the promotion of initiatives to research, develop or adapt new digital solutions to changing needs across sectors. Innovation brings competitiveness and dynamism to the digital economy, and KSA has identified it as a key objective for Vision 2030. Currently, there are multiple initiatives in place to promote innovation in key strategic digital sectors. One example is Fintech Saudi, a project launched in 2018 by the Saudi Arabian Monetary Authority (SAMA) to act as a catalyst for development of the financial services technology (“fintech”) industry. Through this project, SAMA supports fintech entrepreneurs at every stage of their development, including providing clarity on fintech regulation to local and international entrepreneurs, as well as with promoting a framework to help entrepreneurs develop their own fintech ideas.

However, KSA could improve significantly in this field. Among the G20 group, KSA ranks 13<sup>th</sup> for ICT patent applications.<sup>24</sup> In terms of high-tech exports, it ranks at the bottom of the group.<sup>25</sup> Promoting a vibrant innovation ecosystem at both enterprise and start-up level will be extremely beneficial for KSA’s digital economy. It will redefine business models to help businesses better adapt to changing customer needs or make processes more efficient.

20 GSM Association, The GSMA Mobile Connectivity Index 2019

21 “The Online Shopper – KSA” by Ipsos

22 Vision 2030

23 Adoption of e-commerce legislation worldwide, UNCTAD

24 World Intellectual Property Organization. Number of applications for information and communication technology-related patents filed under the Patent Cooperation Treaty (PCT) (per million population)

25 World Intellectual Property Organization



### Institutional frameworks

The most advanced economies in terms of digital transformation have created dedicated institutional frameworks to steer and promote digital transformation initiatives across industries. This is the case with the UK, where the Digital Economy Council and the Digital Economy Advisory Group are working together to implement the UK Digital Strategy.

In KSA, a wide range of institutions are working together to promote digital transformation. These include traditional ministries and, recently, specialized entities such as the National Digital Transformation Unit (NDU). This unit has been set up to accelerate efforts to achieve Vision 2030 objectives and make the Kingdom a leading digital nation with a diversified economy. The unit aims to have a transversal vision, reviewing and evaluating initiatives in force, optimizing investments, and aligning efforts. Empowerment of NDU will be key to guaranteeing success of the transformation and translating investments into socioeconomic benefits.



### Funding, venturing, seeding

In KSA, the most significant financial support for digital transformation comes from the government. In 2016, a “fund of funds” was established to invest in private equity, venture capital, and seed capital funds to support and incentivize start-ups and SMEs over the next 15 years. Foreign players and corporate venture capital (CVC) arms from private sector players are also increasingly interested in investing in the Kingdom.

In 2019, the number of investors participating in the Saudi start-up ecosystem hit an all-time record, with 41 institutions investing in domestic start-ups, an increase of 58 percent compared to the previous year.<sup>26</sup> Sixty-eight percent of these investors are based in KSA, with 32 percent outside, mainly in the UAE. Venture-capital (VC) funding has also shown significant growth, reaching USD 67 million in 2019, although this is still much lower than that of leading economies. In addition to start-up funding, Saudi companies’ investments to digitalize existing businesses and adopt new technologies are a key lever to promote digital transformation across sectors. In terms of investment in emerging technologies such as the IoT, AI and advanced analytics, AR/VR and wearables, advanced robotics, and 3D printing, KSA ranks 10<sup>th</sup> among the G20 countries.<sup>27</sup>

<sup>26</sup> 2019 Saudi Arabia Venture Capital Snapshot, Magnitt

<sup>27</sup> World Economic Forum Opinion Survey

# 3. The way forward – Targeting key challenges and opportunities for KSA

Based on the analysis from the previous section, which consisted of an indicators benchmark and qualitative analysis of all the building blocks of the digital economy, three key challenges and a number of opportunities have been identified as critical for KSA (see Figure 4).

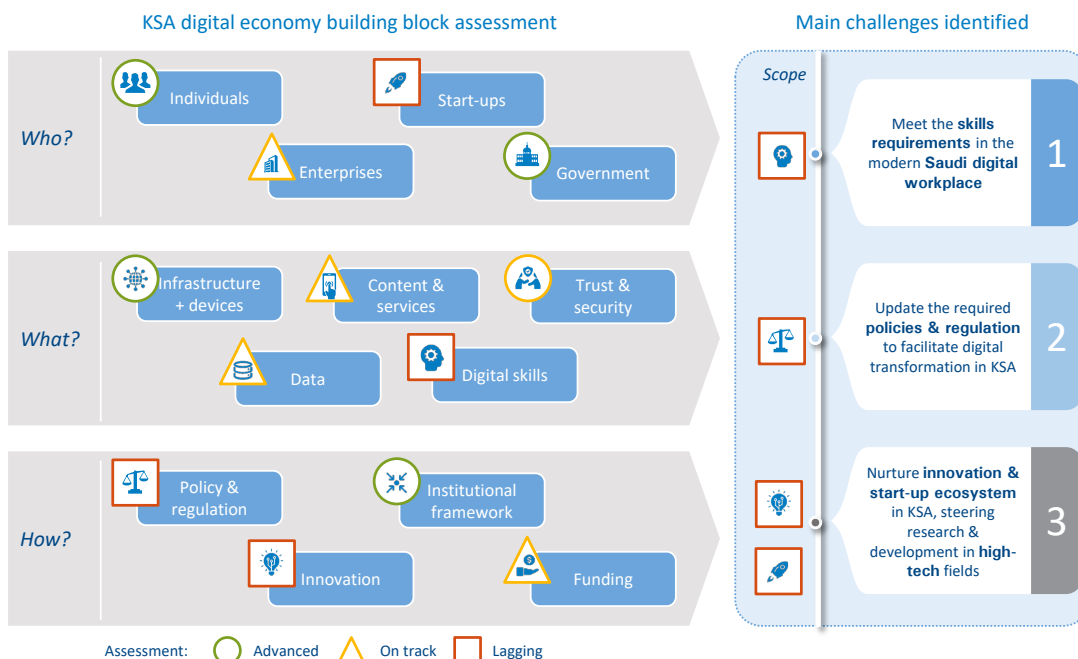
## 3.1 Meet the skills requirements for the modern Saudi digital workplace

Establishing a pool of employees that are experts in digital technologies requires joint efforts between educational institutions and the public and private sectors. Moreover, to ensure success in the long term, the existing workforce, as well as students at all levels, must be considered. In light of best practices from leading countries addressing this topic, and considering KSA's specific context, a number of recommendations are proposed:

**“Training of trainers” program:** The changing nature of digital technologies makes it imperative to continuously introduce digital topics in academic curricula. Estonia has made it a priority to develop and update ICT know-how in teachers and introduced ICT-specific subjects to university teaching degrees. This helps teachers become knowledgeable about technology and comfortable using it for teaching purposes. Although this concept has been prioritized in KSA's digital education blueprint, no formal initiative has been launched at national level yet.

**ICT programs for adults:** Offering ICT learning programs for adults can improve workplace productivity, as well as promote inclusion of marginalized segments of the population in digital-economy job opportunities. In Italy, a public partnership between the European Commission and Telecom Italia launched in late 2019 the program “Operazione Risorgimento Digitale”, with the objective to teach new technologies to over a million adults.

Figure 4: Key challenges identified for the digital economy in KSA



Source: Arthur D. Little analysis

KSA currently has the “Ethrai platform,” which is an electronic platform for the “National Distance Training Program” offering government employees the opportunity to enhance their public service digital skills remotely. To offer similar content to the general public, Kingdom’s open education resources (OER) platform known as “SHMS,” could be leveraged. This platform offers secure and reliable online educational content for students, teachers, faculties and parents in KSA, however its adoption remains limited.

**Post-graduate training, internships and rotational programs:**

The successful transition between higher education and the job market is key. Leading British employers and universities have joined efforts to offer apprenticeships to university students. Through the program, companies have been able to attract and retain talent, as well as ensure new hires meet industry standards for quality, content and delivery. Another interesting example is found in the private sector. The American technological giant Cisco has launched a talent-exchange program with some of its key clients across sectors. Saudi companies could engage in similar programs, to both improve the quality of their hires and upskill current employees with global best practices.

**3.2 Update the required policy and regulations to facilitate digital transformation in KSA**

KSA must keep working on updating its policy and regulation around the digital economy. These four broad categories will have to be tackled:

**Pacing with technological challenges:** The speed at which technology evolves makes it very hard to get a resilient and updated regulatory framework in place. Rushing into regulation may be counterproductive, and sometimes regulation is not even the best solution to optimize social and economic benefits. Recommendations for KSA will vary depending on technology and potential impact, in terms of not only the economy, but also security and social welfare. Alternatives range from preventing development and use of certain technologies until they are mature to adopting a “wait-and-see” approach to discover risks derived from the use of a technology or setting up regulatory sandboxes for innovative entrants. Whichever approach is followed will require periodic adaptations and constant monitoring by responsible entities.

**“Horizontal” regulatory frameworks:** Digitalization blurs the lines between industries (e.g., convergence in telecommunications media markets and digital platforms) and roles such as supply and demand (e.g., “prosumers” in the electricity market). Regulating the digital economy will require coordination and coherence among government entities

across sectors. For example, the European Commission has established a second digital officer to help with horizontal coordination across industry verticals.

**Liability regulation:** One of the main challenges for KSA and other countries is regulating the traditional notion of liability, particularly implications for effects produced by technology (e.g., autonomous vehicle). In the event of an accident, who is responsible – the vendor, distributor, or original equipment manufacturer? Finding the answer to this question requires engaging a broad and diverse range of stakeholders, identifying all issues and anticipating scenarios. In the UK, the 2018 Digital Charter brought together the government, the tech sector, business and civil society to collectively address the challenges of digitalization and find solutions.

**Institutional and transboundary challenges:** Given the cross-border nature of technology, domestic solutions will no longer be enough in the digital economy. International regulatory cooperation will be key to avoiding arbitrage and protecting customers, while creating a favorable environment in which the digital economy will be able to blossom. As an example, Canada has identified international regulatory cooperation as a key pillar of its new Cabinet Directive on Regulation.

**3.3 Nurture the digital innovation and start-up ecosystem in KSA**

With a young, digitally enabled population which represents a large local digital consumer base, KSA has a golden opportunity to develop both its broader and ICT-focused start-up ecosystems. Certain measures will be useful to reinforce KSA’s start-up ecosystem and boost innovation:

**Unique value proposition:** Multiple governmental initiatives in KSA aim to increase the availability of support for start-ups, acting as enablers to strengthen the ICT start-up ecosystem. To succeed, KSA should go beyond replicating other ecosystems, and leverage its own unique strengths. Emerging global start-up hubs such as New Zealand and Busan (South Korea) are following this differentiation strategy. New Zealand, a global leader in dairy exports, is developing a strong “agritech” start-up ecosystem, while Busan, traditionally a ship-building city, has supported multiple marine tech start-ups. At a national level, KSA could leverage its position in oil & gas and strong status in cybersecurity to create unique start-up hubs that would focus on these areas. Its breakthrough smart-city initiative, NEOM, and other significant developments in Riyadh are further potential areas in which KSA has an edge. It is important to note that start-up ecosystems are developed on a “city” rather than a “national basis.” Entrepreneurs should not adopt a “one size suits all” approach, but rather, understand each city’s unique

selling proposition and select the ecosystems that are best suited to developing their ideas. In such a development process, both the public and private sectors (investors and companies) have roles to play and should embrace a cooperative approach when doing so.

**Robust IP protection systems:** Creating an environment that simplifies entrepreneurs' lives, as well as administrative and legal processes, is a "must have" for any successful ecosystem. IP protection is a key concern for entrepreneurs, and relevant lessons can be learned from Singapore's approach to addressing it. In addition to encouraging development of IP through generous financial incentives and grants, Singapore created a specialized IP court to manage complex cases and a WIPO<sup>28</sup> arbitration and mediation center to protect and settle IP disputes. In KSA, the Saudi Authority for Intellectual Property is pushing to raise awareness of IP in the country and facilitate entrepreneurs' access to key aspects of IP protection, such as patenting, copyrighting, regional, national and international registration, as well as support with international patent protection.

**Reduced red tape:** Finally, ease of setting up a business and simplifying the number of administrative procedures required is also high on entrepreneurs' priority lists. Countries across the world have taken action to address this. Estonia has launched an e-residency program that will allow entrepreneurs to set up EU companies from anywhere in the world, and New Zealand enables entrepreneurs to both set up and register businesses within a day's time. While KSA has managed to simplify some procedures, including the registration of a business within one day, the effective time it takes for entrepreneurs to set up companies is longer, due to challenges such as complex import/export procedures and long lead times for setting up a bank account or getting an office license.

While these recommendations address critical challenges for KSA on the digital-economy journey, it is vital to understand that a holistic and coordinated approach across all the building blocks in the digital economy are key to ensuring KSA's success in the next industrial revolution.

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28 World Intellectual Property Organization

# Conclusion

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Embracing technology is an imperative to ensure competitiveness and prosperity in the digital era. The comprehensive use of digital tools unlocks multiple social and economic benefits. For instance, digitalization enables inclusion, allowing for example, small and medium-sized enterprises (SMEs) to sell their products and services online and compete on a global scale. It also contributes to increasing efficiency, for example companies and government entities can make better use of capital and labor by leveraging the speed, reliability and intelligence of digital tools. Additionally, it promotes innovation and allows companies to challenge conventional business models.

Adopting new technologies and finding innovative use cases across industries is key for KSA to achieve its Vision 2030 goals of diversifying the economy and becoming a digitally enabled technology, trade and investment hub. The Kingdom has already been taking decisive steps towards the digital transformation of its economy and society. Several cross-sector initiatives have been set up and new governing entities have been established such as National Digital Transformation Unit (NDU), to coordinate efforts across sectors and to monitor the overall progress of digital transformation in the Kingdom, and Saudi Data and Artificial Intelligence Authority (SDAIA), to lead the transformation towards a national economy based on data and AI.

The economic contribution of digitalization to KSA's economy is forecasted to significantly grow and contribute 19.4% percent of GDP by 2025, an increase of ~SAR 137 bn from 2020. To achieve such benefits, KSA needs to accelerate its rate of digitalization. We propose that a promising digital economy must be built upon not only the most innovative technologies, but also on the confluence and coordination of 13 identified building blocks covering the different stakeholders (who), necessary pillars (what) and enablers (how) to effectively unlock the socioeconomic benefits of a digital transformation.

To understand KSA's current position on each of the 13 building blocks, an indicators analysis was performed for all the G20 countries. The results of the study illustrated that on average, KSA ranks around the 10th position. The outcome is aligned with its national nominal GDP per capita ranking – at USD 19,587, which positions KSA as 10th among the G20 countries, showcasing that on average, performance is on track however there is room for improvement. In-depth analysis on the building blocks allowed us to identify three key challenges for KSA's accelerated digital transformation, namely: difficulty in meeting the skills requirement in modern Saudi digital workplace, limited number of policies that facilitate digital transformation in KSA and a nascent start-up and innovation ecosystem.

We recommend actions to be undertaken based on international best practices and considering KSA's specific context. To meet the skills requirement for modern Saudi digital workplace, KSA can enhance the digital skills of education professionals, launch training programs for adults to enhance digital inclusion, and promote collaboration among universities and the private sector. To enhance the policy and regulatory ecosystem in the Kingdom, KSA needs to ensure that regulations are adaptive to technological developments, address the right challenges, and are enforced despite the cross-border nature of technology. To nurture digital innovation and start-up ecosystem, KSA needs to focus on a few unique value propositions, leveraging its strengths in areas such as oil & gas and smart cities, as well as ensure robust IP protection systems with reduced bureaucracy. While these recommendations address critical challenges, it is vital to understand that a holistic and coordinated implementation across all building blocks of the digital economy, will be key to ensuring KSA's success in this journey.

# Abbreviations

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**AI** – Artificial intelligence

**AR** – Augmented reality

**CITC** – Communications and Information Technology Commission

**G20** – Group of Twenty

**GB** – Gigabyte

**GCC** – Gulf Cooperation Council

**GDP** – Gross domestic product

**ICT** – Information and communications technology

**IP** – Internet protocol

**IT** – Information technology

**KSA** – Kingdom of Saudi Arabia

**Mbps** – Megabytes per second

**MCIT** – Ministry of Communications, Information and Technology

**MoE** – Ministry of Education

**NTP** – National Transformation Program

**OECD** – Organisation for Economic Co-operation and Development

**PCT** – Patent Cooperation Treaty

**SAMA** – Saudi Arabian Monetary Authority

**SAR** – Saudi Arabian riyal

**SEU** – Saudi Electronic University

**SME** – Small and medium-sized enterprise

**UAE** – United Arab Emirates

**UK** – United Kingdom

**VR** – Virtual reality



# Annex

## Indicators used for the “Ranking of G20 countries by building block in a Digital Economy”

Building block	Indicator	Data source
Individuals	Use of virtual social networks	We Are Social and Hootsuite (2019) Global Digital Report 2019
	Active mobile-broadband subscriptions	ITU World Telecommunication/ICT Indicators database 2019
	Internet users	ITU World Telecommunication/ICT Indicators database 2019
Enterprises	Technicians and associate professional	International Labour Organization, ILOSTAT
	Computer software spending	IHS Markit, Information and Communication Technology Database
	Extent of staff training	World Economic Forum, Executive Opinion Survey
Start-ups	# of unicorns	Statista
	Most start-up friendly countries in the world	BAV Group, Wharton School
Government	Government online services	United Nations Department of Economic and Social Affairs (UNDESA)
	ICT use and government efficiency	World Economic Forum, Executive Opinion Survey 2016-2017
	Government procurement of advanced technology	World Economic Forum, Executive Opinion Survey 2016-2017
Infrastructure & devices	4G mobile network coverage (% of population)	ITU World Telecommunication/ICT Indicators database 2019
	Fixed-broadband subscriptions, 10Mbit/s or above (% of total subscriptions)	ITU World Telecommunication/ICT Indicators database 2019
	Average mobile broadband download speeds (33%)	Ookla’s Speedtest Intelligence
Data	Publication and use of open data	World Wide Web Foundation (2017), Open Data Barometer 4th Edition – Global Report
	Average traffic per capita per month	Cisco VNI forecast
Content & services	Availability of latest technologies	World Economic Forum, Executive Opinion Survey 2016-2017
	Availability of local online content	World Trade Organization, Trade in Commercial Services database
	Generic Top-Level Domains (gTLDs) and Country Code Top-Level Domains (ccTLD) per person (20%)	ZookNIC
Digital skills	ICT skills	UNESCO Institute for Statistics, UIS.Stat
	Mobile apps development	GSM Association, The GSMA Mobile Connectivity Index 2019
Trust & security	Cybersecurity	ITU (2019) Global Cybersecurity Index (GCI) 2018
	Online trust and safety	The Economist Intelligence Unit, Inclusive Internet Index 2019
	Socioeconomic gap in use of digital payments	World Bank, Global Findex database
Innovation	ICT PCT patent applications	World Intellectual Property Organization (WIPO) PCT Data
	High-tech exports	World Bank, World Development Indicators
Regulation	Legal framework’s adaptability to digital business models	World Economic Forum, Executive Opinion Survey 2016-2017
	E-commerce legislation	United Nations Conference on Trade and Development (UNCTAD)
	ICT regulatory environment	ITU ICT Regulatory Tracker 2018
Institutional framework	Degree of maturity of institutional frameworks	Arthur D. Little analysis
Funding	Company investment in emerging technology	World Economic Forum, Executive Opinion Survey 2016-2017

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**Thandi Demanet** – Co-founder & Director at Tessellate Advisory, a boutique company with global reach dedicated to helping organizations adapt to and succeed in the digital ecosystem-based economy

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