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The Metaverse and its potential for MENA

Final Report

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Table of Contents

Executive Summary

The region is embarking on a journey of economic transformation and digitalization

The Middle East and North Africa (MENA) region is diverse and changing rapidly. Hydrocarbon-rich countries are seeking sustainable growth through diversification, launching ambitious transformation plans such as the Kingdom of Saudi Arabia's (KSA) 'Vision 2030' and the United Arab Emirates (UAE). 'We the UAE 2031' vision. Digitalization is at the heart of these; for example, KSA is estimated to be investing almost US$ 24.7 billion on technology by 2025 – reportedly the highest globally as a share of GDP – and is commencing work on Neom, an unprecedented investment in new smart cities along the Red Sea.[1] Elsewhere, countries are targeting digitalization as a key driver of development. Egypt's 'Vision 2030', Jordan's 'Economic Modenization Vision 2025' and Morocco's 'Horizon 2025' all aim to accelerate economic modernization, including through investment in digital capabilities.

In parallel, consumers and business communities across MENA are increasingly open to digital technologies and interested in the metaverse.

Key highlights are

27 years old
Median age of the population[2]

81%
UAE consumers expecting and desiring to use AR as a practical "tool" in their everyday lives[3]

84%
Smartphone adoption by 2025[4]

3.5 hours
Average daily social media use among users[5]

79%
Businesses keen to adopt metaverse technologies[6]

Some MENA countries take a pioneering role in developing metaverse ecosystems

At a time when MENA countries pursue ambitious digital innovation and technology objectives, the emergence of the metaverse could support these goals. The metaverse is expected to evolve gradually to become the next iteration of the internet. In the near term, metaverse experiences around 2D augmented reality ("AR"), artificial intelligence ("AI"), and immersive 3D virtual reality ("VR") technologies are emerging through current user devices (e.g., smartphones, computers, headsets) and are offering users a more interactive medium of communication. As the metaverse develops, it will enable users to access immersive virtual 3D realms and seamlessly integrate these with everyday activities.

At a time when MENA countries pursue ambitious digital innovation and technology objectives, the emergence of the metaverse could support these goals.

Metaverse technologies could open new opportunities for MENA countries as they target digitalization, inward investment, and growth of non-hydrocarbon sectors. The UAE and KSA are taking a leading role and are actively investing in metaverse ecosystems. Dubai has launched a Metaverse Strategy, aiming to create one of the world's top ten metaverse economies focusing on innovation in tourism, real estate, education, retail, and government services.[7] KSA is investing US$ 1 billion in metaverse-related projects as it seeks to become a global technology hub.[8, 9] Public-private partnerships and events to advance metaverse technologies are also being established in other countries, such as Morocco's Interactive Digital Center, Jordan's Innovation Hub, and Egypt's Metaverse Hackathon, laying foundations for growth by fostering digital skills and entrepreneurship.[10, 11, 12]

Metaverse applications could unlock revenue and innovation in key growth sectors

Emerging metaverse technologies are unveiling a range of potential benefits, from enhacing individuals' lives and experiences as well as streamlining business operations, for example, through the use of digital twins. Metaverse technologies could be used to attend virtual concerts, access education and healthcare, or even visit virtual shopping malls, making these technologies particularly relevant to the region's young population.. In addition, for businesses it could improve collaboration, customer engagement, and operational efficiency, creating additional B2C and B2B opportunities.

Near-term impacts may be seen in gaming and entertainment sectors, where metaverse applications are already being used. In the tourism industry, metaverse technologies could augment in-person experiences and also encourage new, remote visitors by reducing the cost and increasing the accessibility of historical attractions.[13] In the gaming industry, metaverse technologies have expended the market through new types of games and monetization opportunities. In the medium and longer term, emerging use cases show promise in growing sectors such as retail and real estate, where businesses could leverage new ways to reach customers, trade within the metaverse and optimize their operations.

Near-term impacts may be seen in gaming and entertainment sectors, where metaverse applications are already being used.

The full range of possibilities for the region will become clearer over time, as the metaverse ecosystem develops. Some key highlights from emerging metaverse applications are summarized below:

			
Gaming	**Tourism**	**Retail**	**Real Estate**
MENA has one of the fastest growing gaming industries in the world and KSA is investing nearly US$ 40 billion in the sector.[14, 15]	Tourism is a key sector for diversification and represents 19% of GDP in Jordan, 12% in Egypt and 11% in Morocco.[16, 17, 18]	MENA has a US$ 1 trillion retail industry and 73% of its consumers are shopping more online since the pandemic.[19, 20]	The real estate sector is strategically important for major hubs such as Dubai.
The metaverse could enhance market growth, for example through new forms of AR and VR gaming, or e-sports.	**The metaverse could help promote MENA's rich array of natural and cultural assets to a global audience.**	**The metaverse could support growth through virtual shopping across both digital and physical products.**	**The metaverse could enhance sales through virtual viewings and creates new marketplaces for virtual land.**
Several VR gaming attractions have already opened in Jordan, Morocco, Egypt and the UAE.[21, 22, 23]	Virtual campaigns are promoting eco-tourism and medical tourism in Egypt, while Jordan's Petra and KSA's AlUla can be visited virtually.[24, 25, 26, 27]	IKEA, in Jordan and Morocco, allows customers to visualize items using VR – reportedly increasing sales by 20%.[28]	DAMAC, a UAE real estate developer, offers AR and VR tours and is planning to invest US$ 100 million in digital cities.[29]

Successful adoption of metaverse technologies could eventually deliver multi-billion-dollar contributions to MENA economies

Based on projections of metaverse-related ICT investment globally, this study estimates that metaverse technologies could eventually support an annual economic contribution ranging from US$ $20.2 to US$38.1 billion in KSA and US$11.6 to US$22.0 billion in Egypt, to US$ $0.9 to US$ 1.7 billion in Jordan, by 2035.[i]

Figure 1: Estimated economic contribution of metaverse technologies to annual GDP by 2035

KSA

$20.2 – $38.1 billion

Egypt

$11.6 – $22.0 billion

UAE

$8.8 – $16.7 billion

Morocco

$2.6 – $5.0 billion

Jordan

$0.9 – $1.7 billion

Source: Deloitte analysis
For information about the methodology and assumptions, see Section 2.

Delivering on the full potential depends on key enabling factors, which differ across the region

Whilst early metaverse experiences are emerging through existing infrastructure and current user devices in more advanced regions, the extent to which advanced technologies such as the metaverse will be widely used in MENA will rely on an enabling environment beyond internet service providers, including adequate digital infrastructure, digital skills and regulations to attract investment, foster innovation and facilitate access to metaverse applications.

Today, MENA countries vary greatly with respect to enabling factors and resources available, which will affect their path towards metaverse adoption and realization of benefits. In summary:

— Digitally mature countries such as KSA and the UAE have particular potential for near-term adoption. However, further diversification will be needed to create a dynamic private sector business environment with incentives for innovation and investment, to expand the potential for metaverse adoption across the wide range of sectors where it can create value.

— Elsewhere, benefits can be expected to accrue more gradually. Countries such as Egypt, Jordan and Morocco face wider gaps in digital infrastructure, skills and affordability, creating barriers especially for the adoption of the most sophisticated and transformative use cases.

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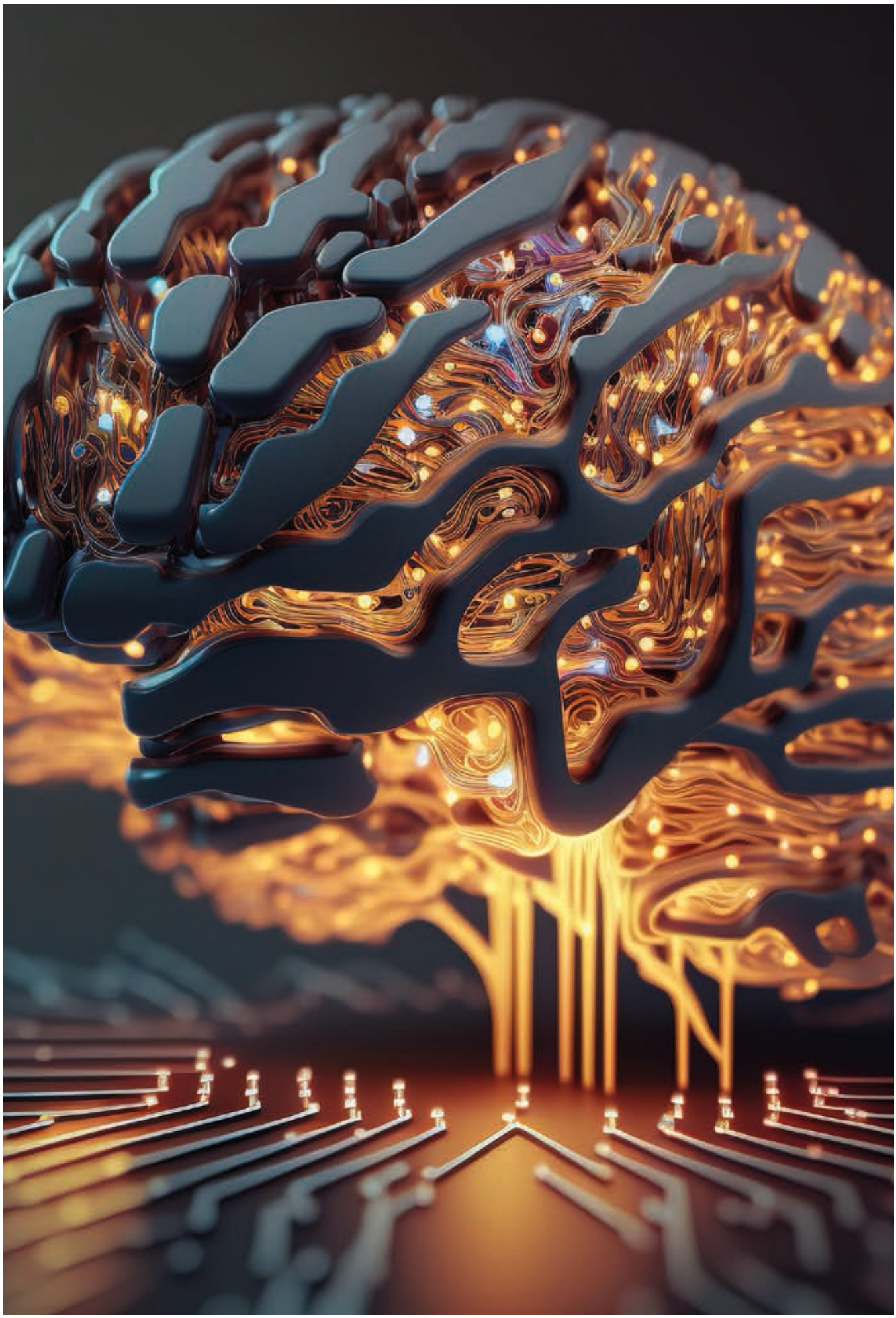
i Note, the estimates consider investments by large technology firms in the development of the metaverse and which could include spending on various forms of ICT capital such as metaverse-specific hardware, computing networks and supporting infrastructure such as data centers, and in less tangible assets such as software, databases, human capital, and content creation.

In the longer term, enabling an inclusive metaverse may help tackle existing inequalities in the region

Some metaverse applications could contribute to efforts to address long-standing regional challenges such as youth employment, empowerment of women, and rural inclusion. For example, metaverse technologies could improve the availability and quality of education and healthcare services delivered remotely and support flexible working facilitating female participation. It could also offer new opportunities for content creators, many of whom are young or female.

The proliferation of Web 2.0 technologies – for example, as shown by the increase in Egypt's internet penetration from 22% in 2010 to 72% in 2020 – provides cause for optimism that an inclusive, widely accessible metaverse could eventually be delivered.[30] However, in the near term, unequal access to connectivity, affordability challenges and low digital skills will act as a barrier for positive social change. Against this backdrop, action is needed to support successful metaverse adoption and avoid worsening digital divides, likely requiring continued investments, policy reform and cross-stakeholder collaboration towards an enabling environment.

Unequal access to connectivity, affordability challenges and low digital skills will act as a barrier for positive social change



1. Introduction[i]

The metaverse promises to be the next stage of the internet that will change how people interact, work, and play online. It will comprise interconnected and immersive virtual spaces, with a stronger feeling of presence. Interest in metaverse-related technologies is on the rise in MENA, with countries such as the UAE and KSA taking a pioneering role.

The metaverse is the next evolution of the internet

The metaverse is envisioned as the next paradigm of online interaction, integrating physical and virtual worlds. Whilst still in the early stages of development, metaverse experiences around 2D augmented reality ("AR"), artificial intelligence ("AI"), and immersive 3D virtual reality ("VR") are emerging through current user devices (such as smartphones, computers and headsets) as well as the existing connectivity infrastructure (e.g., fixed and mobile networks). As the metaverse develops, the inclusion of advanced technologies capable of stimulating other senses (for example using haptic technologies) can enable users to be fully immersed in the digital world. The metaverse seeks to offer immersive experiences, making interactions more intuitive and engaging, with users being able to move seamlessly across different virtual 3D settings.

Metaverse technologies in Amman Arab University

Jordan's Amman Arab University has launched the incorporation of metaverse technologies into its teaching methods. The technologies will allow students to have immersive, interactive lessons through the use of 3D lifelike models and will also facilitate remote teaching experiences.

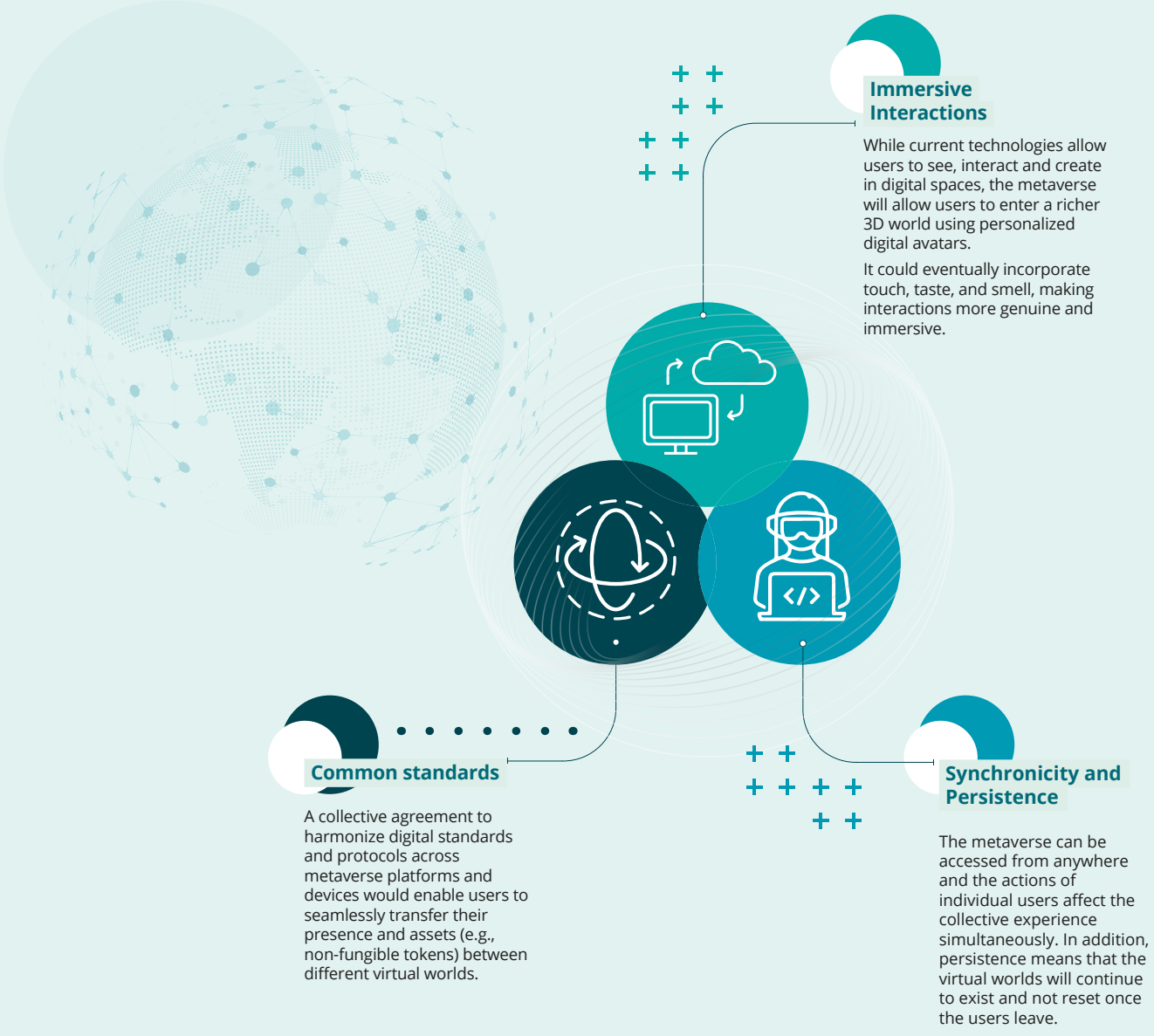
Source: EON Reality (2021).

Emerging use cases show how consumers might use the metaverse to attend virtual concerts, purchase virtual assets, or access more sophisticated education and healthcare services, among other things. For businesses, the metaverse could support more effective collaboration, remote working, customer engagement, or management of physical processes. **Such innovations hold significant economic potential, with previous research by Analysis Group estimating that the metaverse could contribute $360 billion per year to GDP for the Middle East, North Africa and Turkey (MENAT) region by 2031**, and $3 trillion per year globally.[31] The economic potential is discussed further in Section 2 of this report.

ii This report focuses on the opportunity of the metaverse in MENA with a particular focus on five countries: Egypt, Jordan, KSA, Morocco, and the UAE. Throughout the report, any reference to MENA shall be in regard to the region as a whole. Where applicable, the relevant five countries of interest will be noted and referred to independently. Where MENA-level statistics or averages are used, these are based on the World Bank definition of MENA (encompassing Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, KSA, Syria, Tunisia, UAE, West Bank and Gaza, Yemen), unless stated otherwise in the relevant source.

As the metaverse is still nascent, there is no single definition that captures its full potential. However, it is expected to encompass certain core characteristics, as illustrated in Figure 2.

Figure 2. Characteristics of the metaverse

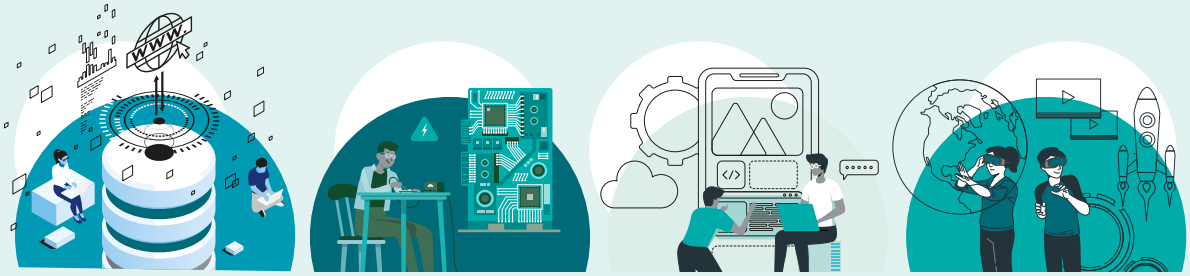


Source: Deloitte analysis

The metaverse ecosystem will integrate existing and emerging technologies

Delivering the core characteristics of the metaverse will rely on the availability of advanced technologies, many of which are still evolving. Widespread infrastructure and accessible hardware can enable these technologies to work together effectively, as a foundation upon which to build platforms, content and experiences for end users. A broad spectrum of stakeholders at the MENA and global level, including governments, small and large businesses, academics and users themselves, will need to coalesce to make this a reality. Figure 3 summarizes the complex technology ecosystem needed to power immersive experiences.

Figure 3: Components of the metaverse technology ecosystem



Digital Infrastructure

More innovative and immersive content will require continuing to maintain dependable and secure digital infrastructure to process and transmit increasing volumes of data. This could include:

- Cloud, data centers and edge computing
- Computing power
- Blockchain technology
- Connectivity infrastructure

Hardware, Protocols and Standards

Higher levels of immersion will require device sophistication (e.g., AR/VR headsets) at affordable prices. This includes:

- Smartphones and other user devices
- Device manufacturers
- Operating systems
- Sensors
- Common technical standards

Content and Experiences

For the metaverse to commercially succeed, there also needs to be access to, and demand for innovative content and experiences. This includes:

- Users (consumers and businesses)
- Content creators
- Product developers
- App developers

Platforms

More sophisticated and affordable devices will increase the demand for supporting technology, such as fit-for-purpose platforms and system integration. This will involve:

- AR/VR platform builders and creators
- Software and IP development
- Technology firms
- Software engineers
- AI/ML

Public policy and governance frameworks

Public policy and regulation will also be crucial in fostering trust in metaverse applications for both consumers and businesses. This could include digital and innovation policy, data protection, online safety, competition, taxation, and cybersecurity.

Source: Deloitte analysis

Whilst still in its nascent state, early metaverse experiences around 2D AR and immersive 3D VR are emerging. AR overlays digital content onto a user's real-world environment, for example to enrich the experience of shoppers and tourists or improve workers' efficiency and accuracy. In contrast, VR can offer fully immersive digital 3D spaces for entertainment, education, healthcare and collaboration. **Existing devices – such as smartphones, which already account for more than three quarters of mobile connections across MENA[32] – are capable of powering some early metaverse experiences**. More specialized standalone devices such as VR headsets, could support more advanced and immersive use cases, though such devices are not widely used in MENA today.

METATUT – The first virtual metaverse city inspired by ancient Egypt, accessible through a phone or other devices

Under the patronage of the Egyptian Ministry of Tourism and Antiquities, a group of students and creative designers built a virtual city in the metaverse, called METATUT, to celebrate the 100th anniversary of the discovery of King Tut's tomb, Tutera. People from all over the world will be able to tour the metaverse city through VR devices, computers or smartphones. The city showcases contemporary and ancient Egypt's architecture.

Source: Scene Now (2022).

Interest in the metaverse is building, with pioneering ventures in MENA

When considering the opportunities and challenges presented by the metaverse, MENA's diversity needs to be considered. As a result, this report focuses on the five countries: Egypt, Jordan, Morocco, the United Arab Emirates ('UAE') and the Kingdom of Saudi Arabia ('KSA'). Across these countries, momentum behind the metaverse is building across policymakers, businesses and consumers, as summarized below.

The UAE and KSA seek to play a leading role in the emergence of the metaverse globally, recognizing the potential contribution towards growth and diversification targets. In the UAE, Dubai has launched a Metaverse Strategy, aiming to establish one of the world's top ten metaverse economies.[33] The Strategy envisages economic benefits of US$4 billion by 2030, focusing on transformative impacts in tourism, real estate, education, retail, and government services.[34] The UAE has hosted international events – including the Dubai Metaverse Assembly and the Gulf Information Technology Exhibition ('GITEX') in 2022 – to spread awareness and explore the metaverse's potential.[35]

Virtual Black Stone Initiative

KSA has launched an initiative that will allow Muslims from all around the world to virtually touch the Black Stone at the Kaaba, an important religious tourism site. The initiative will allow people to completely immerse themselves in the experience, stimulating a range of senses including vision, hearing and smell.

Source: Fatima (2021).

KSA has started building Neom, a mega city involving hundreds of billions of dollars in investment that seeks technology-driven change in business, livability and sustainability.[36, 37] The country's ambitious goals in the metaverse are supported by projects such as the Virtual Black Stone Initiative and the Neom digital twin, which has garnered investments of US$ 1 billion.[38, 39]

Neom's XVRS: A cognitive digital twin for the city

The Neom Tech & Digital Company launched XVRS, a 3D cognitive digital twin that uses a set of algorithms which allows it to acquire, process, and store information to think and make decisions. For Neom, this will allow people to have a simultaneous presence physically in the city and virtually as an avatar or hologram. The platform will also be used to help build Neom – for example, potential residents will have the chance to test different home designs and replicate the one they chose in the physical setting.

Source: WIRED Middle East (2022); Fuse Forward (2022).

Non-GCC ('Gulf Cooperation Council') countries are also increasingly promoting metaverse-related technologies. For example:

— **Morocco**'s Augmented and Virtual Reality Center was established in 2020 through a public-private partnership, seeking to make AR and VR technologies accessible to academia, industry and government.[40] The country will also host the first ever African edition of GITEX in 2023.[41]

— **Jordan**'s Innovation Hub was launched in 2022 and comprises 5 Labs for AI, AR, VR, Blockchain, IoT and 5G, focusing on supporting young entrepreneurs.[42]

— **Egypt**'s government bodies are using AR and VR to promote ecotourism[43] – seeking to improve the attractiveness of seven destinations while contributing to conservation efforts and local livelihoods – and medical tourism.[44]

Metaverse technologies to promote healthcare tourism in Egypt

For the first time in the healthcare space, the General Authority for Health Care has launched a 3D virtual reality program to promote medical tourism in Egypt. The program will allow potential patients to use the metaverse to visit healthcare facilities in Egypt and services offered with the aim of boosting medical tourism in the country.

Source: Al-Monitor (2022).

Within the private sector, businesses across MENA are showing an appetite for new digital tools that enable more immersive collaborations in the workplace and improvement of business operations. Survey evidence shows that a large majority of Middle East companies (79%) report that they are keen to adopt metaverse technologies such as VR to conduct virtual work meetings. Furthermore, most of business professionals in the Middle East (82%) indicate that they are comfortable with their companies utilizing VR for work processes.[45]

With increasing interest in the metaverse among MENA businesses, several applications and commercial use cases have already started to emerge. For example, the Egyptian startup Beyoot has placed AR at the heart of its business model, allowing customers to check and review furniture before buying; the UAE-based telecom operator e& is preparing commercial solutions to create virtual realms for organizations in manufacturing, hydrocarbons, energy, education, healthcare and utilities.[46, 47] Smaller businesses are also showing interest, with an Ipsos survey result finding that more than 90% of small and medium sized enterprises (SMEs) in the UAE, Saudi Arabia and Egypt reported awareness of VR devices/apps and the majority reported being interested in using AR or VR for their business.[48]

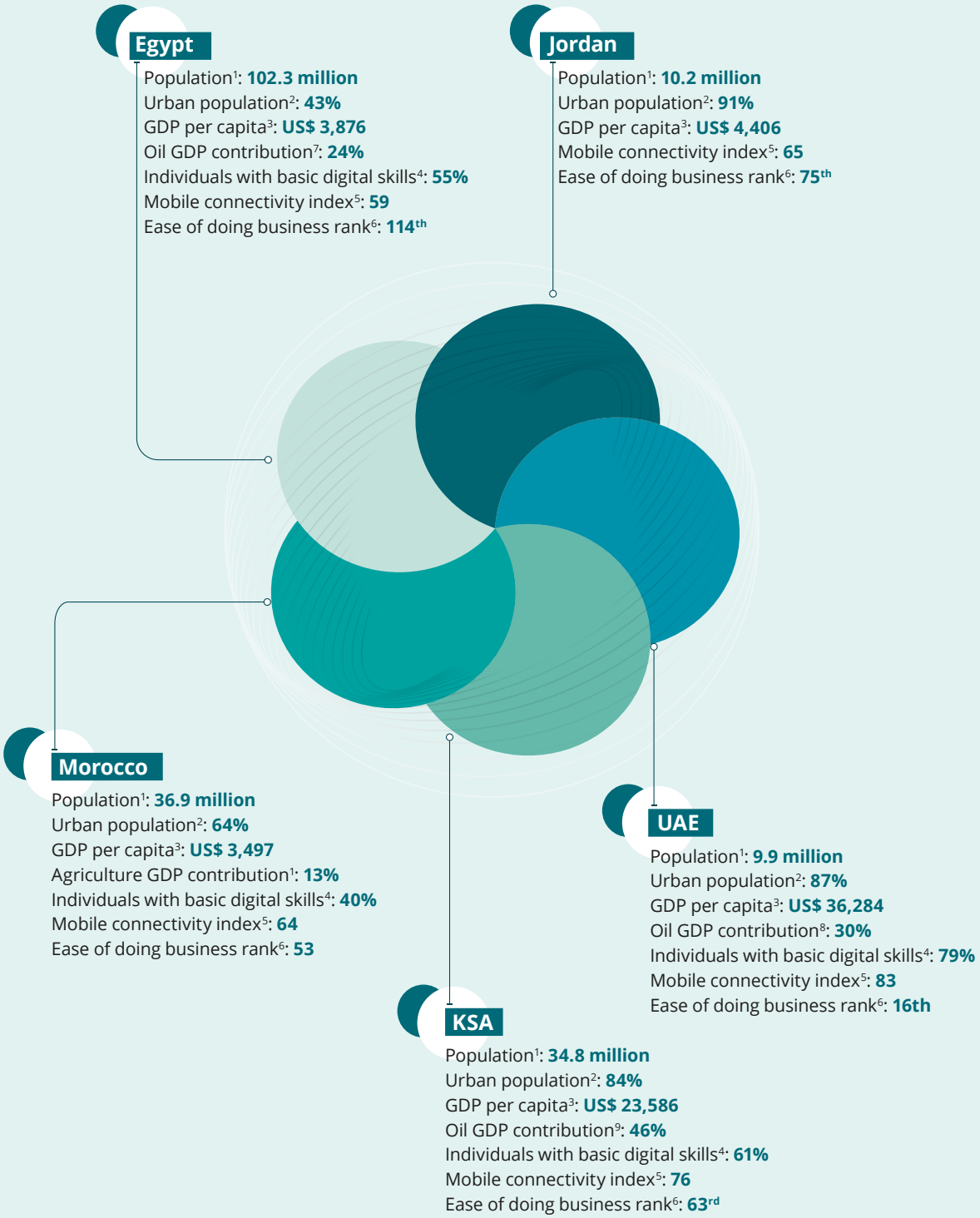
With respect to consumers, MENA has a young and technologically savvy population.[49] **MENA social media users are reported to be among the world's most prolific**, spending on average 3.5 hours per day across platforms compared to a global average of 2.5 hours.[50, 51] A Deloitte study predicted that, **by 2025, the majority of Gen Z and Millennial populations in KSA and the UAE will be frequent AR users**.[52] In addition, survey evidence supports interest in the metaverse, as 50% of consumers expressed excitement and keenness to use it.[53] Current usage is focused on communication, gaming, media and shopping, but drivers of expected future use also include wellness and productivity.[54]

The path to metaverse adoption will depend on the diverse challenges and priorities of MENA countries

There are significant differences between MENA countries in terms of size, income levels, geography, culture, and structure of the economy, as illustrated in Figure 4. Such differences, particularly in the levels of digital maturity, will affect the rate of metaverse adoption and the types of applications that are most relevant. For example, there are disparities in the availability of advanced connectivity (e.g., fixed fibre and mobile connectivity), needed to support more sophisticated use cases in the future. Median fixed broadband download speeds range from around 150 Mbps in the UAE to 17 Mbps in Morocco, and coverage of fixed and 4G/5G networks is similarly uneven.[55] There are also significant digital divides within countries; for example, while 82% of Egypt's urban residents have internet access at home, this falls to 62% for residents of rural areas.[56]

There are significant differences between MENA countries in terms of size, income levels, geography, culture, and structure of the economy.

Figure 4: Overview of MENA countries included in this report



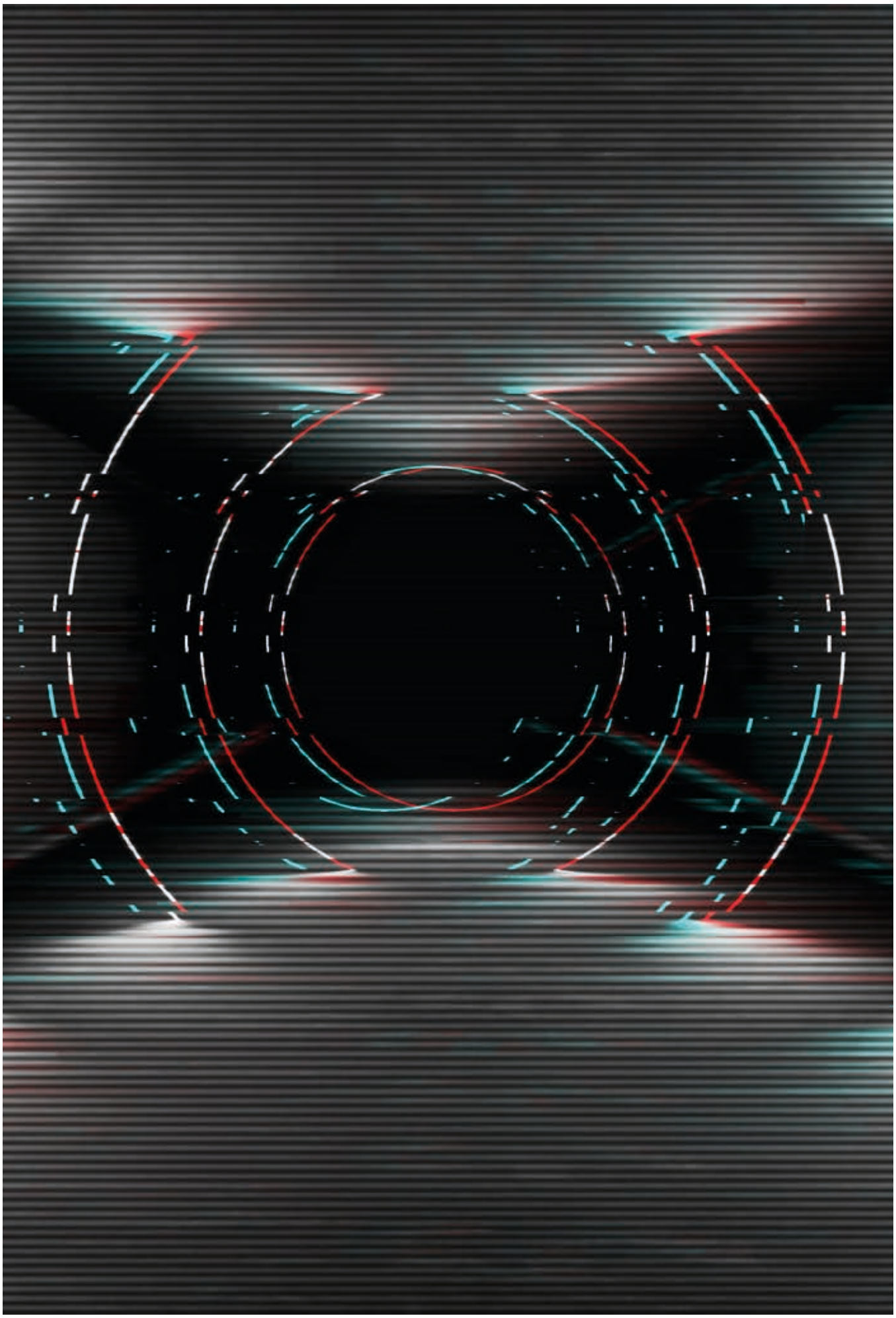
Source: [1] The World Bank (2022). Population; [2] The World Bank (2022). Urban population (% total population); [3] The World Bank (2022). GDP per capita (current US$); [4] ITU (2022). Digital Development Dashboard; [5] GSMA (2022). Mobile Connectivity Index; [6] The World Bank (2022). Ease of doing business rank; [7] International Trade Administration (2022). Egypt – Country Commercial Guide; [8] International Trade Administration (2022). United Arab Emirates – Country Commercial Guide; [9] Trading Economics (2022). Saudi Arabia GDP Growth Oil Sector.

These differences between countries emphasize the importance of creating an enabling environment – discussed later in Section 3 – to support successful metaverse adoption in each country:

— KSA and the UAE are already regional leaders in terms of digital maturity. However, they remain dependent on hydrocarbon revenues and public sector employment. Both countries are targeting sustainable growth through major economic transformation and diversification programs, such as KSA's 'Vision 2030' and UAE's 'We the UAE 2031' vision. The long-term economic returns from the metaverse will be dependent on the structure and modernity of domestic economies. Further growth of private sector employment, with competitive and innovative non-hydrocarbon sectors that can adopt metaverse applications on a large scale, will help to maximize the metaverse's potential.

— Egypt, Jordan and Morocco have large young populations and entrepreneurial cultures that can foster innovation and tech adoption. These countries are also focusing on investment in digital infrastructure (e.g., fiber and 5G) and skills as part of their wider national goals such as Egypt's 'Vision 2030', Jordan's 'Economic Modernization Vision 2025', and Morocco's 'Horizon 2025'. Connectivity plays a fundamental role in ensuring access to technological innovations and will be key to enabling users to access more immersive experiences in the metaverse in the future. To narrow the gap to digital leaders such as the UAE and ensure that a broad base of consumers and businesses are able to participate in the metaverse, continued investments towards inclusive connectivity are likely to be required, particularly among large rural populations in Egypt and Morocco. These countries also have income levels significantly below the regional average, meaning that the affordability of devices and data usage is a barrier to metaverse applications in the near term. Therefore, adoption may depend on a suite of relevant immersive experiences being developed for use even on budget or mid-range smartphones.

Given the breadth of potential metaverse applications and the diversity of socioeconomic factors across MENA, the remainder of this report further explores the potential benefits of the metaverse for the region (Section 2) and the enablers required to capitalize on the opportunity (Section 3).



2. The Potential Impact of the Metaverse in MENA

Successful metaverse applications are expected to generate value across key economic sectors, such as tourism, gaming, retail, and real estate. The potential contribution of metaverse technologies to the economy could reach $38.1 billion for KSA and $22.0 billion for Egypt. Metaverse applications could also support improvements to inclusion and sustainability, but the scale of benefits is uncertain and reliant on an enabling environment.

The metaverse may be a significant economic opportunity for MENA

Early estimates from the literature highlight significant potential growth in metaverse-related investments and revenues, with existing studies showing large potential impacts both globally and regionally. However, as the metaverse is in its early stages of development, the precise timing and scale of its impact is uncertain.

— Estimates of the potential global market size of the metaverse (i.e., revenue) range from $678.8 billion (Grand View Research) up to $13 trillion (Citi GPS) per year by 2030.[57, 58]

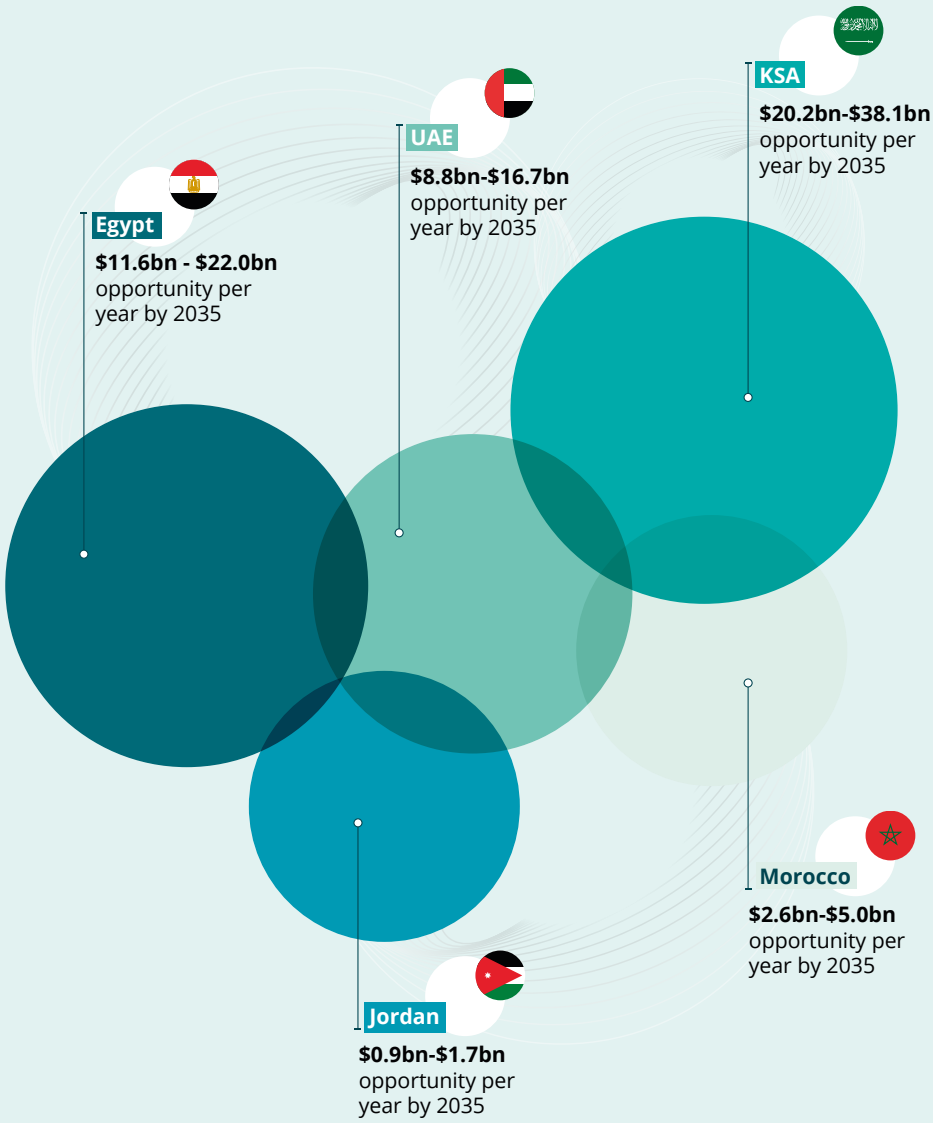
— Estimates of the potential economic contribution of the metaverse to global GDP range from $1.5 trillion per year by 2030 (PwC, focused on AR and VR) and $3 trillion per year by 2031 (Analysis Group).[59, 60]

— For the MENAT region, Analysis Group finds that the contribution to GDP could be $360 billion per year by 2031.[61]

As shown in Figure 5, **this report presents new country-level estimates for selected MENA economies to assess the potential economic benefits of the metaverse, equal to 1.3% to 2.4% of the countries' projected GDP in 2035**. Further information on individual countries is summarized in the country profiles at the end of this report, in Section 4.

Successful metaverse applications are expected to generate value across key economic sectors, such as tourism, gaming, retail, and real estate.

Figure 5: Estimated economic contribution of the metaverse to annual GDP, by 2035



Source: Deloitte analysis.

These estimates depend on several modeling assumptions including global GDP forecasts, investment scenarios, and additionality of these investments, which may ultimately lead to higher or lower impacts (see Box 1 for a methodology overview). The economic estimates effectively assume that the countries draw investment to develop their ICT sectors and capabilities in proportion to their GDP.[iii] Section 3 provides a discussion of the conditions needed for these assumptions to hold, and thus for the ultimate value of the metaverse to be realized. In practice, however, **benefits are dependent on factors which enable the metaverse. The presence of these factors, such as digital infrastructure, skills, device affordability, business environment and regulation, differ across countries**. These factors are discussed further in Section 3.

iii Note, the estimates consider investments by large technology firms in the development of the metaverse and which could include spending on investments across various forms of ICT capital such as metaverse-specific hardware, computing networks and supporting infrastructure such as data centers, and in less tangible assets such as software, databases, human capital, and content creation.

METHODOLOGY OVERVIEW:
Methodology used to derive the country-level estimates of the contribution of the metaverse on GDP

To estimate the impact of the metaverse in in the five selected MENA countries, the methodology begins by estimating the potential global economic impact of the metaverse based on potential levels of global investment in the metaverse. It then apportions this global total to obtain country level estimates. For the analysis, two scenarios for global investment in the metaverse based on the literature are considered:

— **Baseline scenario** where global investment is US$140 billion per year from 2022 to 2029,
— **Upside scenario** where global investment is US$270 billion per year over the same time period.

Using estimates from the economic literature for the relationship between investment of ICT capital and economic growth, the analysis suggests that metaverse investments could add US$1.90-US$3.58 trillion to global GDP by the end of 2035: this would be approximately 1.3-2.4% of global GDP in 2035. To apportion this global total, a proportion is attributed to the five selected MENA countries, and this is based on their forecast contribution to global GDP. Following this, the two scenarios for metaverse investment are estimated to generate an economic contribution between US$20.2 billion and US$38.1 billion for KSA; US$11.6 billion and US$22.0 billion for Egypt; US$8.8 billion and US$16.7 billion for the UAE; US$2.6 billion and US$5.0 billion for Morocco and US$0.9 billion and US$1.7 billion for Jordan, per year by 2035. For a detailed description of the methodology, please see Deloitte's report 'The Metaverse and its Potential for Türkiye'. Please note that following the release of the Türkiye report, the IMF subsequently (in April 2023) published updated GDP forecasts, which have been used in this paper. These impact estimates are dependent on several assumptions and external forecasts, including:

— Country level and global real GDP forecasts from the IMF for 2022-2028, and a CAGR for 2029-2035 based on World Bank figures for GDP over the period 2009-2019.
— The investment scenarios considered look at spending that is likely to arise from large technology firms in the development of the metaverse platforms and technologies. Therefore, they do not necessarily consider wider, longer term, investment that may take place across a number of wider domains such as in communications, connectivity and underlying infrastructure.
— Global ICT investments in the metaverse, which are assumed to be incremental to other ICT investments, rather than substitutes.
— The level of metaverse investments being made in the five selected MENA countries and globally, as well as the development of an enabling environment to support adoption.
— The types of investments in scope, which may not include all broader metaverse-related investments, for example by firms outside the ICT sector, or by public authorities, suggesting estimates may be conservative.

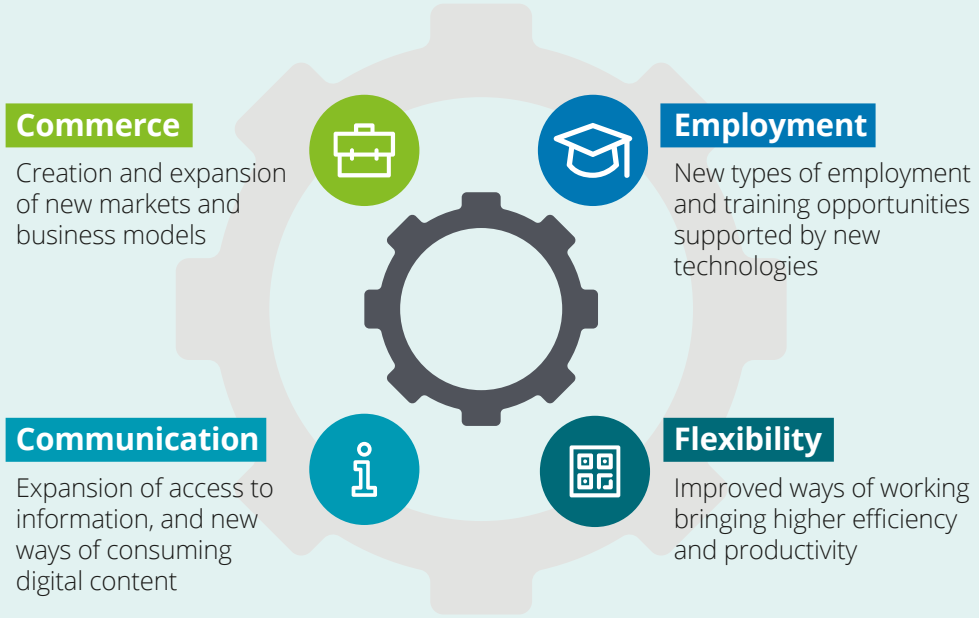
Therefore, caution should be maintained over the exactness of the estimates as a result of assumptions and forecasts differing over time. Consequently, the impact of the metaverse both globally and in the five selected MENA countries may be larger or smaller.

Source: Deloitte analysis

Metaverse adoption could unlock revenue and efficiency gains across MENA sectors

Metaverse technologies can promote this economic value through key impact drivers, as shown in Figure 6 and discussed below in the context of key growth sectors for the region.

Figure 6: The metaverse impact drivers



Source: Deloitte analysis.

Creation and expansion of new markets and businesses

Metaverse technologies could support **diversification and economic development** in MENA by enabling **new business models and revenue streams** across different sectors. Scaling of the opportunity is more likely where businesses have higher levels of digital readiness. As such, **near-term impacts may be most evident in sectors such as gaming** and adjacent media and entertainment sectors, where adoption of metaverse-related technologies is already gathering pace. However, **the longer-term applications could be far broader** if additional sectors – for example, real estate – are able to adopt metaverse technologies at scale.

Near-term impacts may be most evident in sectors such as gaming and adjacent media and entertainment sectors.

Sector deep dive: Gaming

Immersive gaming is currently one of the most prevalent use cases for metaverse-related technologies, and will play a key part in the proliferation of the metaverse across MENA. MENA has one of the fastest growing gaming industries in the world, expected to more than double to a US$ 5 billion industry with 85.7 million gamers by 2025.[62]

MENA countries such as **KSA and the UAE are investing heavily in the industry, reflecting its potential**. KSA is making multibillion-dollar investments in gaming and e-sports and has launched the "Gaming And Esports Strategy" program to boost the sector's contribution to GDP to US$ 13 billion in 8 years and generate 39,000 jobs by 2030.[63, 64] In the UAE, the government is supporting the creation of a gaming hub in Abu Dhabi, ADGaming Hub, that aims to attract international creators and gaming companies.[65,66,67] More generally, the UAE is forecasted to reach an AR and VR penetration rate of over 50% by 2027, highlighting the ubiquity of the technology in the near future.[68]

Other governments in the region also recognize the importance of gaming, such as Morocco, where the Ministry of Youth partnered with Royal Moroccan Federation of Videogames to promote the sector. The two entities plan to increase investment, enhance the country's youth gaming skills and promote participation in international tournaments, such as the FIFAe Nations Series 2022.[69] Improved access to gaming could even offer players new avenues to pursue professional careers as gamers, with this trend already becoming popular in Morocco.[70]

Real estate is an important sector for MENA economies, contributing to almost 6% of UAE GDP for example,[71] and is expected to benefit from adoption of metaverse technologies in the region, as highlighted in the Dubai Metaverse Strategy for example.[72] There are different ways in which this could be achieved.

Firstly, metaverse technologies could help **enhance sales of physical assets**, for example through promotional activities using virtual visits and digital twins of properties. DAMAC, a real estate developer in the UAE is already offering 3D virtual tours to promote properties and is planning to invest in US$ 100 million to build digital assets such as digital homes and property, to support its physical business.[73]

Secondly, the sector may benefit from **new revenue streams from the sale of virtual land and property.** For example, a Dubai-based investment company is working to build the first residential tower in the metaverse called Skylum.[74] **Globally, nearly US$ 2 billion has already been spent on virtual land purchases**.[75] Owning digital land in the metaverse can give the opportunity for governments or businesses to establish a centralized presence where content or services are accessible virtually to a wider range of people. The UAE's Ministry of Economy for example, opened an office in the metaverse which will be accessible to people from anywhere and will offer the same services as the physical one.[76]

Changing the future of real estate search through Dubai's digital twin

Square Yards, an Indian proptech company, has launched a digital twin for Dubai that provides high-definition 3D maps and real estate visualization. The 3D metaverse platform will use technologies such as VR, AR and AI to provide people an immersive experience when searching and viewing properties. Potential buyers will be able to enter the property, tour it through an avatar of their choice and talk to sales representatives through voice conferencing. The project will allow users to access more than 2,000 potential real estate projects in Dubai.

Through these solutions, Square Yards aims to help real estate developers, governments and architects create a fully digital selling experience.

Source: The Economic Times (2022); Khaleej Times (2022).

Expansion of access to information and digital content

Across MENA, citizens may face barriers to accessing information and marketplaces due to factors such as rural connectivity or device access issues.[77] Continued investment into connectivity in recent years has already played a major part in mitigating rural disconnectedness; for example, in Egypt, internet access in rural areas – where just over half of the population resides – has increased from 26% in 2013 to 62% in 2020.[78,79]

With continued improvements in connectivity and digital skills, metaverse technologies could help to further decrease geographic barriers. This could enable immersive content and services to be accessed outside of major urban hubs in the region and bring immersive experiences of MENA's natural and cultural assets to a global audience. Some potential impacts are illustrated below, with a focus on the retail and tourism sectors.

MENA's US$ 1 trillion **retail** industry is diverse and attracts luxury and international brands.[80, 81] With the majority of the population in MENA (73%) shopping more online as a result of the pandemic, retailers in the region are eager to adopt hybrid retail models to enhance their consumers' experience.[82, 83] **MENA's retail industry can benefit from metaverse technologies to meet the changing preferences of consumers,** with evidence that this can improve sales – Shopify, an e-commerce company, reports that **using 3D content in stores leads to a 94% conversion lift on average**.[84]

IKEA virtual reality shopping experience

Takeleap company is developing solutions for retailers such as IKEA in Jordan and Morocco to allow customers to visualize what furniture would look like in their homes using VR technologies. The IKEA Virtual Reality experience allows customers to explore all items in the store through 360° virtual tours. Users can pick a room size and layout and furnish it virtually in the way they want it in their home to then proceed to a virtual checkout to pay. The experience resulted in an estimated 20% increase in footfall and sales in physical retail.

Source: Takeleap (2022).

Metaverse technologies can offer consumers access to engaging shopping experiences through virtual shops, experiencing products without visiting the shop physically. Emerging examples include the launch of **the first metaverse B2B marketplace in the region, based in the UAE, called "Magnati-MetaV', which will provide shops and brands the ability to shift to multi-dimensional online commerce**.[85] Also, retailers such as Chalhoub Group – the largest retail operator in MENA – are already offering retail in the metaverse with products in the form of non-fungible tokens (NFTs) designed to be bought and worn by avatars.[86]

Metaverse technologies can offer consumers access to engaging shopping experiences through virtual shops, experiencing products without visiting the shop physically.

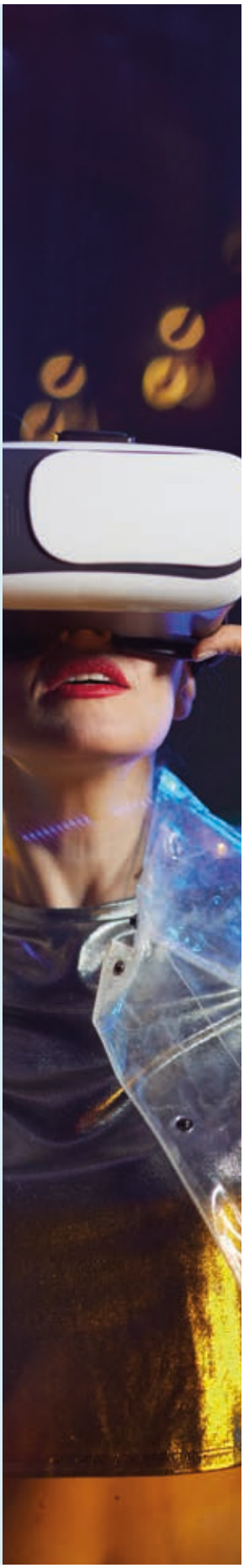
Sector deep dive: Tourism

MENA has a rich heritage, and its natural, cultural, and religious tourism assets make it an appealing destination that attracts around **90 million tourists each year**.[87] At regional level, the tourism sector is forecast to grow from 6.5% of the region's GDP in 2022 to 10.1% by 2032, creating an additional 3.6 million jobs over the next 10 years.[88] At national level, the sector accounts for around 19% of GDP in Jordan, 12% in Egypt and 11% in Morocco, while for GCC countries it is a key strategic non-oil sector.[89, 90, 91] The UAE's 'We the UAE 2031' vision, for example, aims to increase tourism's contribution to the economy to around US$ 120 billion, and the KSA's 'Vision 2030' places tourism as a main contributor to diversification goals.[92, 93]

Metaverse technologies can enhance and amplify the existing tourism industry. AR, VR and MR have the potential to create a more engaging and interactive experience for visitors, for example, by restoring physical historical ruins to their original architecture or augmenting historical events into real life settings. By adopting metaverse technologies, the sector also stands to benefit from virtual visits and virtual tourism campaigns, which could motivate travelers to visit MENA countries physically after experiencing sites or hotels remotely. In addition, virtual visits in the metaverse could generate new revenue streams for the tourism sector as admission models for such visits could emulate the real world, ranging from an entirely free-to-view entry to requiring visitors to buy NFTs to access the virtual space.

MENA countries are already starting to adopt virtual tourism visits and could capitalize on the opportunity to benefit from new business models and revenue streams that the metaverse can enable. For example, **Egypt has launched the ECO Egypt virtual tourism campaign which offers people the opportunity to explore some the country's most spectacular sites through VR tours and 360° technologies and Jordan has introduced virtual reality tours to promote Petra, one of the country's most important tourist sites**.[94, 95]

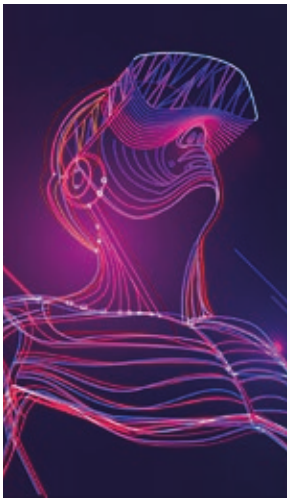
The metaverse could be particularly impactful if used to promote locations that are less well-known to a global audience, or entirely new destinations, such as those being created within KSA's Neom and its Red Sea Project. The historical site of AlUla in KSA only attracts 10% of the visitors in Petra in Jordan (also a Nabatean historical site) and recently became accessible to virtual tourists through virtual 360° tours on the Decentraland platform, making it **the first UNESCO World Heritage site to enter the metaverse**.[96, 97, 98] The virtual tours will allow visitors to see the site in realistic dimensions, explore the history of some of the monuments through vivid and interactive information points, and even enter parts of the site that are not accessible to tourists in-person.[99]



New employment and training opportunities

New **employment opportunities** enabled by metaverse technologies may be especially important for content creators and young people in MENA. Whilst these groups are potentially well-placed to adopt jobs requiring more advanced digital skills as demand grows, they may lack the training and experience currently required to be employed in the labor market.[100]

MENA has seen high structural unemployment, in particular **youth unemployment, which was 26% on average in 2022**.[101, 102] Metaverse technologies could help enhance skills and alleviate some of these pressures. By leveraging AR and VR technologies in the metaverse, employers and educators can offer more efficient **training** and can widen access to education through remote learning. This could help to bridge the gap between qualifications and job requirements, especially for young people.



XR Center in Hassan II Agronomic and Veterinary Institute (IAV Hassan II)

EON Reality is working with the Hassan II Agronomic and Veterinary Institute in Morocco to help integrate Extended Reality (XR) training in the agricultural sector. The partnership aims to help create job opportunities for Moroccan youth, through training of 5,000 students and 750 workers or internships.

Source: EON Reality (2021).

Such impacts are not necessarily limited to opportunities in the digital economies. **Metaverse technologies could also be used to strengthen skills in traditional sectors such as agriculture**, which would in turn help support prosperity in rural regions. However, such sectors may have relatively low technology readiness, such that adoption could be a longer-term prospect.

Improved ways of working

The adoption of metaverse technologies could promote more efficient working practices. Virtual immersive settings that mirror a real-life environment could be leveraged for **productive remote working and collaboration, regardless of the geographic location of each worker**. There is demand in the region for remote communication and collaboration tools, given that countries in the region often act as hubs with respect to international trade, travel and company headquarters. For example, Dubai's largest trading partners are China, India, the USA and Switzerland.[103]

New use cases are emerging which seek to alleviate frictions that arise when communicating and collaborating across borders, both within MENA and beyond. For example, the UAE's Virtuzone – a corporate services company – is planning on using the metaverse to attract and provide virtual headquarters for digital nomads.[iv, 104] The company plans to cater to digital nomads by housing virtual offices and providing real world corporate services such as compliance procedures and human resources solutions, amongst other business processing solutions.[105] Demand for such services is expected to grow, as there has been a post-pandemic increase in digital nomad hubs; Dubai is ranked second in the 2021 Nomad List of the world's fastest growing remote destinations.[106]

iv Digital nomads are defined as people who frequently travel to foreign locations and use the internet and technology to work remotely.

New revenue streams and expanded access could catalyze MENA's creator economy

Metaverse technologies could help stimulate the creator economy in MENA, enabling new forms of content and new ways of connecting with audiences.[v] For example, creators like Dubai-based Sophie Katirai can develop filters that augment pictures and videos by overlaying special effects onto the physical world to create original content.[107]

Time spent on social media (among MENA social media users) is among the highest in the world with users spending 3.5 hours daily, on average.

Internet users in the region have on average 8.4 social media accounts, with users in the UAE having 10.5 accounts which is the highest globally.

70% of people who use the internet in Egypt watch YouTube on a daily basis.

Source: Radcliffe (2022).

MENA's creator economy is already growing.[108, 109] In particular, Dubai was ranked second globally in 2021 for attracting foreign investment to its creative economy,[110] driven by the **Dubai Creative Economy Strategy, which aims to double the contribution of the creative industries to the GDP of Dubai from 2.6% in 2020 to 5% by 2025**.[111]

Underlying this growth is the prevalent use of social media in the region. A growing number of young people are embracing video-based social platforms, which represents **a large addressable market for digital content creators, particularly women** who outnumber men two-to-one amongst full-time content creators globally. [112, 113]

Metaverse technologies could help maximize the potential of the creative economy. There is evidence that metaverse technologies could enhance the creativity of users – **a Deloitte survey of UAE and KSA consumers found that 69% and 73% respectively believe AR allows them to be more creative**.[114] Innovative services and platforms are emerging globally to support creators in adopting metaverse technologies. For example, Roblox (a creator-powered platform for immersive experiences) provides support and resources to help users develop and monetize their virtual experiences. In 2020, the platform had already generated US$ 329 million in revenue globally for creators.[115]

Innovative platforms within MENA specifically include **Million, the region's first NFT-powered social media platform,** that allows users to create exclusive content which they can control and monetize. Through Million, content creators will be able to create "social tokens" whose value is derived from belonging to the community. Based on their popularity, content creators will be able to sell these tokens, allowing certain fans to get access to exclusive content and thus creating an additional revenue source for content creators.[116]

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v Creators can be defined as those who use digital technology to make and publish unique creative content, such as videos, art, music, designs, games or text.

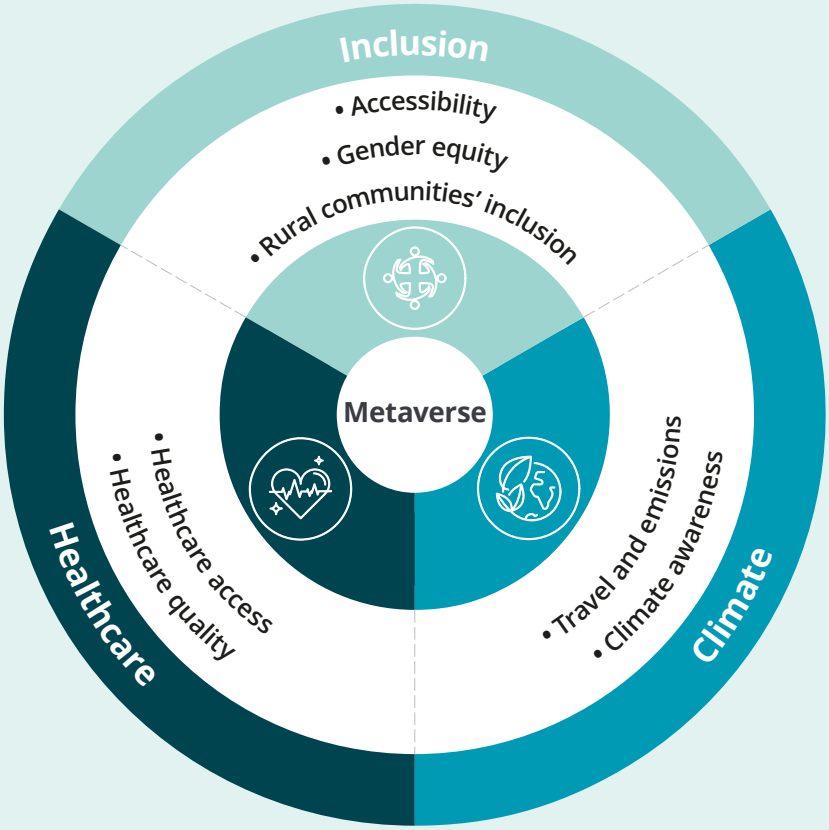
Another example is **Nuqtah (KSA), a female founded NFT marketplace providing an additional way for local MENA creators to market and sell their work**.[117] Maximizing these benefits will however depend on societal as well as regulatory acceptance towards NFTs, which remains a relatively novel and topical subject of regulatory debate.

An inclusive metaverse could support positive social outcomes

The metaverse could have implications for long-standing social challenges that remain key focus areas within governments' agendas in MENA as some metaverse applications could be used to complement broader social reform efforts.

For example, broadened access to information and services in virtual settings could offer new approaches to support **inclusion** for women and rural communities and to improve quality and accessibility of **healthcare** services. The metaverse could even improve alternative options to travel, through remote work and events held virtually (see Figure 7).

Figure 7: Potential social impacts of metaverse development



Source: Deloitte analysis.

Inclusion

Gender equality in MENA lags behind global levels , and the region has the lowest rate of female labor force participation in the world.[118, 119] Lack of access to education is also a barrier to many in the region, with one in every five children in MENA lacking access to schooling.[120] Lower-income households, women and rural communities are the most disadvantaged groups in accessing learning opportunities.[121]

Metaverse technologies could help improve inclusion by providing new, accessible resources and services for rural populations. For example, metaverse technologies could help improve inclusion through **virtual educational and training programs** that might otherwise only be available in urban hubs.[122] The adoption of virtual learning solutions has already started to emerge across MENA and accelerated during the COVID-19 pandemic.[123] For example, in Jordan the Ministry of Education and the Ministry of Digital Economy and Entrepreneurship collaborated with private sector companies that develop e-learning platforms.[124] By further bridging the gap between physical and online experiences, the metaverse could improve the quality of education and outcomes; for example, **a recent study found that the use of AR in Saudi education was associated with higher student performance,** though impacts will vary depending on the specific circumstances.[125]

New forms of remote and flexible working in the metaverse could also provide solutions for parents in the region to better balance work and family life. Women in MENA are often bound to family caregiving and childcare roles due to legislative barriers regarding access to education and prominent social norms in the region.[126] Flexible, remote working enabled by advanced technology such as AR or VR could increase the job opportunities available to working parents and improve the flexibility of combining childcare and working from home for parents sharing childcare responsibilities. As a result, this technology could also have broader implications for gender equality.

Countries in MENA face the challenge that rural and lower-income segments of the population may be among those who could benefit most from an inclusive metaverse, yet they also face the greatest barriers to accessing it. Existing gaps in digital skills are further analyzed in Section 3 , alongside other barriers to access such as connectivity disparities or social norms, that will impact the potential participation in the metaverse.[127]

Public health and healthcare provision

Healthcare systems and outcomes have improved in the MENA region in recent decades, but still faces challenges related to the quality and accessibility of healthcare services.[128] Prevalence of non-communicable diseases such as diabetes, sedentary lifestyles, and unhealthy food habits are increasing in MENA. In addition, some socio-demographic groups, including people in remote areas and people with disabilities, face barriers to accessing healthcare.[129, 130]

Metaverse technologies could support the delivery of certain healthcare services in MENA. For example, **the Ministry of Health in the UAE is working to build the region's first virtual hospital**, with artificial intelligence devices, robotics, and smart monitors. The virtual hospital will offer services like telemedicine, aiming to expand access to healthcare to all geographies and especially to rural communities.[131] Furthermore, AR and VR could help improve the quality of medical training and support.[132]

The development of healthcare use cases is at an early stage and will require several years to mature and to have a transformative impact as technology is developed and adopted in MENA. This will be challenging for this region, as public spending on healthcare remains low compared to global averages.[133] In countries where the healthcare system is at a less advanced stage of digitalization, other barriers – such as data privacy, trust and security – may also affect progress.

At the same time, there could be adverse health implications – while some full-body immersive experiences could promote physical activity and fitness, in other cases the increased use of digital devices can lead to deterioration in eyesight, back pains and social isolation.[134] By considering such issues as the metaverse develops, there is an opportunity to promote the metaverse as a tool to enhance wellbeing, while monitoring for any undesirable effects and putting safeguards in place where necessary.

Climate

MENA is the world's most water-stressed region and is highly vulnerable to the impacts of climate change, affecting key sectors such as agriculture.[135, 136] Policymakers across the region are aware of the urgency of addressing climate change and have already begun to strengthen pledges to reduce greenhouse emissions, with some committing to reach net zero emissions over the next three to four decades.[137] The region is hosting global climate discussions, with COP27 being held in Egypt in 2022 and COP28 due to be held in the UAE in 2023.[138, 139]

The metaverse could support these environmental goals, for example, by providing opportunities for individuals to reduce travel and consumption. In addition, the metaverse could further enhance remote working opportunities and lead to the substitution of some physical activities to virtual alternatives. Globally, there was evidence of reduced greenhouse gas emissions during the COVID-19 lockdowns when remote working became more prevalent and for MENA, a study on air quality in some regions in KSA found similar evidence.[140, 141]

However, the metaverse could also exacerbate adverse environmental impacts if certain issues are not addressed. In the near term, the metaverse is expected to have a slow adoption centered around existing computing power capacities. Over time, as adoption increases, the metaverse is expected to require increased computing power – in a region where data center cooling requirements entail substantial energy consumption – as well as migration to new devices that enable more immersive experiences. The net impacts from such trends are currently uncertain. MENA has some companies that provide e-waste recycling services such as EnviroServe and relevant government initiatives are emerging, for example in Egypt.[142, 143] However, only 5% of e-waste is estimated to be recycled in MENA, lower than the global average of 15% to 20%,[144] which reflects broader limitations of waste management processes and recycling infrastructure in the region.[145] Further efforts to improve this will be necessary to support sustainable metaverse adoption.

Metaverse technologies could help support environmental goals, for example, by providing opportunities for individuals to reduce travel and consumption.

3. Enabling Successful Metaverse Growth in MENA

MENA countries are investing in digital capabilities and other socioeconomic factors that can benefit the broader internet ecosyystem and also facilitate the adoption of metaverse technologies. However, current disparities will result in benefits being distributed unevenly in the near term. Through sustained investment and policy support, there is a long-term opportunity to create a more balanced enabling environment across the region to support an inclusive metaverse.

For MENA countries to realize the potential economic and social benefits discussed in Section 2, there are several important technological and enabling factors that need to be in place to encourage innovation and facilitate widespread adoption. The key enabling factors can be understood as follows:

— **Technology fundamentals:** this refers to the digital infrastructure and hardware required for the metaverse to exist and thrive in a country.

— **Wider ecosystem:** this refers to elements of the business and regulatory environment that can help to fully leverage the potential offered by the technology fundamentals, facilitating a widespread and successful adoption of the metaverse.

Figure 8: The enabling pillars of the metaverse

Source: Deloitte analysis.

The above framework can be used as an early indicator to understand MENA's current position with regard to metaverse readiness. Although all MENA countries are showing improvement in these areas, significant differences remain in terms of ICT infrastructure, skills, digital readiness, business environments, and governance frameworks. These differences imply that the impact of the metaverse may not be felt equally across the region. Those countries and areas that succeed in creating an enabling environment can expect to realize more of the metaverse's potential sooner.

The following pages provide an overview of key enabling factors across the region. Further information on individual countries is summarized in the country profiles at the end of this report, in Section 4.

Digital infrastructure and adoption in MENA are improving

Figure 9. Technology Fundamentals

Enabling access to the metaverse

1 User Devices

- 60% of Moroccan households own a computer, laptop or tablet at home in 2020 *(Oxford Business Group)*
- 97% of UAE residents are smartphone users with 93% of residents being mobile internet users. *(GMI)*

2 Connectivity

- 97% of Jordan's population is covered by 4G networks; *(Orange Jordan)*
- Fixed broadband subscriptions per 100 inhabitants stood at 6.2 in 2020 in Jordan, trailing the UAE's 32.8 in 2020. *(World Bank)*

3 Digital Payments

- 61% of Saudis aged 15+ made or received a digital payment in 2021 – 84% in UAE and 17% in Morocco. *(World Bank)*
- 77% of KSA customers are shopping more after the pandemic *(Mastercard)*

4 Compute Power

- 44 secure internet servers per million people in Egypt in 2020 (UAE regional high of 1,406) *(World Bank)*

1 User devices[146, 147]

Smartphone adoption is projected to reach 84% of all mobile connections in MENA by 2025.[148] As a result, most consumers will be able to access some forms of metaverse experiences through their smartphones. However, smartphone capabilities vary, with cheaper models common in less affluent areas, but generally able to support a narrower range of immersive applications. **Affordability of more advanced smartphones varies due to the significant disparities in levels of GDP per capita, for example from $3,000 in Morocco to $36,000 in the UAE in 2020.**[149] This is reflected in the number of active mobile broadband subscriptions per 100 inhabitants, which sits at 82 in Morocco and 241 in the UAE.[150]

For more immersive experiences, the price of standalone physical devices such as VR headsets is a key barrier in the near term. However, as with other digital devices, prices are expected to fall over time as the technology matures.

2 Connectivity[151, 152]

Connectivity has become a defining feature of the modern economy, widening access to education, employment, healthcare, and public services worldwide. However, the connectivity divide between urban and rural areas has continued to impact people's ability to access the internet. Connectivity needs to continue to expand access to rural communities and evolve to meet consumer demand for faster and more reliable internet as technology develops.

For the foreseeable future, immersive metaverse adoption will continue to be driven predominantly through VR. Almost all VR content is currently consumed over fixed networks through Wi-Fi. With respect to AR, existing services today are largely 2D and already supported by today's networks. As a result, existing fixed network capacity and mobile coverage, in combination with future network investments for 5G, particularly fixed wireless access, fiber-optic cables, along with continued development of edge computing, is likely sufficient to support the ongoing use of the Internet and foreseeable metaverse use cases. Further use cases are expected to develop gradually over the coming years.

Fixed connections will play an important role, as many metaverse use cases are suited to residences and offices. The number of fixed broadband subscriptions per 100 inhabitants range from around 6 in Morocco and Jordan to 33 in UAE with ongoing efforts to extend connectivity.[153] For example, as part of Egypt's 'Vision 2030', Telecom Egypt invested close to US$ 790 million in 2019 in its fixed broadband capabilities.[154] Similarly, UAE has invested heavily in connectivity and has been recognized as a global leader in fiber to the home (FTTH) penetration, achieving 97% in 2022.[155] Domestic connectivity also relies on supporting data center infrastructure and international links, which are expanding, for example with Maroc Telecom's 8,000km West Africa submarine cable, launched in 2021.[156]

Mobile and wireless connections will also play an important role in enabling metaverse use cases. **Uptake of 4G has more than doubled over the past five years**, but 5G is still in a nascent stage.[157] GCC operators launched some of the world's first 5G networks and across MENA, with 5G adoption expected to grow to 17% by 2025 from 1% currently.[158] Spectrum availability will be anoter enabler of enhanced connectivity. KSA, for example, has taken the step of permitting unlicensed use of the 6GHz band, for Wi-Fi 6 technology.[vi] [159]

vi From a connection standpoint, the 6GHz band would lead to speeds 30 40% faster than its predecessor technology (5GHz) and will operate on a less congested spectrum, allowing devices operating on this band to maximize their performance. The additional bandwidth delivered by the 6GHz band will result in greater amounts of data to be transmitted faster, which will be crucial to power the immersive nature of the metaverse..

Fixed connections will play an important role, as many metaverse use cases are suited to residences and offices.

3 Digital Payments[160, 161]

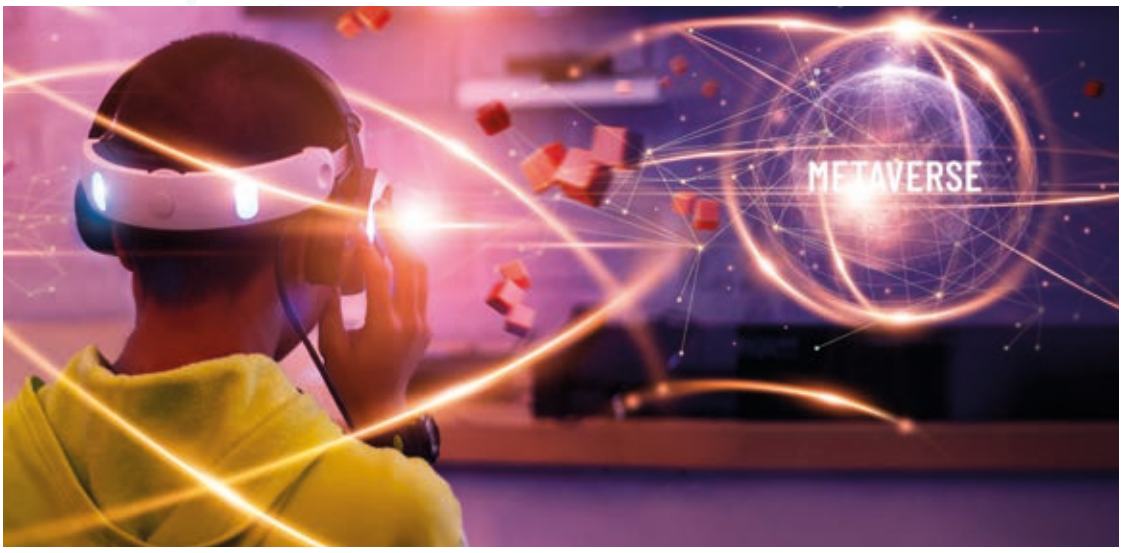
Digital payments are central to many metaverse applications, but these are not prevalent in MENA. For example, **in Jordan and Morocco only around a fifth of the population have made a digital payment**, compared to around 70% in Brazil and 30% in Indonesia.[162]

Among the root causes, a long-established cash culture, driven by a lack of banking and internet access, is still prevalent. While the majority of KSA and UAE populations hold an account with a financial institution, there are large unbanked populations elsewhere in the region. In Egypt only 27% of those aged 15 or over report having an account (either a financial institution or mobile money account), rising to 44% in Morocco.[163]

Government initiatives and new payment service providers are bringing about change; for example, Egypt has launched a Financial Inclusion Strategy (2022-25) as a key pillar of the country's 'Vision 2030' and card payment in KSA has grown 30% in 2021 and is expected to sustain a CAGR of 13.6% between 2022 and 2026.[164]

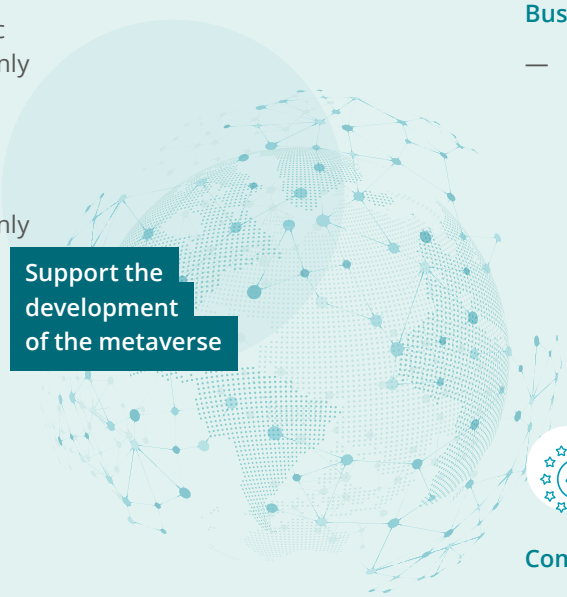
4 Computing Power[165]

As more technological innovations develop, computing power needs to continue to evolve to meet the demands of new use cases. This is also an enabler for the metaverse to provide high-quality immersive experiences to large numbers of participants simultaneously.[166] Whilst many existing AR and VR applications have been designed on current computing capacities, the demand for complex processes and functions such as data reconciliation and synchronization will require a high level of computing power as new immersive technologies continue to develop. The **Digital Egypt** strategy aims to improve Egypt's role in global data traffic by investing in the expansion on data centers, allowing for more data to be processed faster and at a lower average cost.[167]



The wider business and regulatory ecosystems are evolving in MENA

Figure 10. Wider Ecosystem



Digital Skills

- 40% of Morocco had basic digital skills in 2019 and only 9% had advanced digital skills *(ITU)*
- 55% of Egypt had basic digital skills in 2019 and only 8% had advanced digital skills *(ITU)*

Technological Readiness of Businesses

- Morocco ranked 67th out of 132 on the 2022 Global Innovation Index (GII)

Social Acceptance, Security, and Privacy

- Morocco ranked 50th out of 182 countries on the 2020 Global Cybersecurity Index *(ITU)*
- Jordan ranked 71st out of 182 countries on the 2020 Global Cybersecurity Index *(ITU)*

Competition Common Standards

- KSA ranked 66th out of 132 countries on the 2021 Global Competitiveness Index *(WIPO)*
- Morocco ranked 77th out of 132 countries on the 2021 Global Competitiveness Index *(WIPO)*

Digital skills

Although MENA has a young population, businesses experience a supply gap for digital skills.[168] **Leveraging young, digitally adept citizens to develop advanced ICT skills** (e.g., cloud computing, AI, and cybersecurity) **could unlock benefits from the metaverse and support the region's wider digital transformation goals**. Countries across the region are heading in the right direction; among regional leaders, 89% of the UAE's population has basic ICT skills, the highest in the region.[169, 170] In addition, 14% of the population in KSA has advanced ICT skills and nearly 50% have standard digital skills, paving the way for a large base of potential content developers.[171]

Technology readiness of businesses

Businesses that are open to technological change and able to adapt could accelerate the adoption of metaverse-enabling technologies. There are opportunities for government and business to identify and support business needs (e.g., infrastructure, cost, skills), to position them for the future. However, even in the UAE, the regional leader in many indicators, a survey by BCG and Meta reported that 44% of SMEs do not have a digital presence, highlighting the scope for further improvements.[172]

Social acceptance, security, and privacy

Similar to Web 2.0, both data privacy and online safety remain important objectives for the metaverse. The greater immersion provided by metaverse applications may potentially give rise to novel questions, such as new or increased data sharing. Data protection laws are important tools to address these issues. Across MENA, around two thirds of authorities had domestic data protection by 2022.[173] As of 2023, Egypt, Saudi Arabia and Morocco had data protection legislation in place – while Jordan and the UAE have established draft legislation.[174, 175] To ensure that consumers and businesses continue to be protected from online harms and data privacy risks without stifling innovation, governments should ensure that regulations and business practices, built alongside private and public sector, focus on building social acceptance and trust in these technologies.

Whilst increased digitalization can also amplify exposure to cybersecurity threats, **MENA countries such as KSA (99.5) and the UAE (98)** are already performing well in this regard, with **scores close to the US (100) on the Cybersecurity Global Index** which reflects local efforts to mitigate cybersecurity risks.[176]

Widespread acceptance of the metaverse may also rely on developing appropriate norms for conduct within the metaverse and taking into account established social norms in MENA that often differ from other parts of the world.

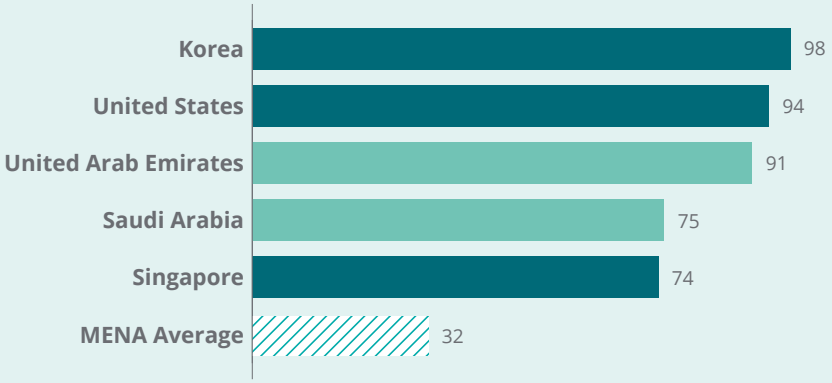
Competition and common standards

There is scope for the metaverse to be built by a diverse range of individuals, businesses, and governments globally. However, without common protocols and standards there will be multiple incompatible metaverses, which in turn may limit competition and consumer choice. For MENA countries, which often differ significantly with respect to local laws, regulations and business environments, a cross-border alignment within the region and beyond could help to avoid a fragmented and uncompetitive emergence of the metaverse. This could involve the creation of relevant fora at MENA level – for example, analogous to the MENA Cloud Alliance – as well as participating in global efforts to develop common technical standards. However, as beneficial as cross-border alignment can be, individual country regulators will be responsible for deciding the scope of the rules and regulations for their respective countries.

There is scope for the metaverse to be built by a diverse range of individuals, businesses, and governments globally.

Addressing key gaps will support metaverse adoption and broader socioeconomic development

Figure 9. 5G coverage by population in MENA and comparator countries (%)

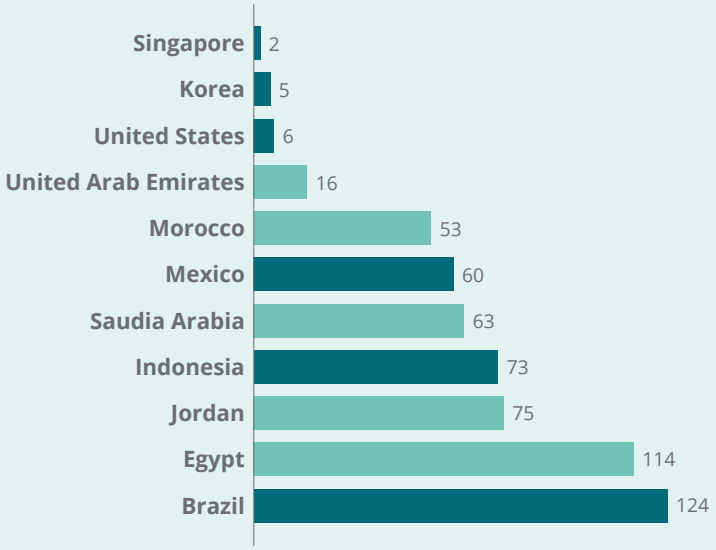


Source: GSMA

While digital capabilities and ecosystems are improving, further progress is needed to create a more balanced enabling environment across the region. Across MENA, many consumers and businesses are reliant on **mobile networks**, particularly where affordable fixed broadband connectivity is not yet available. 4G availability is near-universal in MENA – reaching 99% or higher population coverage in countries such as Jordan, Morocco and Egypt – but more advanced connectivity (e.g., 5G and fiber) is still nascent in much of MENA. **Immersive metaverse applications that require lower latency and higher bandwidth would benefit from the investments already planned for 5G and fiber networks**.

Beyond digital infrastructure, **developing literacy and digital skills** at a basic level could help to support metaverse adoption, whilst more advanced skills (e.g., programming) could enable greater local participation in building platforms and apps. Integrating metaverse technologies in schools and universities could help to develop a future-proof workforce. For example, **Morocco's Interactive Digital Centre is designed to train the new generation of experts in AR and VR,**[177] **supported by wider initiatives such as 1337 – the first coding school in Morocco, which is free to access to anyone aged 18 to 30**.[178] In KSA, the Madrasati Codes competition aimed to promote a culture of programming and innovation, has attracted almost 5 million participants including more than 3 million students.[179]

Figure 10. Ease of doing business rankings (1 = best)



Source: World Bank

Beyond digital infrastructure, developing literacy and digital skills at a basic level could help to support metaverse adoption, whilst more advanced skills could enable greater local participation.

Currently, while GCC countries are generally more advanced in terms of digitalization, their businesses still report **digital skills gaps**.[180] Addressing this could also support social objectives, such as gender equality. The OECD has noted that "the uneven access to digital tools and skills threatens to leave already disadvantaged women entrepreneurs behind".[181]

With respect to the **business environment**, many MENA countries (other than the UAE) do not rank highly globally in terms of ease of doing business. Improving this could unlock additional metaverse-related investment and innovation. Measures to reduce red tape – for instance, as the UAE seeks to do with its new golden visa initiative designed for innovators[182] – and to incentivize investment, competition and innovation, can help achieve this. **KSA and Jordan were identified among the world's top ten improvers in the World Bank's 2020 Doing Business Report, with reforms in areas such as starting a business, access to credit and paying taxes**.[183]

4. Shaping the Metaverse in MENA

The metaverse could become an important contributor to economic diversification and sustainable, inclusive growth. However, current inequalities create barriers to widespread adoption, with a risk that benefits are not felt across less advantaged areas or sociodemographic groups. Shaping the metaverse for the benefit of all citizens and businesses will rely on creating an enabling environment, policy reform and cross-stakeholder collaboration.

The region has distinctive features that can make it a fertile ground for the adoption of new digital technologies. Its citizens are young and use the internet intensively and many MENA economies are seeking to drive growth in under-developed sectors.

There are, however, significant barriers to metaverse adoption in the near term. **Based on current trajectories, the benefits of metaverse technologies are only expected to spread evenly across the region if certain conditions are met**.

— From an end-user perspective, significant gaps exist with respect to **digital connectivity** and **skills**, whilst **affordability** will be a barrier for many potential users.

— From a business perspective, **attracting inward investment** and providing **incentives for innovation** will be important. Indeed, evidence suggests that ease of doing business is still a barrier in several MENA countries, notwithstanding improvements.

— Finally, the emergence of the metaverse may require increased **cross-border coordination**, both within MENA and globally, as different jurisdictions contribute to the development of new platforms, applications, technological standards, norms and regulations. Active participation in international fora could maximize benefits from emerging best practices and innovation being developed globally.

Policy agendas in each country are adapting to these challenges; for example, Jordan's 'Economic Modernization Vision 2025' proposes initiatives including launches of 5G services, free zones for start-ups, legislative changes and investment incentives.[184] **Sustained commitment – including continued investment, reform and cross-stakeholder collaboration – would be needed to maximize the potential of the metaverse**.

The gaps in key enablers vary by country

While the UAE already operates as a global technology hub and has achieved a strong business and innovation environment, KSA for example has scope to further enhance the business and regulatory environment. In countries such as Egypt, Morocco and Jordan, near-term adoption is expected to use existing devices such as smartphones, whereas adoption of more sophisticated applications at scale appears a longer-term prospect. Further improvement in digital skills and infrastructure could unlock incremental benefits.

This report concludes with individual country profiles, presented on the following pages to summarize country-specific impacts for Egypt, Jordan, Morocco, KSA, and the UAE, with selected indicators and examples illustrating progress across some of the areas described in Section 2 – with respect to the metaverse opportunity – and Section 3 with respect to key enablers.

Sustained commitment – including continued investment, reform and cross-stakeholder collaboration – would be needed to maximize the potential of the metaverse.

Appendix: Country profiles

Indices definitions

GSMA's Mobile Connectivity Index[i]

The Mobile Connectivity Index measures the performance of 170 countries against key enablers of mobile internet adoption. Countries are scored within a range of 0 to 100 across 42 indicators including, among others, coverage of 2G, 3G, 4G, and 5G networks, mobile download and upload speed, and mobile latency. A higher score represents stronger performance in delivering mobile internet connectivity.

UNCTAD Frontier Technology Readiness Index[ii]

The UNCTAD Frontier Technology Readiness Index metric assesses a country's readiness for using, adopting and adapting 11 technologies including Artificial Intelligence (AI), Internet of Things (IoT), Big data, 5G, 3D printing, Robotics, Drone, Gene editing, Nanotechnology, and Solar photovoltaic. Five components are used to construct the index: ICT deployment, skills, R&D activity, industry activity and access to finance.

01. **ICT deployment**: This is the level of ICT infrastructure. This considers the prevalence and the quality of the relevant infrastructures to allow for advanced and efficient use of internet-based technologies like AI, IoT, big data and blockchain.
02. **Skills**: Using, adopting and adapting frontier technologies needs people equipped with relevant skills. These may be advanced but are generally lower than those required to originate the technologies. Two types of skills need to be considered: skills acquired through education, and skills acquired in the workplace through practical training or learning-by-doing.
03. **R&D activity**: R&D activity is needed not just for the production of frontier technologies, but also for adoption and adaption. R&D activities are measured using the number of publications and patents filed on the 11 frontier technologies in a country.
04. **Industry activity**: This aims to capture ongoing activities in an industry related to the use, adoption and adaption of frontier technologies. It considers three sectors that are early adopters: manufacturing, with high-tech manufacturing as the frontrunner; finance; and ICT, which tends to interact with other technologies. It uses export data, on high-technology manufactures, as well as on digitally deliverable services which cover both finance and ICT.
05. **Access to finance**: This assesses the availability of finance to the private sector. Better access to finance could accelerate the use, adoption and adaption of frontier technologies. For this purpose, domestic credit to the private sector as a percentage of GDP was selected as part of the index. This indicator measures resources provided by financial corporation. It also includes various financial instruments including loans, purchases of non-equity securities, and trade credits and other accounts receivable.

i GSMA's Mobile Connectivity Index (Link)

ii UNCTAD (2021). Technology and Innovation Report (via Statista's publication repository)

UAE

$8.8 – $16.7 bn

The economic contribution of the metaverse to the UAE's annual GDP could reach $8.8bn – $16.7bn by 2035.

With an increasingly modern economy and supportive business environment, the UAE has the opportunity to be a pioneer of metaverse technology. Interest is strong among UAE leadership and Dubai has already launched a Metaverse Strategy. Current economic reforms and diversification efforts, such as the Abu Dhabi Economic Vision 2030, can help create a fertile ground for adoption at scale, maximizing benefits. With sustained investment, the UAE can play a leading role in building MENA's metaverse ecosystem.

Country snapshot

Economy and society	
GDP (billion $)	$370.8
Population	9,890,400
GDP per Capita ($)	$37,497
Median Age	34.0
Urban Population	87.0%

Digital maturity

	UAE	MENA average	
	224	83	Active mobile-broadband subscriptions (per 100 inhabitants)
	60	57	E-Commerce Value (%) [i]
	85	64	Individuals with basic digital skills (%)

Note: All figures relate to 2020.

Overview and objectives

The UAE is a regional leader, with advanced digital infrastructure and a relatively mature ecosystem for technology adoption. The UAE's Digital Economy Strategy, launched this year, aims to double the contribution of the digital economy to the UAE's non-oil GDP to over 20% within the next 10 years. Rising 5G adoption rates also help set the scene for the metaverse to thrive.

The Dubai Metaverse Strategy aims to make Dubai one of the world's top 10 metaverse economies and a global hub for the metaverse community. The strategy also seeks to build on Dubai's achievement of attracting more than 1,000 companies in the fields of blockchain and the metaverse. In 2022, the Dubai Metaverse Assembly and Gulf Information Technology Exhibition ('GITEX') gathered key stakeholders to explore the metaverse's potential.

Examples of key disruptive sectors

Tourism: The Sharjah Commerce and Tourism Development Authority launched the 'SharjahVerse', a virtual tourism platform intended to present Sharjah to a global audience.[ii]

Tourism: Dubai will become the world's first virtual city as part of Metarverse Holdings' project to build virtual replicas of cities. The emirate will be used as a hub that replicates real-life experiences and places, providing a wide range of immersive attractions and offerings that will help promote the city and increase tourism.[iii]

Retail: Payment solution provider Magnati is set to launch the region's first metaverse marketplace that enables users to experience immersive e-commerce. The platform will focus on experimental commerce, leveraging virtual worlds to provide users with more sensory experiences.[iv]

Real Estate: Investment fund Crypto House Capita, a virtual reality project developer based in the UAE, is set to launch its first fundraising round to fund the development of Skylum, a residential skyscraper in the metaverse.[v]

i The indicator looks at country level responses to questions about how often respondents purchase goods via the Internet.

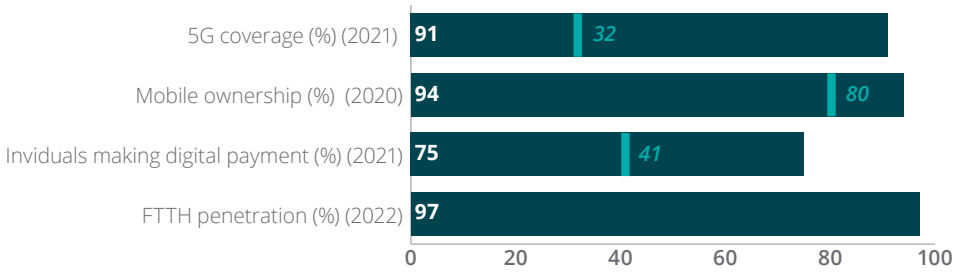
ii Analysys Mason (Yaici, 2022). GITEX 2022 was a chance for e& and other companies in the UAE to showcase their metaverse plans

iii Gulf Business (2022). Metaverse Holdings selects Dubai, Abu Dhabi as first cities in global metaverse launch

iv Magnati Payment Solutions (2022). Magnati Metav

v Arabian Business (2022). Crypto House Capital set to raise funds to finance Skylum, its ambitious virtual residential tower in UAE

Technology Fundamentals



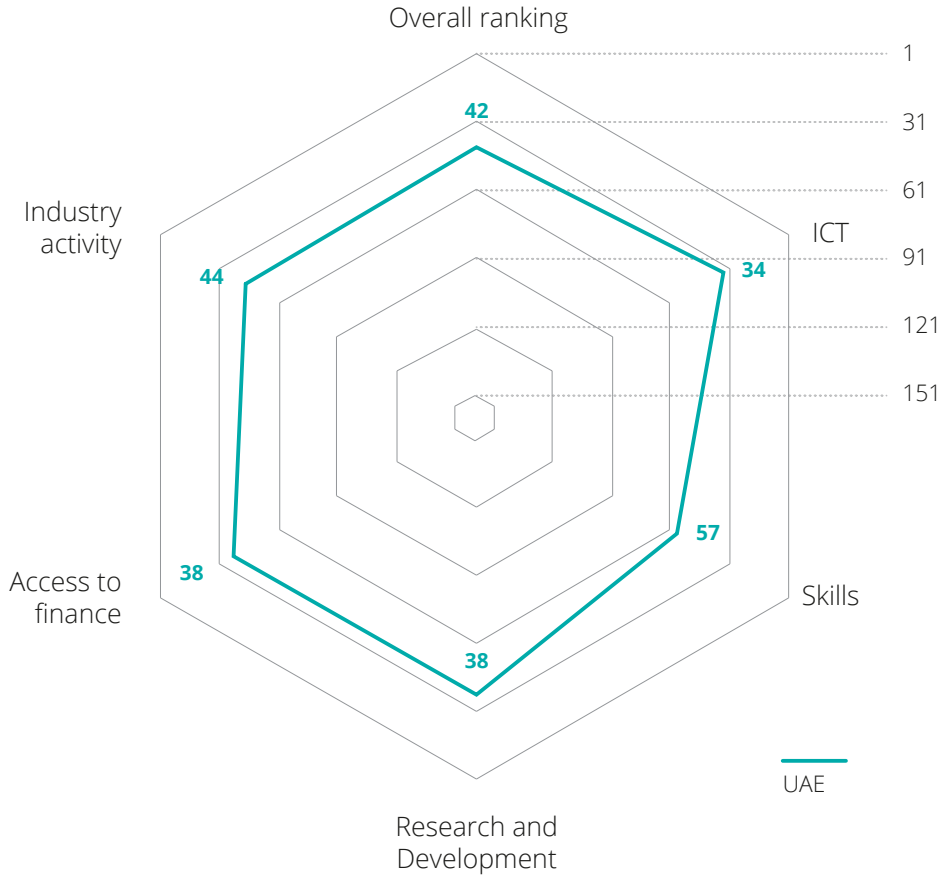
*Note: MENA averages are represented by **teal** vertical lines where available.* Where metrics are not available across the countries of interest, related measures have been included. .*

75 Mbit/s
International internet bandwidth per internet user (2021)

83/100
Mobile Connectivity Index (2021)

Wider Ecosystem Enablers

UNCTAD Frontier Technology Readiness Index (2019)



The Dubai Metaverse Strategy

The Dubai Metaverse Strategy is designed to foster innovation in metaverse and blockchain technologies, as well as set standards for investors and users. The strategy also aims to promote Dubai's ambitions to support more than 40,000 jobs by 2030 to boost Dubai's economy. Furthermore, the strategy seeks to support the UAE government's vision of increasing the number of blockchain companies by fivefold over the next decade.[vi]

The strategy seeks to:[vii]

- Foster innovation, enhance the metaverse's economic contributions through R&D collaborations, and promote advanced ecosystems utilising accelerators and incubators that attract companies and projects to Dubai.
- Foster talent and invest in future capabilities by providing the necessary support in metaverse education aimed at developers, content creators and users of digital platforms in the metaverse community.
- Develop Web 3 technology and its applications to create new governmental work models and development in vital sectors, including tourism, education, retail, healthcare and the legal sector.

Wider Developments and Initiatives

Major companies based in Dubai are starting to incorporate the metaverse into their businesses. The national carrier, Emirates, has announced plans to launch NFTs and new experiences in the metaverse for customers and employees.[viii] The company is planning on building signature brand experiences in the metaverse, alongside both collectible and utility-based NFTs.[viii]

The healthcare and medical education organization Thumbay Group is making its mark in the metaverse by building a hospital, a medical university and a virtual wellness domain.[ix] The core service offering will be a virtual hospital where patients will be able to come in with an avatar and consult with a doctor. In addition to helping residents, the virtual hospital is also meant to be a gateway to more medical tourism as patients will be able to interact with healthcare professionals before visiting.[ix] This is not the Thumbay Group's first foray into the metaverse, as it also recently starting providing AR and VR devices to patients who are bed-ridden or paralyzed for six months or more, virtually recreating their homes supporting mental well-being.[ix]

Public organizations can also play a significant role in adopting the metaverse. Immersive technologies can deliver value to the public and come closer to the realization of 'smart cities'. As AR technology improves, cities such as Dubai can incorporate immersive experiences into public infrastructure. Facilities such as bus stops and public bathrooms could be marked in a user's AR field of view.[x] In addition, digital replicas of the city could also be used to highlight historical landmarks that may often be overlooked and provide educational content, for example.[x]

Part of Dubai's metaverse vision also tackles the creation of the necessary guardrails to facilitate the creation and adoption of new technologies and services. In March 2022, Dubai established the Virtual Asset Regulatory Authority (VARA) and passed its first law dealing with metaverse related assets (such as NFTs or cryptocurrencies).[x] The favorable regulatory environment in Dubai has incentivized several metaverse and Web 3 companies to set-up in the area.[x]

vi UAE Government (2022). Dubai Metaverse Strategy

vii UAE Government (2022). Dubai Metaverse Strategy

viii Emirates (2022). Emirates Media Centre

ix Khaleej Times (2022). UAE healthcare group to launch world's first metaverse hospital in October

x Acceleration Economy (2022). How is Dubai developing its Metaverse Strategy

KSA

$20.2 – $38.1 bn

The economic contribution of the metaverse to KSA 's annual GDP could reach $20.2bn – $38.1n by 2035.

With a strong focus on digitalization as part of Vision 2030's ambitious diversification plans, KSA stands to unlock significant benefits from the metaverse. The country aims to become the region's largest digital and innovation-based economy and is making multibillion-dollar investments in pioneering technology ventures.[i] Through sustained investment and reform to support incentives for innovation and growth in non-oil sectors, KSA could build a competitive metaverse ecosystem that maximizes adoption.

Country snapshot

Economy and society	
GDP (billion $)	$650.7
Population	34,813,867
GDP per Capita ($)	$18,691
Median Age	31.9
Urban Population	84.3%

Digital maturity

	KSA	MENA average	
	119	83	Active mobile-broadband subscriptions (per 100 inhabitants)
	50	57	E-Commerce Value (%) [ii]
	78	64	Individuals with basic digital skills (%)

Note: All figures relate to 2020.

Overview and objectives

KSA is expected to be among the world's fastest-growing major economies, with ambitious transformation plans – such as Neom, an unprecedented development of new smart cities – attracting international investment.[iii] It has a rapidly expanding digital and cloud sector and was among the first in MENA to launch 5G.[iv]

Vision 2030 aims to transform the economy and promote growth in non-traditional sectors. The country plans to expand the digital economy to 19.2% of GDP by 2025.[v] Successful diversification and incentives for private sector innovation can lay foundations for metaverse applications to be used across sectors, maximizing the long-term benefits from the metaverse.

Examples of key disruptive sectors

Tourism: The historical site of AlUla became accessible to virtual tourists through virtual 360° tours in Decentraland, making it the first UNESCO World Heritage site to enter the metaverse. The virtual tours will allow visitors to see the site in realistic dimensions, explore the history of some of the monuments through vivid and interactive information points and even enter parts of the site that are not accessible to physical tourists.[vi]

Real Estate: The Neom Tech & Digital Company launched XVRS, a 3D cognitive digital twin metaverse for Neom, that will allow people to have a simultaneous presence physically in the city and virtually as an avatar. The platform will also be used to help build Neom – for example, potential residents will have the chance to test different home designs and replicate these in the physical setting.[vii]

Tourism (Religious): KSA has launched an initiative that will allow Muslims from all around the world to virtually touch the Black Stone at the Kaaba, an important religious tourism site in the country. The initiative will allow people to completely immerse themselves in the experience as it will stimulate a range of senses including vision, hearing and smell.[viii]

i ArabianBusiness (2022). LEAP 2022: Saudi to invest over $6bn in future tech as part of drive towards future

ii The indicator looks at country level responses to questions about how often respondents purchase goods via the Internet.

iii Oxford Business Group (2022). The Report: Saudi Arabia 2022

iv GSMA (2022). The Mobile Economy Middle East & North Africa

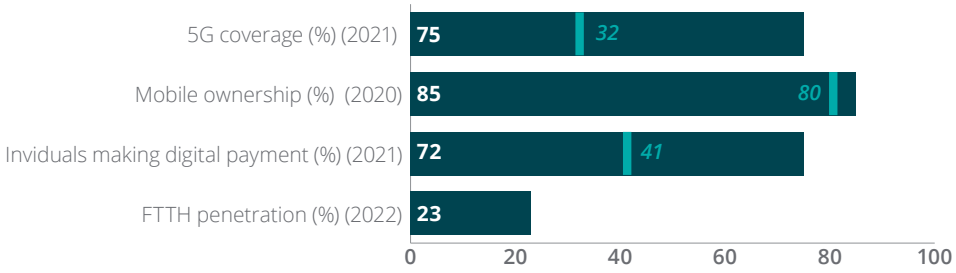
v Saudi Vision 2030 (2022). National Transformation Program

vi Gulf Business (2022). Saudi's Royal Commission for AlUla enters the metaverse

vii WIRED Middle East (2022). Saudi Arabia's new metaverse will help design $500bn city IRL

viii Siasat Daily (2021). Saudi starts initiative to touch black stone at Kaaba virtually

Technology Fundamentals



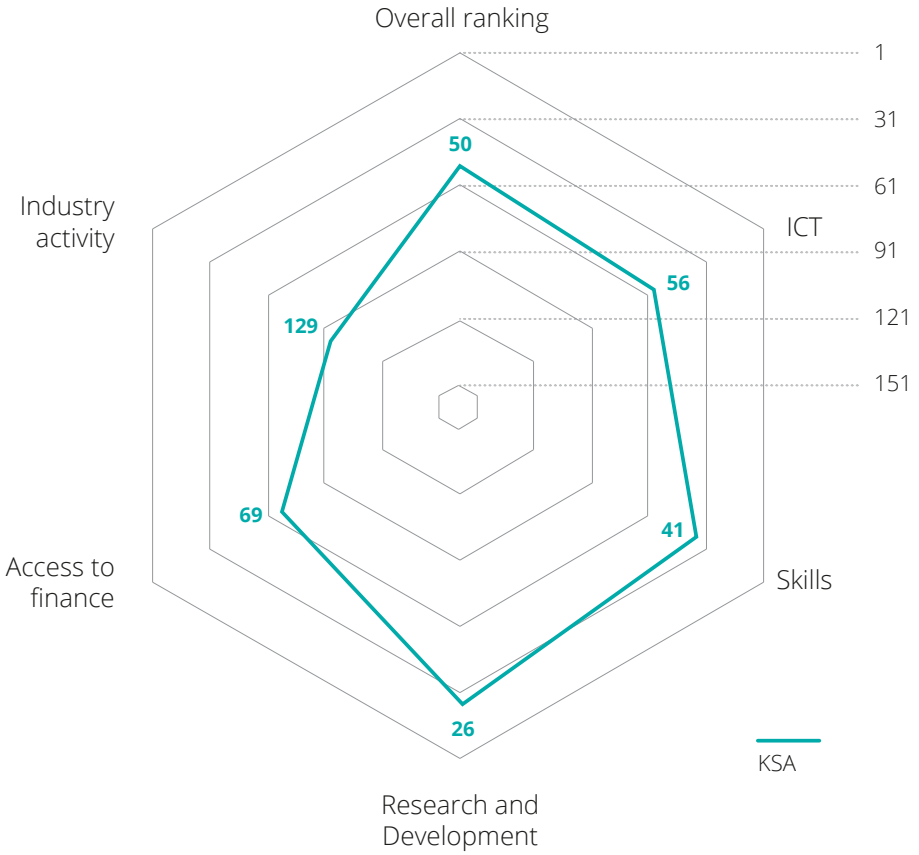
*Note: MENA averages are represented by **teal** vertical lines where available.* Where metrics are not available across the countries of interest, related measures have been included. .*

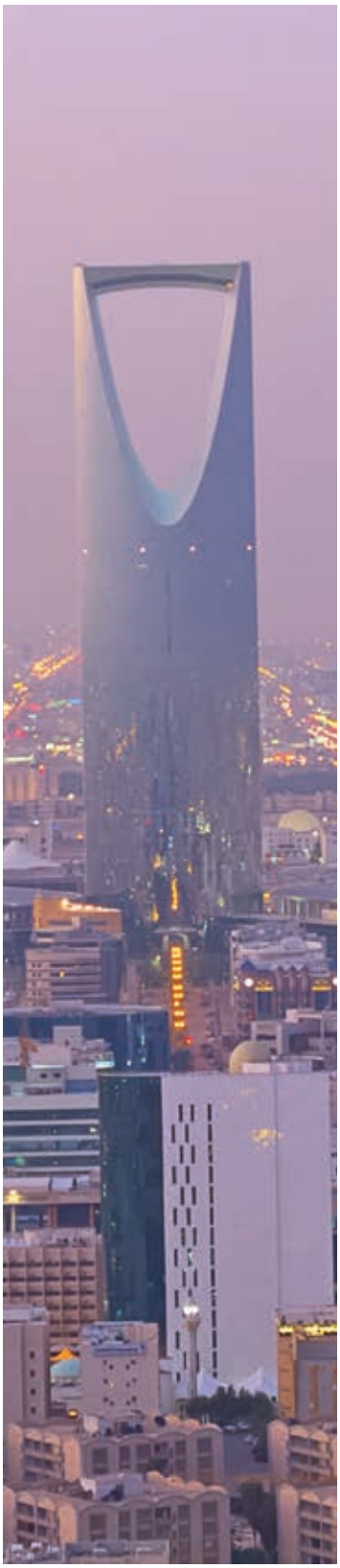
71 Mbit/s
International internet bandwidth per internet user (2021)

76/100
Mobile Connectivity Index (2021)

Wider Ecosystem Enablers

UNCTAD Frontier Technology Readiness Index (2019)





Egypt

$11.6 – $22.0 bn

The economic contribution of the metaverse to Egypt 's annual GDP could reach $11.6bn – $22.0bn by 2035.

As one of MENA's largest economies and fastest-growing entrepreneurial hubs, Egypt has significant potential for innovation and technology adoption.[i] Investor appetite and start-up development in the tech space are strengthening and the population is relatively young and tech savvy.[i, ii] Government has increased efforts to extend digital infrastructure and metaverse initiatives have already started to emerge in some sectors. Addressing current gaps in infrastructure, skills and digital payments can improve the enabling environment.

Country snapshot

Economy and society	
GDP (billion $)	$412.2
Population	102,334,403
GDP per Capita ($)	$4,028
Median Age	25.3
Urban Population	42.8%

Digital maturity	Egypt	MENA average	
	65	83	Active mobile-broadband subscriptions (per 100 inhabitants)
	54	57	E-Commerce Value (%) [iii]
	65	64	Individuals with basic digital skills (%)

Note: All figures relate to 2020.

i Middle East Political and Economic Institute. The Development Of The Tech Environment In Egypt And Other MENA Countries (In COVID-19 Times)

ii ZDNET (Radcliffe, 2019). Tech in Egypt: Here's what you need to know about Middle East's biggest market

iii The indicator looks at country level responses to questions about how often respondents purchase goods via the Internet.

Overview and objectives

Situated in an economically advantageous location, Egypt has a relatively diversified economy driving a dynamic business environment and economic development as part of its Vision 2030.[iv, v] The ICT sector is the fastest growing sector of the economy and can catalyze technology adoption.[vi] Egypt has the fastest fixed broadband internet speed in Africa; however, it still needs to close connectivity gaps, with around a quarter of the population not accessing the internet.[vii, viii] Wider efforts as part of Digital Egypt Strategy and Egypt's ICT 2030 Strategy aim to extend digital infrastructure, build youth's digital skills and promote innovation and entrepreneurship.[vii] This can reinforce the enabling environment for the metaverse, allowing it to become more widely adopted in the longer run.

Examples of key disruptive sectors

Real Estate: Siemens Egypt has launched a residential compound in the country's New Administrative Capital that will be entirely AI-based. Data and information will be readily available to build an IoT-run control center which will allow maintenance and operations to be performed in a less costly way and remotely through the metaverse.[ix]

Healthcare: For the first time in the healthcare space, the General Authority for Health Care has launched a 3D virtual reality program to promote medical tourism in Egypt. The program will allow potential patients to use the metaverse to visit healthcare facilities in Egypt and services offered with the aim of boosting medical tourism in the country.[x]

Real Estate: Estate Waves, a real estate company that uses 3D platforms and marketplaces to promote properties, has invested more than US$ 20 million in an exhibition to showcase and promote virtual real estate projects in Egypt.[xi]

Education: Egypt hosted its first metaverse hackathon to encourage young people and entrepreneurs in ICT to develop technological solutions using the metaverse and its technologies such as AR/VR/MR/XR, NFTs and blockchain.[xii]

iv Oxford Business Group (2022). The Report: Egypt 2022-Economy

v Oxford Business Group (2022). The Report: Egypt 2022-Country Profile

vi Telecom Review (2022). Egypt: A Catalyst of Digital Transformation, Tech Adoption

vii Daily News Egypt (El-Din, 2021). Egypt is ready to introduce 5G technology: Ericsson Vice President

viii Connecting Africa (Gilbert, 2021). Egypt's Internet penetration lags North African peers

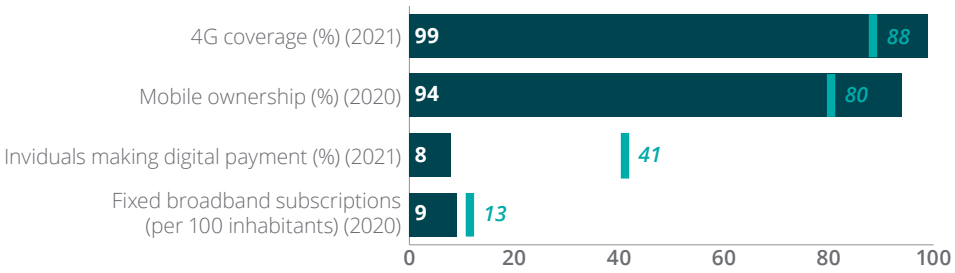
ix WAYA (2022). Siemens, Al Attal and Sigma to build Egypt's first artificially intelligent compound in the New Capital

x Al-Monitor (2022). Egypt uses augmented reality to promote medical tourism

xi Zawya (2022). Estate Waves Egypt launches the first real estate exhibition with the Metaverse feature next September

xii TECHx (2022). Egypt hosts first Metaverse Hackathon

Technology Fundamentals



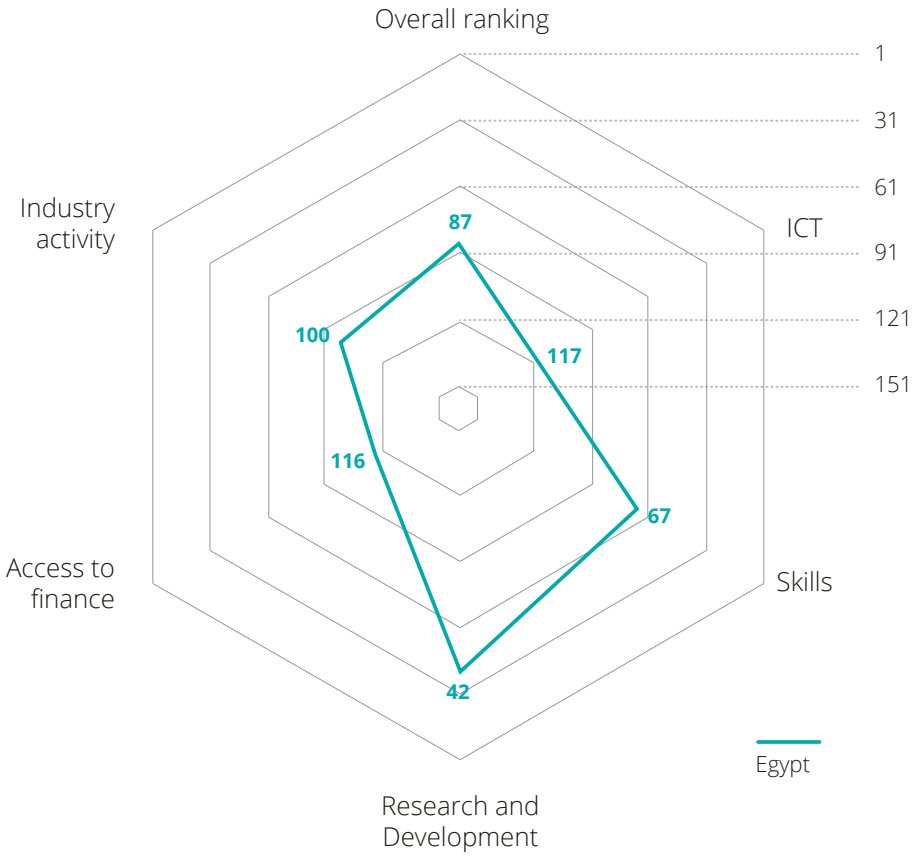
*Note: MENA averages are represented by **teal** vertical lines where available.* Where metrics are not available across the countries of interest, related measures have been included.*

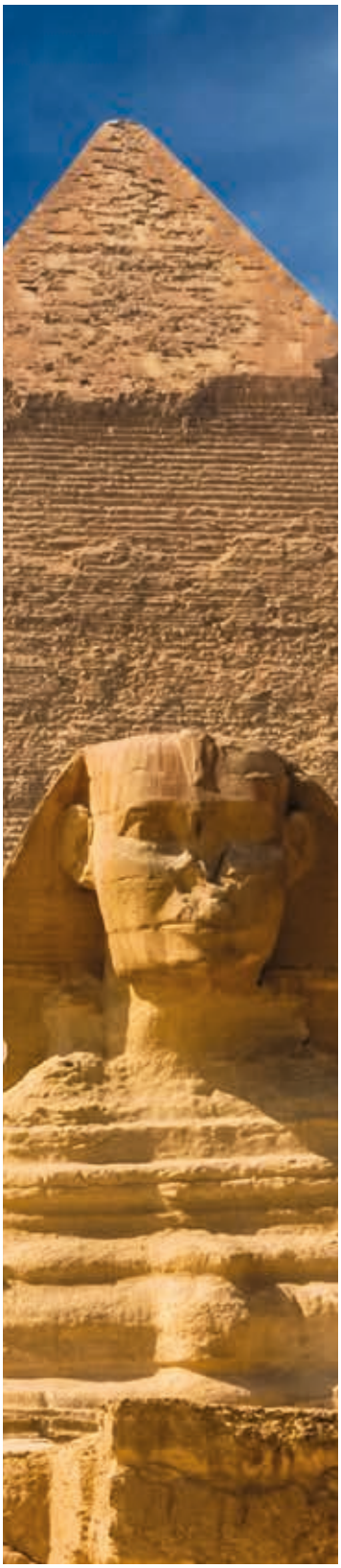
53 Mbit/s
International internet bandwidth per internet user (2021)

59/100
Mobile Connectivity Index (2021)

Wider Ecosystem Enablers

UNCTAD Frontier Technology Readiness Index (2019)





Jordan

$0.9 – $1.7 bn

The economic contribution of the metaverse to Jordan's annual GDP could reach $0.9bn – $1.7n by 2035.

With a highly urban population and a thriving entrepreneurial and start-up culture, Jordan has become a major technology and innovation outsourcing hub in the region.[i] The country has a large pool of digitally skilled youth and is home to one third of MENA's tech entrepreneurs, with Jordanian tech start-ups eager to expand both regionally and internationally.[ii, iii] Government's efforts and investments as part of digital transformation plans can reinforce the technology ecosystem and lay the foundations for metaverse adoption.

Country snapshot

Economy and society	
GDP (billion $)	$41.108
Population	10,203,140
GDP per Capita ($)	$4,028
Median Age	23.2
Urban Population	91.4%

Digital maturity	Jordan	MENA average	
	68	83	Active mobile-broadband subscriptions (per 100 inhabitants)
	52	57	E-Commerce Value (%) [iv]
	–	64	Secure Internet Servers (per 1m inhabitants)

Note: All figures relate to 2020.

i Wamda (2021). What is so special about Jordan?

ii Zawya (2021). Jordan's ICT sector set to grow owing to strong human capital and infrastructure

iii Startup Scene ME (Habachi, 2022). Jordan: The Middle-East's Overlooked Tech and Innovation Hub

iv The indicator looks at country level responses to questions about how often respondents purchase goods via the Internet.

Overview and objectives

Jordan has a diverse economy and culture presenting an internationally open environment for businesses and visitors.[v] Its growing technology ecosystem and competitive ICT sector allows it to serve regional markets in MENA.[vi] 87% of Jordanians use the internet and their majority (85%) own a smartphone.[vii] The entire population is covered by 4G and main operators in the country are working to launch 5G.[viii]

Jordan's Economic Modernisation Vision 2025 and the National Strategy for Digital Transformation aim to accelerate digital transformation including in Healthcare, Retail, Trade and Commerce, and Education and Training.[ix] Focus will be placed on extending 5G, IoT, AI, cybersecurity, and blockchain.[x] These efforts will help lay the foundations for the metaverse to start emerging in some sectors.

Examples of key disruptive sectors

Education: Jordan launched its Innovation Hub in 2022 as the first of its kind in the country, aiming to promote innovation and support young people and entrepreneurs in enhancing their skills for a career in the digital sector. The hub will have different labs allowing people to experience and learn about technologies like AI, AR, VR, Blockchain, IoT and 5G.[xi]

Retail: IKEA in Jordan has launched the IKEA Virtual Reality experience which allows customers to explore all items in the store through 360° virtual tours. Users can pick a room size and layout and furnish it virtually in the way they want it in their home and then proceed to a virtual checkout to pay. The experience resulted in an estimated 20% increase in footfall and sales in physical retail.[xii]

Education: The Amman Arab University has launched the incorporation of metaverse technologies into its teaching methods. The technologies will allow students to have immersive and interactive lessons by the use of 3D lifelike models and will also facilitate the remote teaching experience.[xiii]

v Zawya (2021). Jordan's ICT sector set to grow owing to strong human capital and infrastructure

vi Abu Dhabi Government Media Office (ADGMO) (2022). ADQ and Jordan's Ministry of Digital Economy and Entrepreneurship Launch $100 million Tech Fund

vii Pew Research Center (Sliver & others, 2019). Mobile Connectivity in Emerging Economies

viii Developing Telecoms Ltd (O'Grady, 2022). Jordan gets ready for the introduction of 5G

ix Economic Modernisation Vision (2022). Vision's Document

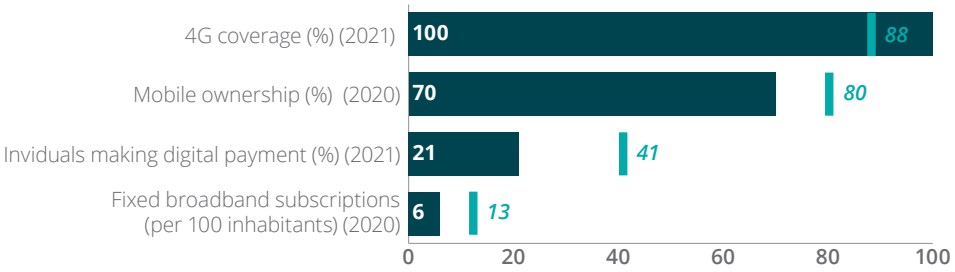
x Ministry of Digital Economy and Entrepreneurship – Jordan(2020). Jordan Digital Transformation Strategy

xi ZAWYA (2022). The EU and Orange Jordan launch the first of a kind "Innovation Hub"

xii Takeleap (2022). IKEA VIRTUAL STORE

xiii EON Reality (2021). EON Reality and Amman Arab University to Launch New Knowledge Metaverse Hub

Technology Fundamentals



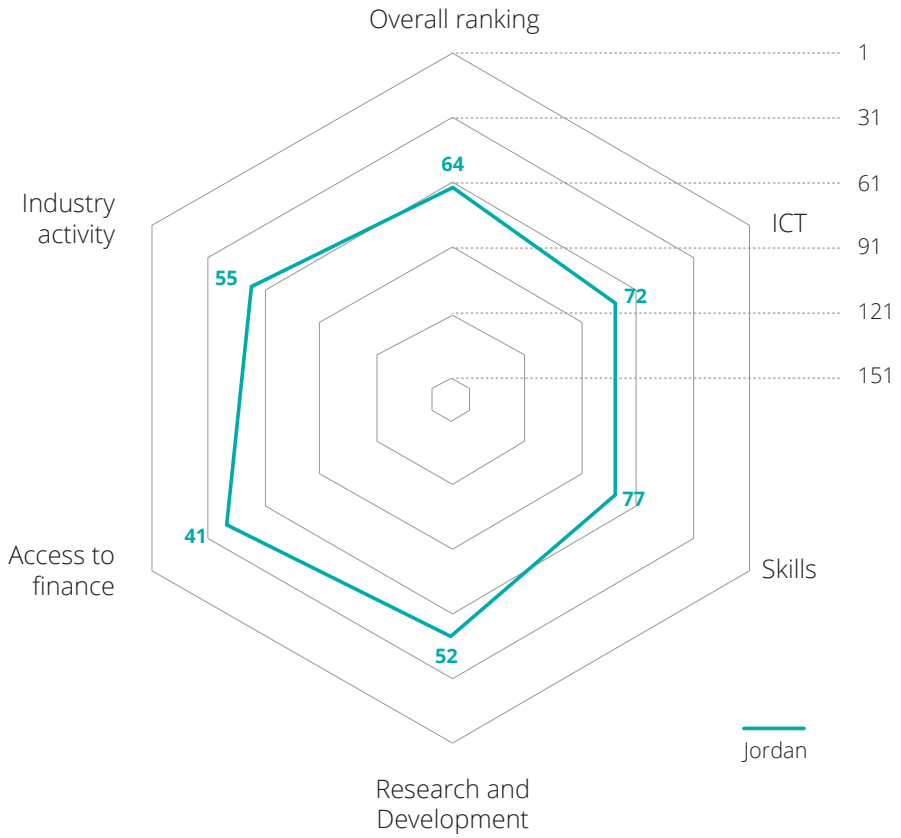
*Note: MENA averages are represented by **teal** vertical lines where available.* Where metrics are not available across the countries of interest, related measures have been included.*

54 Mbit/s
International internet bandwidth per internet user (2021)

65/100
Mobile Connectivity Index (2021)

Wider Ecosystem Enablers

UNCTAD Frontier Technology Readiness Index (2019)



Morocco

$2.6 – $5.0 bn

The economic contribution of the metaverse to Morocco's annual GDP could reach $2.6bn – $5.0bn by 2035.

As a fast-growing entrepreneurial hub in MENA with a very competitive technology market, Morocco is increasingly attracting foreign investment and R&D in the digital space and in new technologies.[i, ii] The country is committed to achieve digital transformation and has launched several strategies to enable this transition for citizens, businesses and government services.[iii] Achieving these goals will help develop the technological foundations and enablers required for the metaverse, paving the way for future innovation.

Country snapshot

Economy and society	
GDP (billion $)	$105.7
Population	36,910,558
GDP per Capita ($)	$2,818
Median Age	29.6
Urban Population	63.5%

Digital maturity

Morocco	MENA average	
75	83	Active mobile-broadband subscriptions (per 100 inhabitants)
56	57	E-Commerce Value (%) [iv]
40	64	Individuals with basic digital skills (%)

Note: All figures relate to 2020.

i Mancebo (2022). Morocco, one of the world's most competitive countries in new technologies

ii Middle East Political and Economic Institute. The Development Of The Tech Environment In Egypt And Other MENA Countries (In COVID-19 Times)

iii Gómez (2022). Moroccan companies increase their level of integration of new technologies

iv The indicator looks at country level responses to questions about how often respondents purchase goods via the Internet.

Overview and objectives

Morocco has a relatively stable macroeconomic environment with an open, diverse market economy.[v, vi] As one of the most technologically developed countries in North Africa, Morocco has the highest internet penetration and the most powerful supercomputer in this region.[vii, viii, ix] It is also among the leaders in MENA in cryptocurrency ownership and is due to host the first ever African edition of Gulf Information Technology Exhibition (GITEX) in 2023.[x, xi, xii]

Maroc Digital 2025 and wider National Digital Strategy aim to strengthen the country's position as a regional digital hub.[xiii] Enhancing Moroccans' digital skills, reinforcing cybersecurity and extending internet access are focus areas.[xiv]
With continued efforts to achieve these goals, Morocco can strengthen the enabling environment for the metaverse.

Examples of key disruptive sectors

Education: Morocco established the Interactive Digital Center in 2020 through a public-private partnership which aims to make AR and VR technologies accessible to academia. This can offer new innovative learning solutions to enhance young people's skills, and to industrial sectors and the government to accelerate digital transformation goals in the country.[xv]

Education: Morocco's Office of Vocational Training and Labour Promotion has collaborated with EON Reality company to bring metaverse technologies to its training programs. The technologies will allow students to access stimulating virtual learning environments and interactive lessons which can facilitate the learning experience for people not able to be present physically in the center.[xvi]

v Crédit Agricole Group (2022). Morocco – Economic and political overview

vi U.S. News & World Report L.P (2022). Best Countries Ranking

vii Ortiz (2022). Morocco is starting to feel the benefits of digitisation

viii Gillbert (2021). Egypt's Internet penetration lags North African peers

ix Gómez (2022). Moroccan companies increase their level of integration of new technologies

x Udeorah (2022). Morocco leads North African P2P Crypto Trading

xi TripleA (2022). Global Crypto Adoption

xii GITEX AFRICA (2022). Homepage

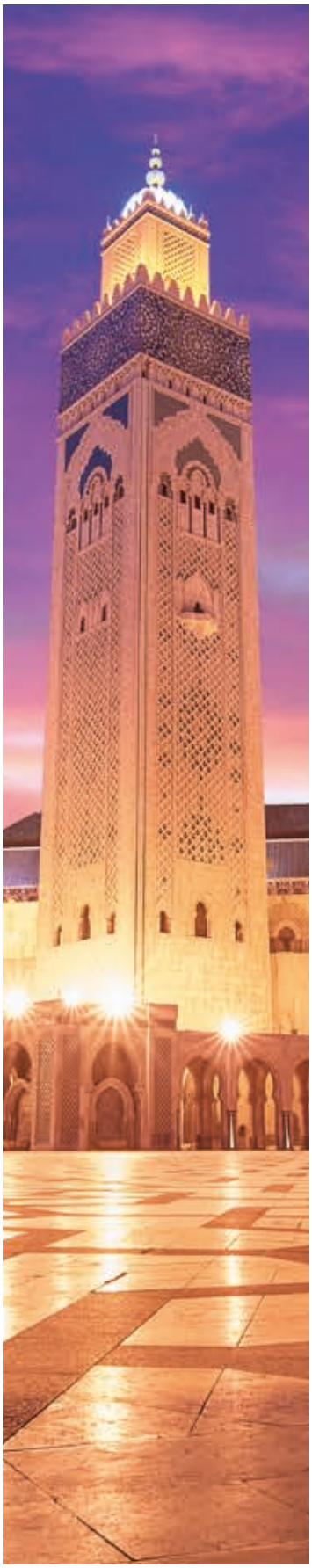
xiii The Federal Ministry for Economic Cooperation and Development (2022). Digital Transformation Center Morocco

xiv Mancebo (2022). Morocco, one of the world's most competitive countries in new technologies

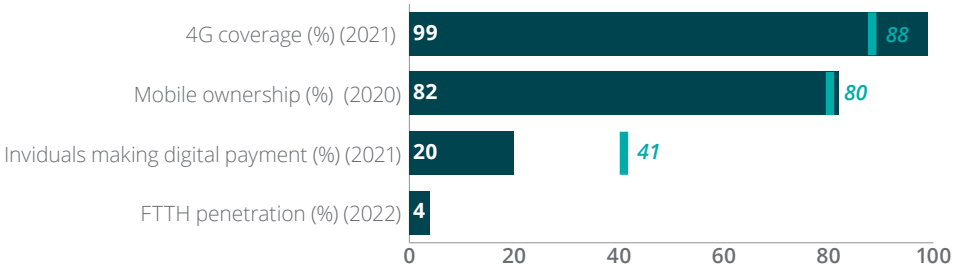
xv Kingdom of Morocco – Ministry of Industry and Trade (2020). Mohammed VI Polytechnic University Hosts the New Augmented and Virtual Reality Center in Morocco in Collaboration with EON Reality and USAID

xvi EON Reality (2022). EON Reality and the Office of Vocational Training and Labor Promotion in Morocco Partner to Create a New Metaverse Hub

Retail: IKEA in Morocco has launched the IKEA Virtual Reality experience, which allows customers to explore all items in the store through 360° virtual tours. Users can pick a room size and layout and furnish it virtually in the way they want it in their home and then proceed to a virtual checkout to pay. The experience resulted in an estimated 20% increase in footfall and sales in physical retail.[xvii]



Technology Fundamentals



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57 Mbit/s
International internet bandwidth per internet user (2021)

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Wider Ecosystem Enablers

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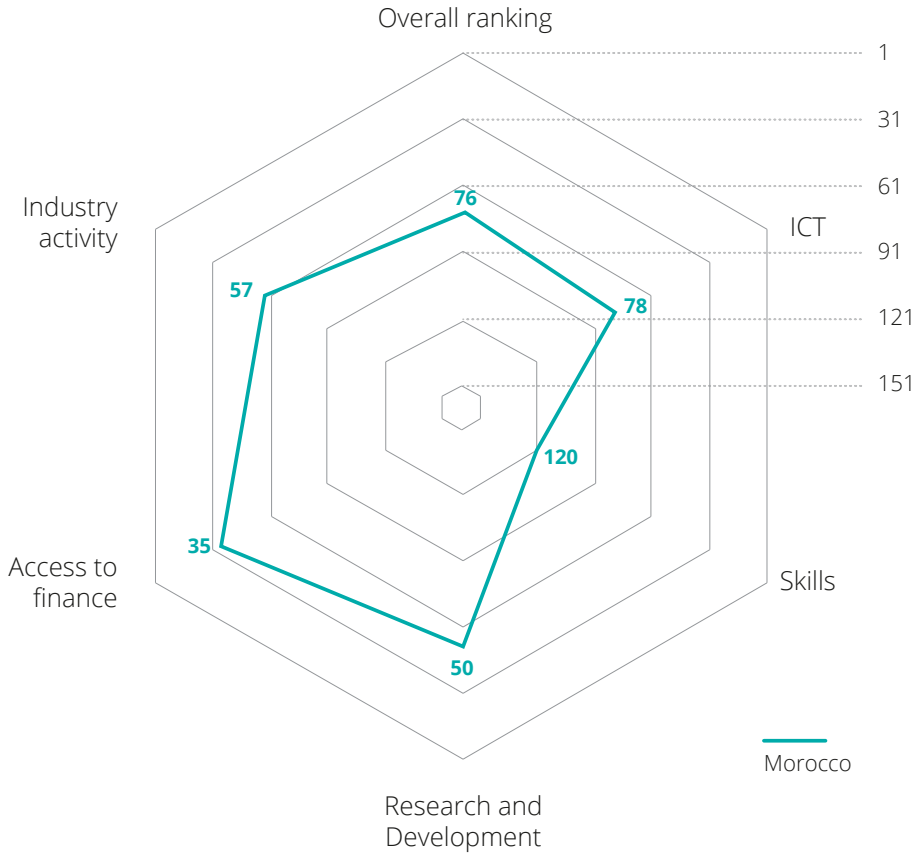

xvii 16 Takeleap (2022). IKEA VIRTUAL STORE

References

Country Snapshot (for all countries)	
Data Point	**Source**
GDP (Current US$ billion, 2021)	World Bank (2022). GDP (current US$) – United Arab Emirates, Egypt, Arab Rep., Jordan, Morocco, Saudi Arabia
Population (2021)	World Bank (2022). Population, total – United Arab Emirates, Egypt, Arab Rep., Jordan, Morocco, Saudi Arabia
GDP per Capita (Current US$, 2021)	World Bank (2022). GDP per capita (current US$) – United Arab Emirates, Egypt, Arab Rep., Jordan, Morocco, Saudi Arabia
Median Age	Hannah Ritchie and Max Roser (2019). Age Structure
Urban Population (% of total population, 2021)	World Bank (2022). Urban population (% of total population) – United Arab Emirates, Egypt, Arab Rep., Jordan, Morocco, Saudi Arabia
Active mobile-broadband subscriptions (per 100 inhabitants, 2020)	ITU(2020). Digital Development Dashboard
E-Commerce Value (%, 2020)	Economist Impact (2022). The Inclusive Internet Index
Individuals with basic digital skills (%, 2020)	ITU (2020). Digital Development Dashboard

Technology Fundamentals and Wider Ecosystem Enablers (for all countries)	
Data Point	**Source**
Mobile Connectivity Index (Index, 2020)	GSMA (2022). The GSMA Mobile Connectivity Index
4G Coverage (%, 2021)	GSMA (2022). The GSMA Mobile Connectivity Index
5G Coverage (%, 2021)	GSMA (2022). The GSMA Mobile Connectivity Index
Mobile ownership (%, 2020)	GSMA (2022). The GSMA Mobile Connectivity Index
International internet bandwidth per internet user (2021)	GSMA (2022). The GSMA Mobile Connectivity Index
Individuals making digital payments (2021)	World Bank (2021). The Global Findex Database 2021
FTTH penetration (%, 2022)	FTTH Council (2022). FTTH/B Global Ranking 2022
Fixed broadband subscriptions per 100 inhabitants (2020)	ITU (2020). Digital Development Dashboard
UNCTAD Frontier Technology Readiness Index (2019)	UNCTAD STAT (2019). Frontier technology readiness index, annual

Note on MENA averages

These country profiles focus on five countries: Egypt, Jordan, KSA, Morocco, and the UAE. Throughout the report, any reference to MENA shall be in regard to the region as a whole. Where applicable, the relevant five countries of interest will be noted and referred to independently. Where MENA-level statistics or averages are used, these are based on the World Bank definition of MENA (encompassing Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, KSA, Syria, Tunisia, UAE, West Bank and Gaza, Yemen), unless stated otherwise in the relevant source.

Endnotes

1 Fast Company Middle Saudi Arabia is investing billions in tech. But is the workforce future-ready?

2 Deloitte analysis of United Nations Population Division Data Portal (2022).

3 Deloitte (2021). Snap Consumer AR – United Arab Emirates Report

4 Statista (2022). Share of smartphones connections in the Middle East and North Africa in 2019 with a forecast for 2025, by region

5 Radcliffe (2021). How the Middle East uses Social Media: 20 standout stats from 2020

6 Zawya (2022). 79% of Middle East business pros are open to metaverse meetings

7 Government of Dubai Media Office (2022). Hamdan bin Mohammed launches Dubai Metaverse Strategy.

8 Haddad (2022). Is Saudi Arabia ready for the metaverse and its related challenges and opportunities?

9 Fast Company Middle East (2022). Saudi Arabia wants to be a global tech hub. This event is helping to achieve that

10 Kingdom of Morocco – Ministry of Industry and Trade (2020). Mohammed VI Polytechnic University Hosts the New Augmented and Virtual Reality Center in Morocco in Collaboration with EON Reality and USAID

11 ZAWYA (2022). The EU and Orange Jordan launch the first of a kind "Innovation Hub"

12 TECHx (2022). Egypt hosts first Metaverse Hackathon

13 BCG and Meta (2022). Open Sesame: Unlocking the Metaverse Opportunity in MENAT (Middle East, North Africa & Turkey)

14 PocketGamer (2022). MENA: A thriving region with lots of support for the games industry

15 Beyond Games (2022). Saudi Arabia Launches Gaming And Esports Strategy

16 Jordan Investment Commission (2018). Sector Profile: Tourism

17 Trading Economics (2022). Egypt Tourism Revenues

18 Financial Times (2021). Morocco tourism struggles despite vaccine progress;

19 Zawya (2021). RetailME Recognizes 100 Most Powerful Icons of USD 1 Trillion Retail Industry in the Middle East

20 Mastercard International (2020). Press Releases: 73% of Consumers in Middle East and Africa are Shopping More Online Since the Start of Pandemic, Reveals Mastercard Study

21 Umniah (2022). Virtual Reality Game Centers in Jordan

22 EgyptInnovate (2016). Virtual Reality Gaming Introduced Egypt

23 Morocco World News (2020). Morocco Launches First Interactive Digital Center in North Africa

24 UNDP (2022). Pioneering Virtual-Reality Tourism in Egypt's Protected Areas

25 Al-Monitor (2022). Egypt uses augmented reality to promote medical tourism

26 Spear (2020). Wander through Petra with this immersive online tour

27 Gulf Business (2022). Saudi's Royal Commission for AlUla enters the metaverse

28 Takeleap (2022). IKEA Virtual Store.

29 DAMAC (2022). DAMAC Group gears up to enter the metaverse

30 The World Bank (2022). Individuals using the Internet (% of population) – Egypt, Arab Rep.

31 Analysis Group (2020). The Potential Global Economic Impact of the Metaverse

32 GSM Association (2022) The Mobile Economy Middle East & North Africa 2022

33 Government of Dubai Media Office (2022). Hamdan bin Mohammed launches Dubai Metaverse Strategy.

34 Government of Dubai Media Office (2022). Hamdan bin Mohammed launches Dubai Metaverse Strategy.

35 Garde (2022). 10 Highlights of GITEX GLOBAL that's Happening in Dubai

36 Nihal (2022). What is Neom and The Line? All you need to know about Saudi Arabia's $500 billion megacity

37 Vision 2030 Kingdom of Saudi Arabia (2022). NEOM

38 Bell (2021). Saudi's NEOM will have a digital twin in the 'metaverse': FII

39 Haddad (2022). Is Saudi Arabia ready for the metaverse and its related challenges and opportunities?

40 Kingdom of Morocco – Ministry of Industry and Trade (2020). Mohammed VI Polytechnic University Hosts the New Augmented and Virtual Reality Center in Morocco in Collaboration with EON Reality and USAID

41 Gitex Africa (2022). Homepage.

42 ZAWYA (2022). The EU and Orange Jordan launch the first of a kind "Innovation Hub"

43 UNDP in Egypt (2022). Pioneering Virtual-Reality Tourism in Egypt's Protected Areas

44 Al-Monitor (2022). Egypt uses augmented reality to promote medical tourism

45 Zawya (2022). 79% of Middle East business pros are open to metaverse meetings

46 Daily News Egypt (2022). Beyooot – Egypt's first electronic platform using AR technology to export furniture

47 Gulf News (2022). etisalat by e& ready to provide enterprises with their own Metaverse ecosystem in a year

48 Ipsos (2022). Almost half of small and medium sized businesses globally plan to extend their online reach

49 Sorrells (2019). Middle East, Part 1: How a young, digital-savvy population is impacting travel

50 Radcliffe (2021). How the Middle East uses Social Media: 20 standout stats from 2020

51 WEF (2022). Which countries spend the most time on social media?

52 Deloitte (2021). Snap Consumer AR Saudi Arabia Report and Snap Consumer AR – United Arab Emirates Report

53 Zawya (2022). 1 in 2 consumers in MENA are excited about metaverse and keen to experience it: GfK Consumer Pulse Study

54 Ibid.

55 Ookla® (2022). The Speedtest Global Index

56 International Telecommunication Union (ITU). Digital Development Dashboard

57 Grand View Research (2022). Market Analysis Report

58 Citi GPS (2022). Metaverse and Money

59 PwC (2019). Seeing is believing

60 Analysis Group (2020). The Potential Global Economic Impact of the Metaverse

61 Analysis Group (2020). The Potential Global Economic Impact of the Metaverse

62 PocketGamer (2022). MENA: A thriving region with lots of support for the games industry

63 Beyond Games (2022). Saudi Arabia Launches Gaming And Esports Strategy

64 News@Northeastern (2022). Saudi Arabia is going all in on video games. What does that mean for the games industry?

65 Twofour54 Abu Dhabi (2021). Emirates Esports Association joins growing roster of gaming organisations moving to Abu Dhabi's Yas Creative Hub

66 Twofour54 Abu Dhabi (2022). Why the Ad Gaming Hub Contains Endless Opportunities for Gaming Businesses and Freelancers

67 AD Gaming(2022). Who We Are

68 Statista (2022). Forecasted AR and VR penetration rate MENA 2027, by country

69 Morocco World News (2022). Minister of Youth Pledges to Boost E-Gaming Industry in Morocco

70 World Bank vis Statista (2022). Morocco: Youth unemployment rate from 2002 to 2021

71 Construction Business News (2022). Dubai recorded $2.9bn worth of real estate transactions in a single week in July 2022

72 Government of Dubai Media Office (2022). Hamdan bin Mohammed launches Dubai Metaverse Strategy.

73 DAMAC (2022). DAMAC Group gears up to enter the metaverse

74 Startup News (2022). Crypto House Capital set to raise funds to finance Skylum, its ambitious virtual residential tower

75 Tidy (2022). Billions being spent in metaverse land grab

76 Pessarlay (2022). UAE's Ministry of Economy opens office in the metaverse

77 The World Bank (2022). Rural population (% of total population) – Egypt, Arab Rep.

78 International Telecommunication Union (ITU). Digital Development Dashboard

79 The World Bank (2022). Rural population (% of total population) – Egypt, Arab Rep.

80 Zawya (2021). RetailME Recognizes 100 Most Powerful Icons of USD 1 Trillion Retail Industry in the Middle East

81 Forbes Middle East. The Largest Retail Chains In The Middle East

82 Mastercard International (2020). 73% of UAE Consumers are Shopping More Online Since the Start of Pandemic, Reveals Mastercard Study

83 PwC. Navigating the new retail reality

84 Shopifyplus (2021). How Augmented Reality (AR) is Changing Ecommerce Shopping

85 Sebugwaawo (2022). Metaverse in UAE: Shop virtually, try products before purchasing in this new marketplace

86 RetailME Bureau (2022). Middle East retailers are entering the metaverse, but are the customers there yet?

87 Strategy& (2022). Travel and Tourism

88 World Travel & Tourism Council (2022). Middle East Travel & Tourism sector expected to create 3.6 million new jobs within the next decade

89 Jordan Investment Commission (2018). Sector Profile: Tourism

90 Trading Economics (2022). Egypt Tourism Revenues

91 Financial Times (2021). Morocco tourism struggles despite vaccine progress;

92 UAE Government (2022). UAE Tourism Strategy 2031

93 KSA Vision 2030. Visit Saudi Arabia

94 UNDP (2022). Pioneering Virtual-Reality Tourism in Egypt's Protected Areas

95 Spear (2020). Wander through Petra with this immersive online tour

96 Gulf Business (2022). Saudi's Royal Commission for AlUla enters the metaverse

97 AlArabiya News (2022). Saudi Arabia's AlUla welcomed over 146,000 visitors in 2021 alone

98 Jordan News (2022). 220% more tourists visit Petra in January this year than in January 2021

99 Gulf Business (2022). Saudi's Royal Commission for AlUla enters the metaverse

100 UN News (2022). Middle East and North Africa: addressing highest rates of youth unemployment in the world

101 The World Bank (2022). New World Bank Report Says MENA Labor Markets Need Level Playing Field

102 UN News (2022). Middle East and North Africa: addressing highest rates of youth unemployment in the world

103 Visit Dubai (2022). Dubai a trusted partner in global trade

104 Virtuzone (2022). Virtuzone partners with pax.world to build iconic V-shaped headquarters in the metaverse

105 Virtuzone (2022). Virtuzone partners with pax.world to build iconic V-shaped headquarters in the metaverse

106 Visit Dubai. Work remotely from Dubai

107 About Her (2022). Dubai Female Entrepreneur Creates The First AR Instagram Filter In The Region

108 Zawya (2022). Regional creator economy expected to rise in popularity

109 AIR Media-Tech (2021). MENA YouTubers Insights – First regional survey by AIR Media-Tech

110 Government of Dubai Media Office (2022). Dubai ranks first regionally and second globally in attracting FDI projects in the creative economy in 2021

111 UAE Government (2022). Dubai Creative Economy Strategy

112 Fast Company Middle East (2022). Arab youth to fuel growth of creative economy in the MENA region

113 Meta (2022). Exploring the Potential of the Creator Economy

114 Deloitte (2021). Snap Consumer AR Saudi Arabia Report and Snap Consumer AR – United Arab Emirates Report

115 Venture Beat (2022). The future of the creator economy in a Web3 world

116 Zawya (2022). Million, the platform revolutionizing the creator economy in the Middle East

117 Nuqtah (2022). Homepage

118 World Economic Forum (2022). How women's empowerment can drive competitiveness in the Middle East

119 World Bank (2022). Labor force participation rate, female (% of female population ages 15+).

120 UNICEF (2022). Education

121 Rizk and Hawash (2020). Education Gap and Youth: A Growing Challenge in The MENA Region

122 Deloitte (2021). Enhancing rural connectivity

123 Young (2020). Interest in Online Courses Surges in the Middle East. See also, Kadi (2022). Digital Universities Conference Explores Future of Higher Education in MENA

124 The World Bank (2021). Accelerating the EdTech ecosystem in the Middle East and North Africa

125 AlNajdi (2022). The effectiveness of using augmented reality (AR) to enhance student performance: using quick response (QR) codes in student textbooks in the Saudi education system

126 Elmnhrawy (2022). How companies in the Middle East can catch up on gender equality

127 OECD (2020). Changing Laws and Breaking Barriers for Women's Economic Empowerment in Egypt, Jordan, Morocco and Tunisia

128 Mate, Bryan, Deen, and McCall (2017). Review of Health Systems of the Middle East and North Africa Region. See also, World Bank (2021). MENA Economic Update: Overconfident: How Economic and Health Fault Lines Left the Middle East and North Africa Ill-Prepared to Face COVID

129 DUPHAT (2022). Digital Healthcare Ecosystem in the Middle East

130 Arab Barometer (2019). Challenges of Health Care in the Middle East and North Africa

131 DUPHAT (2021). Middle East's First Virtual Hospital In UAE

132 Swider (2022). The Future of Healthcare & Patient Care in the Metaverse

133 The World Bank (2022). Current health expenditure (% of GDP) – Middle East & North Africa, World. See also Gatti and others (2021).MENA public healthcare systems: building resilience for future emergencies

134 Chetty & others (2020). The emerging public health risk of extended electronic device use during the COVID-19 pandemic

135 The World Bank 2017. Beyond Scarcity: Water Security in the Middle East and North Africa

136 The World Bank 2021. Middle East and North Africa Climate Roadmap

137 Chibani (2022). COP27 and the MENA Region: Can Climate Change Pledges Result in Action?

138 COP27 – Home. Accessible here

139 Reuters (2021). Dubai ruler says UAE to host COP28 climate conference in 2023

140 Le Quéré and others (2020). Temporary reduction in daily global CO 2 emissions during the COVID-19 forced confinement

141 Anil and Alagha (2021). The impact of COVID-19 lockdown on the air quality of Eastern Province, Saudi Arabia

142 De Oliva (2021). Recycling the Middle East's e-waste in Dubai

143 Shamaa (2022). Egypt launches initiative to recycle e-waste via app

144 UnEarth magazine (2020). E-wate in the Middle East and North Africa

145 See for example Thabit and others (2022). Facts and Figures on Aspects of Waste Management in Middle East and North Africa Region

146 Oxford Business Group (2020). New technologies strengthen Morocco's ICT sector

147 GMI (2022). UAE Internet Statistics 2022

148 Statista (2022). Share of smartphones connections in the Middle East and North Africa in 2019 with a forecast for 2025, by region

149 The World Bank (2022). GDP per capita (current US$) – Morocco, United Arab Emirates, Middle East & North Africa

150 ITU (2022). Digital Development Dashboard

151 Orange (2022). Orange Jordan enhances its mobile network in the kingdom

152 The World Bank (2022). Fixed broadband subscriptions (per 100 people) – Jordan, United Arab Emirates

153 ITU (2022). Digital Development Dashboard

154 Ghisad and Reed (2020). Building on Egypt's Broadband Progress

155 FTTH Council (2023). FTTH/B Global Ranking 2022.

156 Telegeography (2022). Submarine Cable Map

157 GSMA (2022). The Mobile Economy Middle East & North Africa

158 GSMA (2022). The Mobile Economy Middle East & North Africa

159 International Trade Administration (2021). Saudi Arabia enables 6 GHZ band

160 The World Bank (2017). Made or received digital payments in the past year (% age 15+)

161 Mastercard Newsroom (2020). 77% of KSA Consumers are Shopping More Online Since the Start of Pandemic, Reveals Mastercard Study

162 The World Bank (2021). The Global Findex Database 2021

163 The World Bank. The Global Findex Database 2021 – Account (% age 15+)

164 Global Data (2022). Saudi Arabia card payments market to grow at 13.6% CAGR between 2022 and 2026, forecasts GlobalData

165 The World Bank (2022). Secure Internet servers (per 1 million people) – Egypt, Arab Rep.

166 The precise computing requirements are not yet known, but existing virtual worlds such as Fortnite and Roblox do not allow more than 200 participants due to computational constraints. See Ball (2022). Compute and the Metaverse

167 Egypt Ministry of Communication and Information Technology (2022). Digital Egypt

168 World bank Blogs (2021). Accelerating the EdTech ecosystem in the Middle East and North Africa

169 BCG and Meta (2022). Open Sesame: Unlocking the Metaverse Opportunity in MENAT (Middle East, North Africa & Turkey)

170 ITU (2022). Digital Development Dashboard

171 ITU (2022). Digital Development Dashboard

172 BCG and Meta (2022). Open Sesame: Unlocking the Metaverse Opportunity in MENAT (Middle East, North Africa & Turkey)

173 CCAF (2021). FinTech Regulation in the Middle East and North Africa

174 Data Guidance (2023). Saudi Arabia

175 Data Guidance (2023). Saudi Arabia

176 GSMA (2022). Mobile Connectivity Index

177 USAID (2022). Interactive Digital Center

178 1337 (2022). Homepage

179 Ministry of Education – Kingdom of Saudi Arabia (2021). 4.7 Million Participants in the " Madrasati (My School) Codes Competition"

180 Blom, Goldin and Nusrat (2020). Starting line – Where does MENA stand with digital skills?

181 OECD (2022). The promises of digitalisation for women entrepreneurs in the MENA region

182 Dubai Future Foundation. The UAE Golden Visa

183 World Bank Group (2020). Doing Business 2020

184 Jordan Vision (2022). Economic Modernisation Vision

Deloitte.

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