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STUDY ON THE HASHIMITE KINGDOM OF JORDAN'S READINESS AND POTENTIAL TO UTILIZE IMMERSIVE TECHNOLOGIES

Ministry of Digital Economy and Entrepreneurship

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Executive Summary.

The Hashemite Kingdom of Jordan has the potential to lead in the regional adoption of immersive technologies by addressing its challenges and leveraging its strengths. With the right infrastructure, talent, and government support, these technologies can drive innovation, enhance high-demand sectors, and promote economic growth to help the Kingdom achieve its development goals.

Key Takeaways.

***Infrastructure Readiness**: Jordan's deployment of 5G technology is a critical enabler for immersive technologies, providing the necessary infrastructure for their implementation.*

***Talent Investment**: Continued investment in education and training programs is essential to develop a skilled workforce capable of leveraging immersive technologies.*

***Government Support**: Jordan enjoys the strong commitment of its national government and supportive policies for fostering innovation and digital transformation, both of which are crucial for the adoption of immersive technologies.*

***Potential Applications**: Immersive technologies have significant potential in high-demand sectors as outlined in Jordan's Economic Modernization Vision of 2022-2033, including education, healthcare, and tourism; offering opportunities for enhanced learning, training, and cultural promotion.*

***Challenges**: Addressing challenges such as infrastructure, regulation, workforce capacity, funding, and societal awareness is vital for the successful adoption and integration of immersive technologies.*

Methodologies.

The study employed a combination of qualitative and quantitative research methods, including:

1. *Desk Research: Comprehensive review of existing literature, reports, and data on immersive technologies and their applications in various sectors.*
2. *Stakeholder Interviews: One-on-one interviews conducted with key stakeholders from the public and private sectors to gather deep insights and perspectives.*
3. *Survey and Data Analysis: Representative survey of stakeholders, including government officials, industry experts, educators, and technology providers to collect first-hand insights, followed by rigorous data analysis to identify challenges and opportunities.*
4. *Case Studies: Examination of successful implementations of immersive technologies in other countries or regions to draw lessons and best practices that can be applied in Jordan.*
5. *Thought Leadership: Engagement with thought leaders and experts in the field of immersive technologies to gain deeper insights and forward-looking perspectives.*

Introduction and Background.

Introduction.

Jordan, officially the Hashemite Kingdom of Jordan, is a constitutional monarchy located in the Arab region. It is making strides in advancing its national development targets through a long-term strategy presented in its Economic Modernisation Vision of 2022-2033. The vision is based on the dual strategic pillars of accelerated sustainable and inclusive growth and an improved quality of life for all Jordanians.

As part of the first implementation phase (2022-2025) of this Vision, Jordan's Ministry of Digital Economy and Entrepreneurship (MoDEE), in collaboration with the International Telecommunication Union (ITU) Regional Office for Arab States and the United Nations Economic and Social Council for Western Asia (UNESCWA), commissioned this study to assess Jordan's readiness and potential to adopt and utilize immersive technologies—including virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), and the metaverse—to achieve its national development targets.

Background.

The world is experiencing dramatic shifts that have been driven primarily by 1) A COVID-19 pandemic that has upended the global economy; 2) Emerging technologies that are supercharging a global digital transformation; 3) A Ukraine-Russia war that is disrupting an important breadbasket; and 4) Geopolitical tensions between the United States and China that is politicizing traditional value chains.

On the other side of these destabilizing forces, is an opportunity for nations to position themselves as talent rich, technologically savvy, cost-effective, and infrastructurally resilient alternatives.

It is in this context that Jordan started the implementation of its Economic Modernisation Vision which was launched in 2022 to focus on sustainable development, innovation, and technology to drive economic growth and improve quality of life for its citizens.

Macro Socioeconomic Determinants.

Jordan is an upper middle-income country with a gross domestic product (GDP) of approximately USD 53.57 billion and an annual growth rate of 2.6%.[1] It is strategically located at the head of the Gulf of Aqaba; bordered by the Syrian Arab Republic to the north, the Republic of Iraq to the east, the Kingdom of Saudi Arabia to the south, and the State of Palestine to the west. Its rich history and strategic location, make it a significant player in the Arab region.

The Kingdom has a population of about 11.4 million,[1] 92% of whom are in urban areas in its western regions, particularly in and around the capital of Amman (northwest), with a sizeable, but smaller population located along the shore of the Gulf of Aqaba (southwest). It is also host to over 1.3 million refugees (about 12% of the country's population).[2]

Jordan's social structure is deeply rooted in extended patriarchal family units. It has a high birth rate and a rapidly growing population, which has doubled over the past two decades; and its people are known for their warmth and hospitality.

The nation's economy is diverse, driven primarily by services (66.6%), industry (28.8%), and agriculture (4.5%); with key industries including tourism, information technology, clothing, fertilizers, and pharmaceuticals. It has been notably resilient, maintaining a steady average growth rate of about 2.5% over the past decade[2] despite challenges posed by regional and global crises, including the current regional conflicts just outside its borders.

Jordan also has a reasonably strong propensity for innovation, showing remarkable improvement in its ranking on the World Intellectual Property Organization's Global Innovation Index from 81st in 2021 to 78th in 2022, and then to 73rd in 2024, a rank that makes it 12th among the 18 economies in Northern Africa and Western Asia.[3]

A founding member of the Organisation of Islamic Cooperation and the Arab League, with a U.S.-Jordan Free Trade Agreement, and "advanced status" with the European Union; Jordan offers a good business environment, especially to those seeking to engage in regional markets. It also has a young and rapidly growing population of highly educated digital natives.

Despite these advantages, the business environment faces hurdles including a high unemployment rate of 22.9%[1] (well above the region's average of 9.8%) that disproportionately impacts women at 30.9% and youth at 46.1%[2] in a nation whose median age of about 25 makes its population amongst the youngest in the world. Challenges also include a significant budget deficit, reliance on foreign assistance, limited natural resources that make it one of the most water-scarce countries in the world, as well as a high refugee influx and its accompanying economic disparities.

In commissioning this study—to assess its readiness and potential to adopt immersive technologies—Jordan seeks to explore innovative solutions to these challenges, specifically by boosting job creation and increasing foreign and domestic investment.

Immersive Technologies Landscape.

The global and regional landscape of immersive technologies is rapidly evolving, with significant implications for various sectors—including education, healthcare, tourism, and industry—that offer meaningful opportunities for nations like Jordan to leverage them for national development.

Immersive Technologies Overview.

Definitions

Immersive technologies—which can be broadly categorized into Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR)—are increasingly blurring the line between the physical and digital worlds, offering new ways to interact and engage.

- **Virtual Reality (VR)**: Three-dimensional, fully digital computer-generated environment.
- **Augmented Reality (AR)**: Digital or visual content integrated into physical environment.
- **Mixed Reality (MR)**: Combines elements of VR and AR. Responsive digital or visual content integrated into physical environment.[4]
- **Extended Reality (XR)**: Umbrella term for current and future immersive technologies including VR, AR, and MR.

The immersive environments created by these technologies are increasingly leveraged to improve productivity, reduce costs, enhance customer experiences and foster innovation. These include:

- **Virtual World**: Computer-generated environment. Virtual objects grouped in a 3D space.
- **Metaverse**: Integrative ecosystem of virtual worlds.[5]

Immersive Environments

Two main models have emerged for the core framework of these immersive environments.

1. **Centralized Model**: Hosted on a controlled platform and managed by a central entity. Examples include many online persistent world games like Roblox, World of Warcraft and Final Fantasy.
2. **Decentralized Model**: Built on blockchain technology and distributed infrastructure with no single controlling entity. Examples include Decentraland and The Sandbox.

These frameworks often structure the key components of immersive environments into layers.

- **Hardware/Infrastructure**: VR/AR devices, networks, cloud computing.
- **Platforms**: Virtual environments and worlds.
- **Content**: 3D assets, avatars, virtual goods.
- **Economic Systems**: Cryptocurrencies, non-fungible tokens (NFTs), virtual economies.
- **Identity**: Digital identities, avatars.
- **Social**: Communication and interaction tools.
- **Governance**: Rules and moderation systems.

Emerging Use Cases

Several applications and use cases are emerging in the immersive space.

- Virtual Real Estate, Construction and Architecture.
- Virtual Events and Entertainment.
- Virtual Goods and NFTs.

- Advertising and Marketing.
- Virtual Clothing and Fashion.
- Education and Training.
- E-Gaming and E-Sports.

Standards and Interoperability

The concept, organization and architecture of immersive environments, like the metaverse, is still evolving. Standards Developing Organization like ITU, ISO (International Organization for Standardization), and IEEE (Institute of Electrical and Electronics Engineers) are working to develop standards for safe adoption and to enable interoperability between different platforms and components.

Global Trends and Market Growth.

The immersive technology market is experiencing exponential growth. In 2023, the market size was estimated at USD 108.46 billion, with growth projections of up to USD 154.94 billion in 2024, before it grows almost six-fold in four years to USD 638.69 billion by 2028, fueled by advancements in hardware, increased demand for VR head-mounted displays, and the proliferation of smartphones and internet of things (IoT) connected devices.[6]

Key trends shaping the immersive technology landscape include:

- The **rise of the metaverse**—which is expected to be valued at USD 5 trillion by 2030—for social interactions, commerce, and work.[7]
- The **convergence of immersive technologies** with Artificial Intelligence (AI), IoT, and 5G networks.
- Increased **use of these technologies in enterprise settings** for training, collaboration, customer engagement and in industries like automotive, healthcare, retail, education, and tourism. 64% of leading consumer brands invest in immersive experiences.[8]

The market is also seeing **advancements in hardware** like high-end photorealistic headsets, lightweight AR glasses, haptic feedback devices, and screen-less devices catering to various use cases and budgets. Some organizations are working to make AR/VR more accessible to a wider range of people with diverse needs by developing haptic interfaces, audio-based navigation, and other assistive features.

Key Applications

1. **Education**: The use of immersive technologies to provide interactive and engaging learning experiences could revolutionize education. For example, VR and AR can be used to create virtual classrooms, simulate historical events, or transport students to faraway locations.
2. **Healthcare**: The use of VR and AR in healthcare, could span from providing realistic simulations for medical training, to hyper realistic therapy or rehabilitation to patients.
3. **Tourism**: Rich cultural heritage and historical sites can be showcased through immersive technologies. For example, virtual tours of landmarks can attract tourists and promote cultural awareness.
4. **Industry**: Immersive technologies can be used for industrial training, safety simulations, and skills development. This can enhance productivity and safety in sectors like manufacturing, construction, and mining.

Landscape

Globally, advanced economies like the United States and China are at the forefront of immersive technology adoption, offering highly competitive business environments with access to vast markets, advanced infrastructure, significant venture capital funding, substantial investments in research and development (R&D) and a strong technology ecosystem, that drives innovation and implementation.

The US and the European Union (EU) also have well-established regulatory frameworks that support and provide guidelines for innovation and emerging technologies, while ensuring consumer protection. Additionally, the US and South Korea have strong educational systems, high digital literacy, and technology savvy populations that can support adoption from an early age.

- **United States**: The U.S. is a leader in the development and implementation of immersive technologies, with widespread use in education, healthcare, and workplace training.
- **Europe**: Countries like the United Kingdom and Germany are using VR and AR for medical training, manufacturing, and tourism.
- **Asia**: Japan and South Korea are leveraging immersive technologies to create digital workplaces and enhance educational experiences.

Regional Trends and Market Growth.

The Arab region is rapidly adopting immersive technologies to support strategic priorities related to diversifying its economy and enhancing global competitiveness. The region, especially the Gulf Cooperation Council (GCC) area, is on track to see a significant rise in VR and AR adoption, with a projected compound annual growth rate (CAGR) of 39% between 2023 and 2028.[9] The metaverse alone is expected to inject USD 15 billion into GCC economies by 2030.[10]

Growth in immersive technologies in the Arab region is driven by 1) A young, technology savvy population; 2) Increasing investments in technology infrastructure, particularly in VR and AR; and 3) Sectors like gaming, education, healthcare, and tourism.

Key Developments

- **Healthcare**: The increased use of AR and VR is led by applications in surgical simulation, diagnostic imaging, and patient care management.
- **Gaming and Entertainment**: The region is experiencing a surge in gaming, supported by advancements in 5G and immersive technologies.
- **Education**: Technologies like AR and VR are being integrated into educational platforms to enhance learning experiences.
- **Tourism**: Virtual tours are being used to market tourist destinations, offering potential visitors an immersive preview of sites.
- **Events**: The region has made strides in hosting major technology events including LEAP in Saudi Arabia and GITEX Global in the United Arab Emirates (UAE).

Landscape

Regional players like UAE and Saudi Arabia, with more robust economies, higher GDP growth rates and significant technology investments are leading the regional adoption of immersive technologies. Both Saudi Arabia and UAE also have more streamlined regulatory frameworks, greater access to capital, more favorable business environments (with better infrastructure), and significant government support for technology innovation (with incentives such as technology hubs and free zones to attract global companies).

- **Saudi Arabia**: Through its Vision 2030 initiative, Saudi Arabia is focusing on digital transformation, including the adoption of immersive technologies in various sectors.
- **UAE**: Adoption in UAE is facilitated by a diverse expatriate population, high internet penetration rates, and high social acceptance of new technologies.

Local Use and Key Initiatives.

Jordan has been actively working to integrate immersive technologies into various sectors, including education, healthcare, and tourism. Key initiatives include:

- **Education**: Programs like EON Reality's Spatial AI Center offer tailored courses to build skills in immersive technologies.
- **Healthcare**: Jordan has a growing interest in leveraging immersive technologies to enhance healthcare services and improve medical education, including the use of lifelike 3D models.
- **Tourism**: Jordan is leveraging immersive technologies to enhance tourism experiences. For example, virtual tours of historical sites like Petra are being developed to provide unique experiences that will attract more tourists while preserving the site.
- **Gaming**: Jordan has been fostering innovation through initiatives like the Jordan Gaming Lab, which supports young talent in game development.
- **Digital Infrastructure**: The National Broadband Network and secured government networks are pivotal in supporting the adoption of immersive technologies.

Jordan's National Development Landscape.

Jordan faces several key challenges to its national development, including:

1. **High unemployment** disproportionately impacting its large youth population as well as women, who also suffer consistently low labor participation rates.
2. **Water scarcity** making the country more vulnerable to climate shocks.
3. **Hosting the second largest number of refugees** per capita worldwide, which puts pressure on the nation's resources and services.[11]

Jordan's national development landscape is shaped by crucial strategies and initiatives whose targets aim to address these challenges by fostering sustainable growth and addressing environmental concerns. Its primary focus areas for development include:

1. Private sector-led economic growth
2. Water security and climate resilience
3. Governance and public sector reform
4. Education and skills development
5. Women and youth empowerment
6. Social protection

Key Strategic Framework.

Jordan's Economic Modernisation Vision (2022-2033)

Jordan's national development targets are outlined in several strategic frameworks, most notably its Economic Modernisation Vision, which aims to accelerate sustainable and inclusive economic growth and improve quality of life to transform the country into a model of economic growth, innovation, and lifestyle.[12] See Annex A for key aligned supportive strategic frameworks that this study also references to further characterize Jordan's current national development landscape.

Table 1 analyzes the Vision's benefits and challenges, illustrating ways in which it could be enabled using immersive technologies.

Table 1: Analysis of Jordan's Economic Modernisation Vision

CATEGORY	STRATEGIC GOALS	KEY BENEFITS	CHALLENGES
Economic Growth Pillar *Unleash Jordan's full economic potential to achieve significant economic growth and job creation.*	- Accommodate 1+ million youth in the labor market - Increase income per capita by an average of 3% per year - Improve Jordan's ranking in Global Competitiveness Index to top 30 percentile	- Job creation - Increased income - Enhanced global competitiveness	- Matching skills with market needs - Ensuring equitable income distribution
Quality of Life Pillar *Improve living standards and happiness; make communities more attractive.*	- Increase satisfaction with quality of life to 80% - Have one Jordanian city ranked in top 100 cities in the world - Improve Jordan's ranking in the Legatum Prosperity Index to top 30 percentile	- Higher satisfaction with quality of life - Global recognition - Improved prosperity	- Measuring and maintaining quality of life - Achieving global city ranking
Sustainability *At the core of both pillars of this vision are efforts to tackle needs related to climate change, food security, water, and clean energy.*	- Improve Jordan's ranking in the Global Sustainability Competitiveness Index to top 40 percentile - Improve Jordan's ranking in the Global Environmental Performance Index to top 20 percentile	- Better sustainability practices - Enhanced environmental performance	- Implementing sustainable practices - Balancing economic growth with environmental protection
Immersive Enablement *Illustration of potential to leverage immersive technologies to enable this vision.*	Economic Growth Pillar - **High-Value Industries**: Training and skill development; product design and prototyping - **Future Services**: Digital transformation; exporter positioning - **Destination Jordan**: Virtual tourism; film production Quality of Life Pillar - **Livability**: Urban planning; healthcare - **Lifestyle**: Community engagement; education	- Improved skills and productivity - Cost and time efficiency - Increased tourism - Enhanced film production - Better urban planning - Improved healthcare - Stronger community engagement - Enhanced educational experiences	- High initial costs - Technological adoption and integration - Ensuring accessibility for all - Data privacy and security concerns

Why Should Jordan Assess its Readiness and Potential to Adopt Immersive Technologies?

Immersive technologies and the digital spaces they enable are becoming increasingly important to the global economy. Their diverse applications go well beyond gaming and entertainment, spanning across various industries, including education, healthcare, and industry.

Jordan has ambitious development goals, including creating one million new jobs, improving living conditions, and promoting sustainability. The nation is also well-positioned to capitalize on the growth of immersive technologies.

Assessing its readiness and potential to adopt immersive technologies is a crucial step to exploring the significant role these technologies could play in advancing various sectors and addressing some of the country's key challenges.

Potential for Achieving National Development Targets.

Jordan's national development targets—as outlined in its Economic Modernization Vision and supportive frameworks—primarily emphasize accelerating sustainable and inclusive economic growth and improving quality of life for all Jordanians. Immersive technologies can play a crucial role in helping Jordan effectively address its national priorities, driving sustainable development and economic growth.

A clear assessment of the Kingdom's readiness and potential to adopt immersive technologies can highlight areas of strength and opportunities.

1. **Economic Growth and Fiscal Stability**: Immersive technologies can drive economic growth by creating new industries and job opportunities. They can also improve productivity and efficiency in existing sectors, contributing to fiscal stability. This can help diversify Jordan's economy and reduce unemployment.
2. **Attracting Investment:** By adopting immersive technologies, Jordan can position itself as a leader in the region and globally, staying competitive in an increasingly digital world with the capacity to attract global talent, investment, and partnerships.
3. **Developing High-Value-Added Sectors**: Sectors like education, healthcare, and tourism can benefit from VR, AR, and MR, enhancing their value and export potential.
    - Enhancing Education: The integration of XR and AI in education can revolutionize education and vocational training by making learning more engaging and effective, and better preparing the workforce for high-demand sectors. This aligns with Jordan's focus on human capital development by helping address the skills gap and improve the employability of Jordan's workforce.
    - Improving Healthcare: VR and AR can enhance medical training and patient care, leading to better healthcare outcomes and cost savings. This also supports the Kingdom's position as a medical and wellness tourism destination.
    - Boosting Tourism: Immersive experiences can help preserve and promote Jordan's rich cultural heritage sites, increasing tourism revenue and global interest; creating new job opportunities, and fostering a sense of national pride.
4. **Improving Business and Industry**: Immersive technologies can improve business operations, from virtual meetings to product design and prototyping, leading to increased efficiency, innovation, and global competitiveness. They could also provide small and

medium-sized businesses with innovative tools to improve their products and services, also making them more competitive.

5. **Workforce Development**: VR and AR can be used for workforce training and upskilling, enhancing labor market efficiency and productivity. Immersive technologies can drive economic diversification and provide flexible and remote work opportunities, making it easier for women and youth to participate in the labor market.
6. **Social and Cultural Impact**: Immersive technologies can provide tailored experiences for individuals with different needs, promoting inclusivity in education, work and daily life. These technologies can also be used to engage communities in new and meaningful ways, fostering social cohesion and cultural understanding.
7. **Digital Transformation**: Assessing readiness can identify gaps in digital infrastructure, guiding investments to build a robust foundation for immersive technologies. A thorough assessment can also help develop effective policies and regulations to support the safe and ethical use of these technologies.

By assessing its readiness and potential, Jordan can strategically plan and implement immersive technologies to drive national development, improve quality of life, and achieve its long-term goals.

While there are challenges to adopting immersive technologies—including high costs, privacy concerns, and a lack of skilled talent—that would require strategic investments in infrastructure, education, and regulatory frameworks; the potential economic and social benefits can significantly contribute to Jordan's development targets making this a worthwhile effort.

Assessing Jordan's Readiness: Firsthand Insights.

For countries like Jordan, their readiness to adopt immersive technologies involves assessing existing infrastructure, investing in upskilling the workforce, and fostering partnerships with technology providers. The potential benefits include aligning with national development goals, enhancing global competitiveness, and boosting sectors like tourism and education.

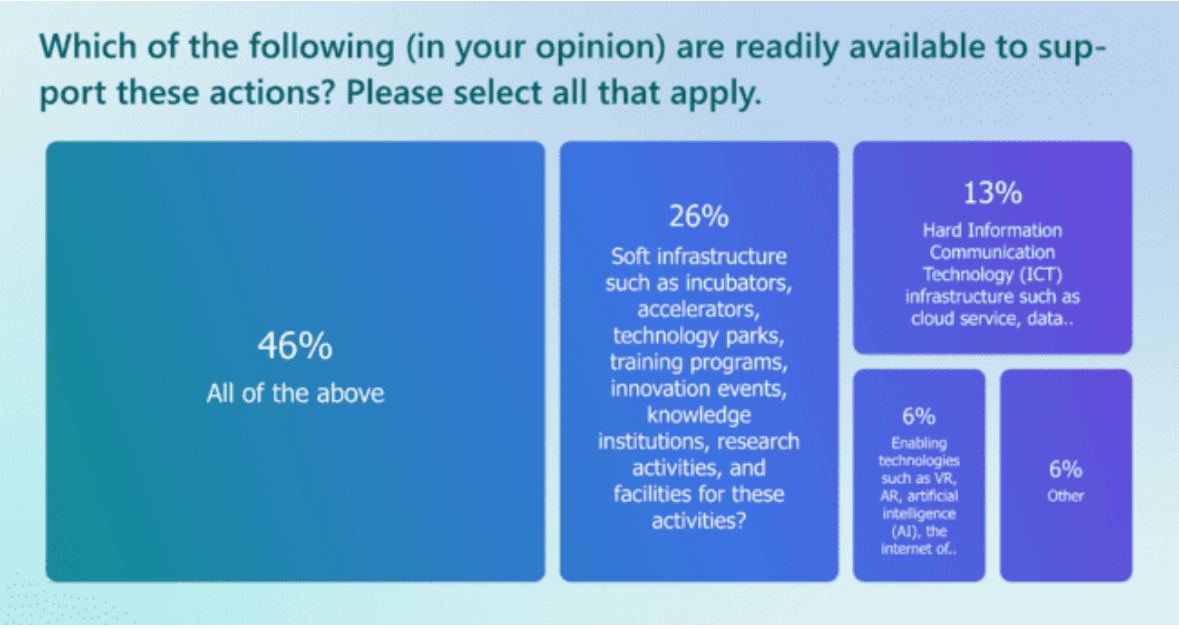
Jordan is actively exploring the benefits of integrating immersive technologies into its national development plans. This integration is seen as a potential driver for achieving the country's economic and social development goals.

Insights from Survey.

Results from a July 2024 survey conducted for this study show a promising potential to adopt immersive technologies, with several public and private sector organizations already taking steps towards integration.

In July 2024, ITU, UNESCWA and MoDEE collaborated on a survey of national leaders and stakeholders, to better understand the perspectives of Jordan's public, private, and non-profit sectors and academia, relating to the Kingdom's readiness and potential to adopt immersive technologies to achieve its national development targets.

46% of respondents believe that Jordan has the support structures required to adopt immersive technologies. Common challenges cited include the ecosystem's **lack of advanced technologies necessary for immersive technology adoption**, and concerns about limited support from both public and private sectors in fostering an environment conducive to immersive technology growth.



Source: Jordan Immersive Study Survey, July 2024

The survey yielded some key priorities for adoption of immersive technologies, including: 1) Enhanced **government policies and incentives**; 2) Emphasis on **public-private partnerships**; 3) Increased **funding and grants** from both government and private sector sources; and 4) Continued efforts to develop both **soft and hard infrastructure**. See Annex B for a summary of results.

Insights from Stakeholder Interviews.

One-on-one interviews conducted for this study in August 2024 concluded that Jordan has a reasonable level of readiness to adopt and utilize immersive technologies, with some key strengths and notable challenges to overcome.

In August 2024, ITU, UNESCWA and MoDEE collaborated on one-on-one interviews of Jordanian government stakeholders relating to the Kingdom's readiness and potential to adopt immersive technologies to achieve its national development targets.

Overall, stakeholder sentiment is that, while Jordan faces some challenges, it has a strong foundation and significant potential to leverage immersive technologies for economic growth and social development (see Annex C for more details). Most interviewees believe that Jordan could position itself to fully leverage immersive technologies by:

1. Developing a specific strategy for immersive technologies, like Jordan's AI strategy.
2. Enhancing curricula to include immersive technologies and practical applications. Upskilling programs and vocational training should be prioritized.
3. Establishing clear regulations and support to help attract investment and foster innovation.
4. Encouraging more pre-seed and angel investment to support early-stage startups.
5. Promoting public-private partnerships to drive innovation and adoption.
6. Expanding infrastructure and opportunities to rural areas to ensure inclusive growth.

Recommendations from Public Consultation.

Participants in a public consultation of the first draft of this study acknowledged Jordan's potential to integrate immersive technologies, underscoring the need for infrastructure development, capacity building, policy support and public awareness.

MoDEE, in collaboration with ITU and UNESCWA, conducted a two-day public consultation workshop from November 10-11, 2024, in Amman, Jordan, based on this study and with the theme, "Co-Creating Recommendations for a Thriving Immersive Ecosystem in Jordan". See Annex F for a summary of key discussions and findings.

Based on the consultation discussions, the following key recommendations were proposed:

1. Develop a national strategy for immersive technology adoption.
2. Invest in digital infrastructure, particularly in rural areas.
3. Create specialized educational programs and curricula for immersive technologies.
4. Establish expert focus groups to tailor immersive experiences for different sectors.
5. Promote public-private partnerships to drive innovation and adoption.
6. Implement awareness campaigns to educate the public about immersive technologies.
7. Develop a regulatory framework that balances innovation with safety and ethical considerations.
8. Encourage international cooperation and knowledge sharing in the field of immersive technologies.

Assessing Jordan's Readiness: Factors and Initiatives.

Jordan's efforts to assess its readiness and potential to utilize immersive technologies to achieve its robust national development targets is the first in the Arab region, possibly the world. The effort itself, therefore, is one that must leverage both standardized and innovative methodologies.

This study employs standardized methods including a national survey (see Annex B), stakeholder interviews (see Annex C), and the analysis of good practices (see Annex D). In addition to these methods, the study utilizes a novel immersive readiness framework from the strategic consultancy, Build n Blaze[13], to assess Jordan's readiness and potential to utilize immersive technologies to achieve its national development targets. See Annex E for a high-level summary of this framework.

Analysis of Jordan's Readiness Factors.

A general analysis of the global, regional, and local environment and this readiness framework yields the following readiness factors unique to Jordan's context and current circumstances. Annex E further defines these factors.

1. Infrastructure and Connectivity

Readiness

Jordan has made significant strides in enhancing its digital infrastructure with a solid broadband substructure, which is crucial for the adoption of immersive technologies and includes:

- 4G network coverage, currently estimated at 100%.[14]
- High internet penetration, currently estimated at 97.61%.[14]
- 55-60% of government services digitized.
- Successful rollout of cybersecurity systems, cloud platforms, open application programming interfaces and baseline open-source toolsets.[15]

Key Initiatives

- National Broadband Network: Currently connecting 633 public schools, eight universities, 23 knowledge stations, 127 government entities and 88 healthcare centers; this network aims to provide high-speed internet access across the country, which is essential to deploying immersive technologies.[16]
- Secured Government Network: Connecting 128 government entities, this network provides secure and reliable communication channels for government services, supporting the integration of digital technologies.[17]
- National goal to connect all government institutions, 80% of commercial establishments, and 55% of homes with fiber-optic networks by 2025.[1515]

While coverage is mostly limited to major urban areas, Jordan's recent 5G rollout provides a robust foundation for immersive technologies, enabling low-latency and high-bandwidth applications. The government's commitment to digital transformation, coupled with private sector investments, suggests that 5G and broadband coverage will continue to improve across the country in the coming years.

Jordan has established a robust Information and Communication Technology (ICT) infrastructure, providing a strong foundation for hardware and software availability. The Kingdom also generates about 75% of Arabic internet content and hosts 40% of the top visited Arabic websites in the Arab region.[18] It has a growing public cloud market, indicating availability of cloud-based software and services.

Although Jordan has made significant strides, there are still areas for improvement including infrastructural challenges, such as creating an integrated, reliable, and widely used public transportation system. The government has ambitious plans to improve its public transportation system.

Potential

Enhanced Connectivity: Continued investment in digital infrastructure can support the widespread adoption of immersive technologies, enabling seamless experiences and applications.

2. Technology Ecosystem

Readiness

Home to one of the largest and oldest startup ecosystems in the Arab region, Jordan has a young, technology savvy population and a growing technology ecosystem that could drive innovation in immersive technologies including some sector specific companies like:

- Vortigate: AR/VR and web development,
- ASFAN VR: AR/VR development,
- Trixel Studios: AR/VR development and video production services among others,
- Maysalward: AR/VR and mobile application development,
- Atomkit: AI and mobile application development.[19]
- Beyond Universe: Integrates AI and XR (VR, MR, AR) with business operations.

Prominent institutions are indicating a strong interest in adopting immersive technologies through collaborations with global technology companies including:

- Amman Arab University: This private institution partnered with EON Reality (a global innovator in immersive learning technologies) to bring EON-XR solutions and the knowledge metaverse to its six colleges.[20]

Jordan's capacity to adopt immersive technologies is growing, supported by educational and training initiatives aimed at upskilling the workforce in VR and AR technologies, which are essential for creating job opportunities and enhancing productivity:

- Spatial AI Center**:** Building on previous partnerships with prominent Jordanian institutions, EON Reality, launched a new venture in March 2024 to transform education by converting conventional learning materials into interactive, immersive formats. This initiative includes the development of over 10,000 tailored courses designed to address educational gaps by equipping students and professionals with skills required by the current job market and preparing the workforce for an AI-driven future job market to enhance competitiveness.[21]

Jordan is developing innovation hubs for technology innovation and entrepreneurship:

- NashamaStart**:** Part of the Youth, Technology, and Jobs project, this collaboration between MoDEE and Leaders International seeks to empower 48 technology startups through advisory and legal services as a catalyst for Jordan's growing technology sector.[22]
- ICT and Advanced Technology Sector: Jordan's ICT sector is dynamic, with significant opportunities for growth in immersive technologies. The nation hosts events like the Xpand Conference (focuses on emerging technologies, including AI and digital transformation) and JSYP (fosters creativity and innovation in immersive technologies through advancements in e-sports, VR, AI, and game design).

Potential

- Skilled Workforce: Continued investment in education and training can develop a skilled workforce proficient in immersive technologies, driving innovation and economic growth.
- AI Readiness: The Governments' Readiness for Artificial Intelligence Index 2023 ranked Jordan fifth in the Arab region and 55th globally out of 193 countries; indicating Jordan's growing capabilities in emerging technologies. In 2024, the Arab region ranked fifth with an average score of 48.50, positioning it in the middle of the regional rankings.

3. Regulatory and Data Governance Framework

Readiness

The Jordanian government has shown a commitment to technological advancement through policies and initiatives aimed at fostering innovation and digital transformation. Since the launch of its 2020 Digital Transformation Strategy,[17] Jordan has outlined and implemented strategic requirements for digital transformation, including adopting tools to accelerate a digitization journey across the Kingdom, and leveraging a young technologically savvy population.

Building on a Jordanian Constitution that guarantees rights to freedom of expression and privacy, the national government has recently sought to provide a foundational legal framework for digital activities by implementing laws to create secure and regulated digital environments.

- Cybercrimes Law (No. 17) of 2023 addresses a broad spectrum of online activities and imposes stringent penalties for offenses such as data interception and unauthorized access. International organizations including Amnesty International and the UN's Office of the High Commissioner for Human Rights, have expressed concern that the law may infringe on freedom of speech.[23]

A robust data governance framework, to establish clear definition and regulatory oversight for data protection, is critical for the successful implementation of immersive technologies. Recent focus on ensuring robust safeguarding of personal data reflects Jordan's commitment to protecting digital privacy and security.

- Personal Data Protection Law (No. 24) of 2023 provides a legal framework for data privacy, addressing concerns related to the collection and use of personal data.
- National Information System: Manages government data classification, personal data, and open data, ensuring proper handling and security of information. [17]

Potential

- Regulatory Support: A strong legal framework can support the safe and ethical use of immersive technologies, fostering innovation while protecting users' rights. The coexistence of innovation and compliance, exemplified in regulatory frameworks like JoRegBox[24] where the regulator helps drive innovation, can be extended to immersive technologies.
- Enhanced Data Security: A robust data governance framework can ensure the secure and ethical use of data in immersive technologies, building trust among users and stakeholders.
- International Standards: Jordan should also seek opportunities to participate in global immersive technology standards development for global alignment and interoperability.

4. Investment and International Collaboration

Investment

Although investment promotion policies are implemented unevenly; Jordan's government welcomes foreign investment. It has taken steps intended to ease processes for foreign investors and to develop an outward-oriented, market-based, and globally competitive economy.

Through this study, Jordan is also actively taking steps to assess its ability to adopt immersive technologies and has expressed some interest in exploring foreign investment to leverage the sector to enable the Kingdom's sustainable development.

- Investment Environment Law (No. 21) of 2022 aims to attract more than USD 15.5 billion in foreign investment by clarifying regulations and guidelines for investors.[25]
- World Bank Group's Country Partnership Framework with Jordan for 2024-2029 focuses on private sector jobs (especially for youth and women), improved human capital outcomes, and increased resilience and sustainability with green investments.[26] While not specifically mentioning immersive technology, it supports digital transformation and capacity building in various sectors, providing a foundation for incorporating such technologies into these sectors as part of its broader digital transformation efforts.
- Venture Capital Ecosystem: There are about six venture capital funds in Jordan. Several respondents of this study's survey indicated a need for funds that support the ideation phase of entrepreneurship and innovation, an important area for adoption.

Collaboration

Jordan is fostering international collaboration to support its Economic Modernization Vision, improve infrastructure, and drive sustainable development across various sectors.

- International Collaboration: Partnerships like that with the World Bank's IFC, European Bank for Reconstruction and Development, and Capital Bank of Jordan are providing USD 81 million to drive economic development and job creation in Jordan by strengthening the Kingdom's position as a gateway to the Arab region.
- Regional Collaboration: Jordan's engagement in regional initiatives like the Arab States Research and Education Network (ASREN) drives improved connectivity, collaborative platforms, and a focus on advancing e-infrastructures that together contribute to an environment conducive to implementing immersive technologies in education and research across Jordan and the broader Arab region.

Potential

A comprehensive national strategy for immersive technologies, coupled with targeted investments and international partnerships, could help Jordan capitalize on the potential of these transformative technologies for economic and social development.

5. Privacy and Security

Regulatory Environment

Jordan has made significant progress in establishing a legal framework for data protection and cybersecurity, which is crucial for the adoption of immersive technologies. However, there are concerns about the broad exceptions in these laws and their potential impact on freedom of expression.

The country's readiness for immersive technologies from a security perspective will likely depend on how these laws are implemented and enforced, as well as further development of technological infrastructure and specific regulations addressing the unique challenges posed by immersive technologies.

- Data Protection and Privacy: Jordan's Personal Data Protection Law provides a framework for protecting personal data, including regulations on data collection, processing, and consent. It aligns Jordan with international data protection standards, which is vital for the adoption and regulation of immersive technologies that often collect and process large amounts of personal data. However, the law includes broad exceptions and provisions for permits and licenses that could potentially be misused, which may create challenges for protecting user data in immersive environments.
- Cybersecurity: Jordan's Cybercrimes Law demonstrates awareness of digital security issues. While it has been criticized for potentially stifling freedom of expression (which could impact the development and use of immersive technologies for communication and social interaction), the Kingdom has moved up 44 spots on ITU's Global Cybersecurity Index to claim the 27th spot in 2024 (the world's highest status of Tier 1).

Security Implications

Growing global trends, including towards integrating AI, machine learning, and IoT devices in security systems, could be relevant for securing immersive environments in Jordan. The use of behavioral analytics and threat assessment teams; and the integration of various security components (access control, video surveillance, etc.) also align with the needs of securing complex immersive technology systems.[27]

Current Initiatives and Readiness.

Jordan shows promising readiness and potential to adopt immersive technologies across several strategic sectors including tourism, education, healthcare and gaming and sports. It has been making strides in integrating digital technologies, particularly in the education sector where there is growing interest in using immersive technologies to enhance learning experiences in higher education.

1. **Education**: Some Jordanian universities have already partnered with companies like EON Reality to explore the use of VR and AR in education, as studies show that Jordanian students are receptive to adopting new technologies like the metaverse for educational purposes. EON Reality's launch of Jordan's first Spatial AI Center builds on these partnerships.[21]

Image: EON Reality

2. **Healthcare**: Jordan is a regional leader in healthcare, with a well-developed system that includes both public and private sectors. Its high-quality and affordable medical services attract numerous foreign patients making it a vibrant medical tourism destination.

   The Kingdom has a growing interest in leveraging immersive technologies to enhance healthcare services, improve medical education, and increase access to care across the country. Recent developments like Amman Arab University's partnership with EON Reality to bring EON-XR solutions to its campus, allow for "hands-on" training using lifelike 3D models, which could be particularly beneficial for medical and healthcare education.

   As these programs continue to develop and expand, they have the potential to significantly transform Jordan's healthcare landscape.

3. **Tourism**: Jordan is leveraging immersive technologies to enhance its tourism sector with initiatives like VR tours of Petra being developed to attract international tourists as part of the iHERITAGE project, which aims to enhance access to UNESCO World Heritage sites through innovative technologies like AR and VR.[28]

Image: Petra, Jordan (Adobe Stock)

4. **Gaming and Sports**: MoDEE has launched strategies to support the gaming and e-sports industry, aiming to create 3,000 jobs and train 1,500 professional players by 2027. Events like the "Game Masters" roundtable and the Esports Future Summit also foster collaboration.

Image: Esports Future Summit

Outlook.

Despite its promising growth, the adoption of immersive technologies faces challenges such as high costs, technical glitches, and privacy concerns. The integration of generative AI is seen as a catalyst for overcoming some of these barriers by enabling efficient content creation and enhancing user experiences. The introduction of budget-friendly VR options could also make the technology more accessible to a wider audience.

While the region faces additional challenges including a lack of widespread adoption and limited content availability, there are significant opportunities for growth. The establishment of innovation hubs and government initiatives, like Saudi Arabia's Vision 2030, are fostering an environment conducive to technological advancement and adoption. The launch of the 5G network in the region, including in Jordan, is also a significant milestone, providing the necessary infrastructure for advanced technological applications.

Although Jordan is making early strides in adopting immersive technologies, challenges include ensuring widespread access to digital infrastructure, addressing skill gaps in the workforce, and fostering an environment conducive to innovation and investment in new technologies.

By continuing to invest in its infrastructure, enhance legal and regulatory frameworks, build capacities, ensure robust data governance, and address security concerns, the Kingdom can harness the full potential of immersive technologies to drive national development and economic growth.

Conclusion: Opportunities and Recommendations.

Jordan's national development targets, as outlined in its Economic Modernization Vision, include increasing income per capita, improving global competitiveness, and enhancing the quality of life for Jordanians. Investing in immersive technologies could play a key role in achieving these targets.

Opportunities.

- **Boost GDP and Create Jobs**: Immersive technologies, now at a tipping point and poised for everyday use, are expected to contribute USD 1.5 trillion to the global economy by 2030.[29] If Jordan were to capture even a small fraction of this market—which is expected to create new job opportunities in the Kingdom's high-demand sectors, including education, healthcare, and tourism—it could significantly boost its GDP.
- **Attract Foreign Investment**: With global adoption still in an early phase, Jordan's continued investment in digital infrastructure could support the widespread adoption of immersive technologies, enabling seamless experiences and applications to help it position itself as a leader in the sector. This could attract foreign investment from global technology companies looking to expand into new markets and bring in capital, expertise, and technology.
- **Enhance Education**: The integration of XR and AI in education can improve learning outcomes and better prepare the workforce for high-demand sectors, aligning with the country's focus on human capital development. This type of integration is already underway with most universities in Jordan currently offering specialized education programs in the field of AI.
- **Enrich Tourism**: Immersive technologies can enhance the tourism experience by offering virtual tours of historical and cultural heritage sites, increasing tourism revenue and helping preserve and promote Jordan's rich cultural heritage in innovative ways. A visible example is the Kingdom's participation in the iHERITAGE project to create a 3D version of Petra, one of six Jordanian sites included on the UNESCO World Heritage List.
- **Support Medical Training and Treatment**: VR and AR could revolutionize medical training and treatment, leading to better healthcare outcomes and cost savings. This can reduce the burden on the healthcare system and improve overall public health while supporting the Kingdom's status as a medical tourism destination.
- **Foster Innovation in ICT**: The growth of the ICT sector, supported by immersive technologies, can drive economic diversification and create new job opportunities, particularly for youth and women. Some infrastructural work underway includes the World Bank Group and the Ministry of Planning and International Cooperation's recent launch of a new 5-Year Country Partnership Framework to foster inclusive and green growth and promote job creation, starting with expediting digital transformation and enhancing public service delivery.
- **Grow E-Gaming and E-Sports**: The gaming market in Jordan is growing rapidly, with significant potential for VR and AR applications in e-gaming and e-sports. The adoption of immersive technologies can create new job opportunities and drive economic growth in this sector.

Recommendations.

Jordan is poised to utilize immersive technologies to advance its national development goals, with efforts already underway in key sectors such as tourism and education. However, strategic planning; investment in infrastructure, education, and regulatory frameworks; and public awareness campaigns are necessary to maximize the potential of these technologies in achieving long-term economic and social objectives.

1. Develop a National Strategy

Develop a comprehensive national strategy to ensure safe adoption of immersive technologies. *The rapid pace of technological advancement often outstrips the development of regulatory and policy frameworks.*

CHALLENGE	RECOMMENDATION	IMPLEMENTATION STRATEGIES
Immersive technologies often involve the collection and processing of large amounts of personal data, raising concerns about the privacy and security of this data, especially in the context of potential breaches and other evolving cyber threats. • Developing comprehensive policies that address the ethical, legal, and social implications of immersive technologies is essential. • Ensuring the security of immersive technology systems against cyber threats is a critical challenge.	Develop a national strategy for the adoption of immersive technologies, outlining clear goals and timelines to consider how regulatory and data governance frameworks; digital infrastructure; talent capacity; and privacy and security can be enhanced in support of adoption. <u>Consideration:</u> This strategy should align with Jordan's national development targets and include input from key stakeholders across government, industry, and education.	**International Standards**: Work with international bodies like ITU, ISO and IEEE to adopt global standards for immersive technologies ensuring compatibility and interoperability with global systems. **Policy Exchange**: Engage in programs to learn from regulatory frameworks and best practices of other countries. This can help Jordan develop effective policies for immersive technologies. **Transparency and Trust**: Policies and guidelines should be transparent and communicated clearly to build trust and allow users control over their data.

2. Invest in Digital Infrastructure

Invest in digital infrastructure to support the widespread adoption of immersive technologies. *The initial investment and ongoing maintenance required for immersive technologies is substantial. This includes the cost of hardware, software, and the necessary infrastructure to support these technologies.*

CHALLENGES	RECOMMENDATIONS	IMPLEMENTATION STRATEGIES
Connectivity Issues: Despite recent progress, there are still areas that lack the necessary broadband and mobile connectivity to support immersive technologies effectively. **High Costs**: Initial investment and ongoing maintenance of VR, AR, and MR hardware and software (including regular updates and staff training) can be substantial. **Content Availability**: The availability of high-quality and relevant content is crucial for the adoption of immersive technologies. Limited content can reduce user engagement and interest. **Accessibility and Inclusivity**: Ensuring that immersive technologies are accessible to all, including those who lack financial means and individuals with disabilities, remains a significant challenge.	**Broadband Expansion**: Continue to invest in expanding broadband and mobile internet infrastructure to ensure reliable and high-speed connectivity across the country that can support the widespread use of immersive technologies. **Cost Reduction**: Provide financial incentives or subsidies to small businesses and startups to invest in immersive technologies. Encourage development of affordable hardware and software solutions to lower barriers to entry. **Content Quality**: Collaborate with content creators and developers to produce high-quality local content to promote cultural relevance, increase engagement, and meet the needs of strategic sectors. **Inclusive Design**: Design with accessibility in mind from the outset to cater to diverse users.	**Funding**: Provide funding opportunities specific to immersive technology projects. Seek international aid and private sector investment to support these initiatives. **Collaboration**: Foster collaboration between the government, private sector, and international organizations to drive innovation and investment. **Innovation Hubs**: Establish innovation hubs and technology parks that provide a conducive environment for startups and established companies to collaborate and innovate. **Accessibility Research**: Conduct research to identify and address specific accessibility barriers and involve diverse user groups in the design process.

3. Build Workforce Capacity

Expand educational initiatives to build a skilled workforce proficient in VR, AR, and MR technologies. *The technical complexity involved in establishing and using immersive technologies can be intimidating, particularly for individuals without a strong technological background.*

CHALLENGES	RECOMMENDATION	IMPLEMENTATION STRATEGIES
There is a shortage of professionals with the expertise to develop, implement, and maintain immersive technologies. This skills gap could hinder the widespread adoption and effective use of these technologies. A significant upskilling investment is required to build a proficient workforce.	Expand current educational initiatives to build a skilled workforce proficient in VR, AR, and MR technologies. <u>Considerations:</u> • **Curriculum**: Integrate immersive technologies into the national curriculum, ensuring that they are used to enhance learning outcomes across various subjects. • **Teachers**: Implement holistic training programs targeted at ensuring that teachers are proficient in using and instructing in immersive technologies. Include ongoing support and development as part of these programs. • **Workforce**: Establish mentorship programs where experienced professionals can guide new talent in immersive technology solutions. • **Complexity**: Develop user-friendly interfaces and provide holistic support resources, including tutorials and customer support, to ease the adoption process.	**Public Sector Agreements**: Establish agreements with countries that have advanced technology sectors to facilitate knowledge transfer, joint research projects, and investment in immersive technologies. **International Partnerships**: Collaborate with international educational institutions and global technology companies to bring their expertise and technology to Jordan and provide cutting-edge training. **Knowledge Exchange**: Establish exchange programs for students, researchers, and professionals to gain experience and knowledge from leading technology hubs around the world. Engage in joint research projects with international universities and research institutions to get access to cutting-edge research, funding, expertise, and technology. **Global Training Programs**: Participate in international training programs and workshops to build local expertise in immersive technologies. **international Funding**: Leverage opportunities for funding from organizations like World Bank, UNESCO, USAID, and the European Union.

4. Promote Awareness and Acceptance

Promote the benefits of immersive technologies to encourage adoption across strategic sectors. *Potential users and stakeholders may not fully understand the capabilities and benefits of immersive technologies.*

CHALLENGE	RECOMMENDATION	IMPLEMENTATION STRATEGIES
Misconceptions and a lack of understanding about the benefits and applications of immersive technologies could slow their adoption and integration into strategic sectors, including high-demand sectors as outlined in Jordan's Economic Modernization Vision.	Prioritize awareness and acceptance of immersive technologies in public discourse and within strategic sectors. Considerations: Focus on successful use cases supporting national development goals across high-demand sectors such as tourism, education, and healthcare. Engage community leaders, parents, and other stakeholders in the implementation process to ensure broad-based support and understanding.	**Global Alignment**: Participate in global events and host international conferences to increase societal awareness and attract global experts, investors, and companies to Jordan. **Targeted Campaigns**: Launch targeted marketing campaigns and educational initiatives to demonstrate the potential benefits and applications of immersive technologies across different sectors. **Hands-on Experience**: Organize workshops and seminars to showcase successful use cases and provide hands-on experiences.

Annexes.

This document includes the following annexes:

1. Annex A: Key Supportive Frameworks
2. Annex B: Results from July 2024 Study Survey
3. Annex C: Insights from August 2024 Stakeholder Interviews
4. Annex D: Global and Regional Good Practices
5. Annex E: Jordan's Readiness Factors
6. Annex F: Insights from November 2024 Public Consultation

Annex A: Key Supportive Frameworks.

This study references key aligned supportive strategic frameworks to further characterize Jordan's current national development landscape. These frameworks are as follows:

1. Jordanian Strategy for E-Gaming and E-Sports (2023-2027)
2. Jordan's Artificial Intelligence Strategy and Implementation Plan (2023-2027)
3. National Digital Transformation Strategy & Implementation Plan (2021-2025)
4. Entrepreneurship Policy and National Strategic Plan (2021-2025)

Jordanian Strategy for E-Gaming and E-Sports (2023-2027)

The economic growth pillar of Jordan's Economic Modernisation Vision prioritizes five growth drivers, one of which is future services. This includes the country's digital economy and creative industries, from whose convergence e-gaming and e-sports arise.

The Vision also recognizes an opportunity in a Jordanian creative industries sector that—though small with limited access to international markets—enjoys a strong recognizable local and regional brand with untapped potential to support economic growth and raise its contribution to Jordan's GDP which currently stands at 1.9%.[30]

As a result, the Vision includes a national priority to elevate Jordan into a center for developing e-gaming and e-sports at the regional and international levels, which led MoDEE to develop the Jordanian Strategy for E-Gaming and E-Sports. Table 2 analyzes its status.

Table 2: E-Gaming and E-Sports Strategy – Analysis and Current Status

VISION AND STRATEGIC GOALS	TARGETS	CURRENT STATUS (2024)	CHALLENGES AND SOLUTIONS
Enhance contribution to the GDP and provide new job opportunities.	Increase GDP contribution by 1% and create 3,000 jobs.	Currently contributes 1.9% to GDP with about 300 jobs in the sector.	Regulatory streamlining and incentives needed.
Encourage competition and investment in the e-games industry at the local, regional and international levels.	Attract five international companies. Have 20 startups and SMEs operating in the sector.	Over 15 SMEs established. Ongoing partnerships with international organizations.	Strategic partnerships required to advance international market expansion.
Provide enabling environment to develop and enhance the e-gaming industry in Jordan.	Establish four specialized training centers and certify 1,500 professional players and coaches.	Initiatives underway to develop training programs in partnership with educational institutions.	Continuous investment in training required to build a skilled workforce.
Provide a safe and healthy environment and support for Jordanian players.	Improve players' health and moral awareness by 80%.	Ongoing promotional efforts are underway through educational campaigns.	Continued efforts required to address health and moral concerns among players.
Increase the number of local events and enhance Jordan's representation in international and regional e-sports events and tournaments.	Host five international and/or regional tournaments and increase national team participation by 50%.	Actively organizing local events.	Need scaling and partnerships to increase regional and international presence.
Raise community awareness on the importance of e-gaming and e-sports.	Raise general awareness of e-sports as a profession by 25%.	Efforts underway through educational campaigns.	Continued promotional work required to reach targets.

Jordan's Artificial Intelligence Strategy and Implementation Plan (2023-2027)

Building on Jordan's previous strategies and policies relating to digital transformation and digital technology, the Kingdom's Artificial Intelligence Strategy and Implementation Plan aims to keep pace with global trends for the adoption of AI, by accelerating social and economic development in key areas such as health, education, social protection, employment and well-being.

Developed in the context of Jordan's Economic Modernisation Vision, the AI strategy aligns with the Vision's goal to convert Jordan into a center for high-value industry in the region; specifically, by transforming Jordan into a regional leader in AI, and creating a unique and attractive technological and entrepreneurial environment where AI can be effective, supportive, and an integral part of the national economy.[31] See Table 3 for analysis of its status.

Table 3: Artificial Intelligence Strategy – Analysis and Current Status

VISION AND STRATEGIC GOALS	TARGETS	CURRENT STATUS (2024)	CHALLENGES AND SOLUTIONS
Build capacity and develop Jordan's capabilities and expertise in the field of AI.	Train 15,000 trainees through capacity building programs and teaching various skills in the AI field.	Initiated programs at universities and training centers.	Need for comprehensive training and curriculum development that aligns with industry demands.
Promote scientific research and development in the field of AI.	Increase the number of AI researchers and published research papers by 30% from current levels.	Efforts are part of ongoing capacity-building programs at universities and training centers.	Training and curriculum that aligns with industry demands and evolution. Engagement in global fora.
Improve investment and business environment in AI field.	Increase the volume of investment and number of AI startups to 50 new operating companies.	Initiatives underway; some success in fostering innovation.	Challenges in attracting significant international investment.
Ensure a legislative and regulatory environment that supports the safe use of AI.	Improve the global AI readiness index by 20% from current level.	Initial efforts are underway; framework evolving.	Clear guidelines and standards needed.
Apply AI tools to increase the efficiency of the public sector and priority sectors.	Increase AI awareness in 50 government agencies. Use AI in 25 government projects to solve national challenges.	Ongoing initiatives to train government employees in various agencies. Gradual integration of AI tools in operations.	Overcoming bureaucratic hurdles and ensuring interoperability.
Enhance data utilization, quality and governance.	Establish a public data authority and develop an integrated data strategy.	National information system created; Personal Data Protection Law drafted; steps taken to improve data quality.	Challenges related to data collection and analysis. Data privacy and security concerns.

National Digital Transformation Strategy & Implementation Plan (2021-2025)

Seeking to transform Jordan into a digitally advanced nation—by enhancing government services, improving economic competitiveness, and promoting sustainable development—the Digital Transformation Strategy emphasizes the role of digital transformation in driving economic growth, creating jobs, and improving public services.[32]

Overall, while Jordan is making strides in digital transformation, which includes reaching about 40% of this framework's targets as of August 2023;[33] achieving all targets by 2025 will require continued focus on infrastructure development, economic reforms, and workforce training. The government's

commitment to leveraging digital technologies for economic growth and improved public services remains a key driver of these efforts.

For instance, the digital transformation strategy's key performance indicator (KPI) to increase connectivity is a critical enabler of Jordan's potential to adopt immersive technologies, with marked progress including:

- **Internet Penetration and Usage**: As of early 2024, there were 10.33 million internet users in Jordan, representing an internet penetration rate of 91.0% of the total population.[34]
- **Internet Speeds**: Jordan has successfully rolled out 4G and 5G networks. As of March 2024, Jordan ranks 33rd globally and fourth in the Arab region for average internet speeds.[35]
- **Government Initiatives**: The government is working on expanding digital infrastructure, including broadband and 5G networks. This includes projects to connect all governorates across the Kingdom to the fiber optic network, which were completed in all Northern and Southern regions and were in their final stages in the Central region as of late 2023.[36]

Entrepreneurship Policy and National Strategic Plan (2021-2025)

The goals of this policy and strategic plan are to 1) Establish a friendly, incubating, and motivational environment for entrepreneurship in Jordan; 2) Stimulate economic growth; 3) Reduce poverty and unemployment; 4) Increase national income rates; and 5) Develop youth talent.[37]

Jordan's progress on this plan's KPIs shows a mixed picture, with some areas advancing well, while others are facing challenges.

- **Legislative and Regulatory Environment**: Jordan has made strides in creating a more conducive legislative environment for entrepreneurship by reviewing and amending relevant laws and regulations. Bureaucratic procedures, taxes, and regulatory burdens still pose significant obstacles for entrepreneurs, particularly in launching and sustaining businesses.
- **Skills Gap**: Efforts have been made to enhance digital and entrepreneurial skills among the youth through specialized training programs and partnerships with educational institutions. The focus on aligning educational outcomes with labor market needs is ongoing.
- **Market Access**: While initiatives to facilitate access to local, regional, and international markets have been launched; limited technology integration and market connectivity remain barriers, particularly for startups seeking to expand internationally.
- **Access to Financing**: Although the government has introduced measures to improve access to financing—including tax incentives and support for venture capital and accelerator programs—access to funding remains a significant hurdle, especially for early-stage startups, due to limited financial resources and risk aversion among investors.
- **Cultural View of Entrepreneurship**: Awareness campaigns and educational programs have been implemented to promote entrepreneurship as a viable career path. Cultural perceptions of entrepreneurship are gradually changing, but there is still a need to overcome societal biases and promote entrepreneurship as a mainstream option.

Annex B: Results from July 2024 Study Survey.

In July 2024, ITU, UNESCWA and MoDEE collaborated on a survey of 17 national leaders and stakeholders to better understand their perspectives relating to the Kingdom's readiness and potential to adopt immersive technologies to achieve its national development targets. The representative survey included five stakeholders from Jordan's public sector; six from the private sector; three from the non-profit sector; and five from academia.

The survey yielded some key priorities for adoption of immersive technologies, including.

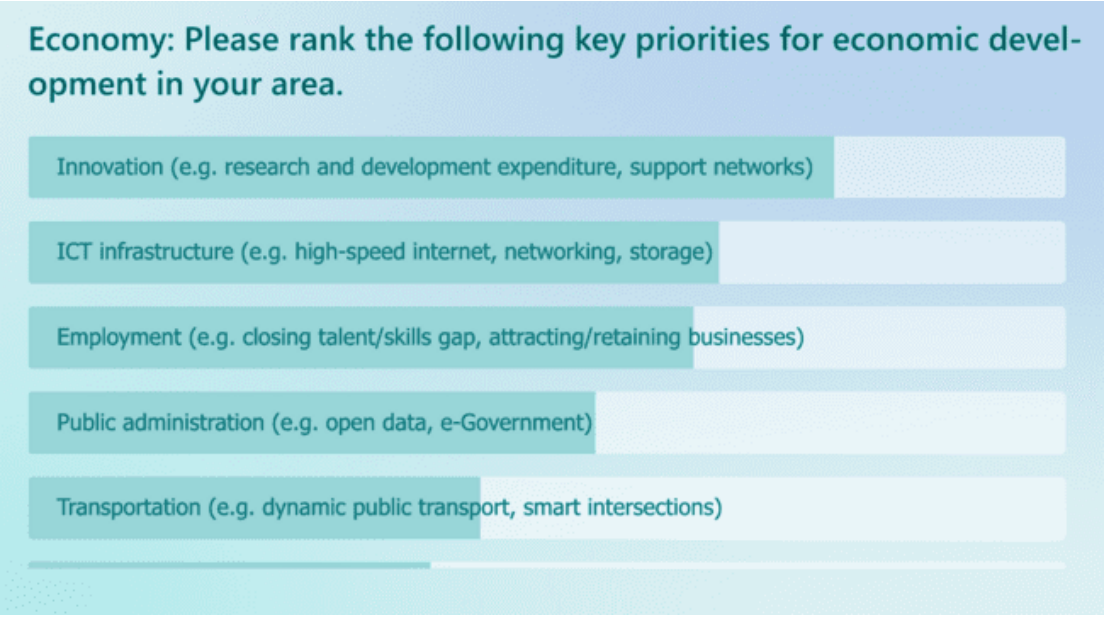
1. **Government Policies and Incentives**: Some respondents highlight the presence of government policies and incentives that support the adoption of immersive technologies with goals to create a conducive environment for innovation and growth. Others are concerned that these policies would not be enough to support the adoption of emerging technologies and suggest that government incentives will also be required.
2. **Public-Private Partnerships**: There is a strong emphasis on public-private partnerships to drive the adoption of immersive technologies by pooling resources, sharing knowledge, and scaling successful initiatives.
3. **Funding and Grants**: Most respondents point to a lack of funding and grants from both government and private sector sources; a crucial component for supporting startups and established organizations in adopting immersive technologies.
4. **Infrastructure Development**: Several respondents point to efforts being made to develop both soft and hard infrastructure; the presence of which will support the adoption of immersive technologies. Mentioned specifically were efforts to set up innovation hubs and incubators, and improvement of ICT infrastructure.

Select responses are as follows.

In contextualizing Jordan's national development targets, **50%** of respondents stated that economic challenges were the biggest they will face over the next five years.

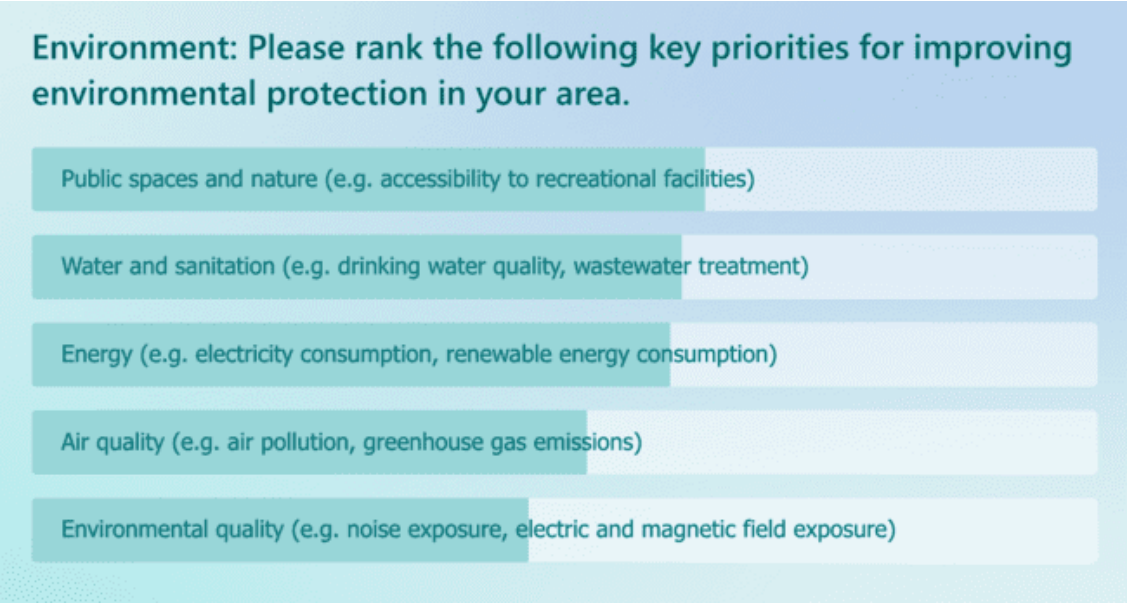
Source: Jordan Immersive Study Survey, July 2024

As leaders strive to address these challenges, the top three economic priorities as rated out of seven were 1) **Innovation**; 2) **Information and Communication Technology (ICT) infrastructure**; and 3) **Employment**.



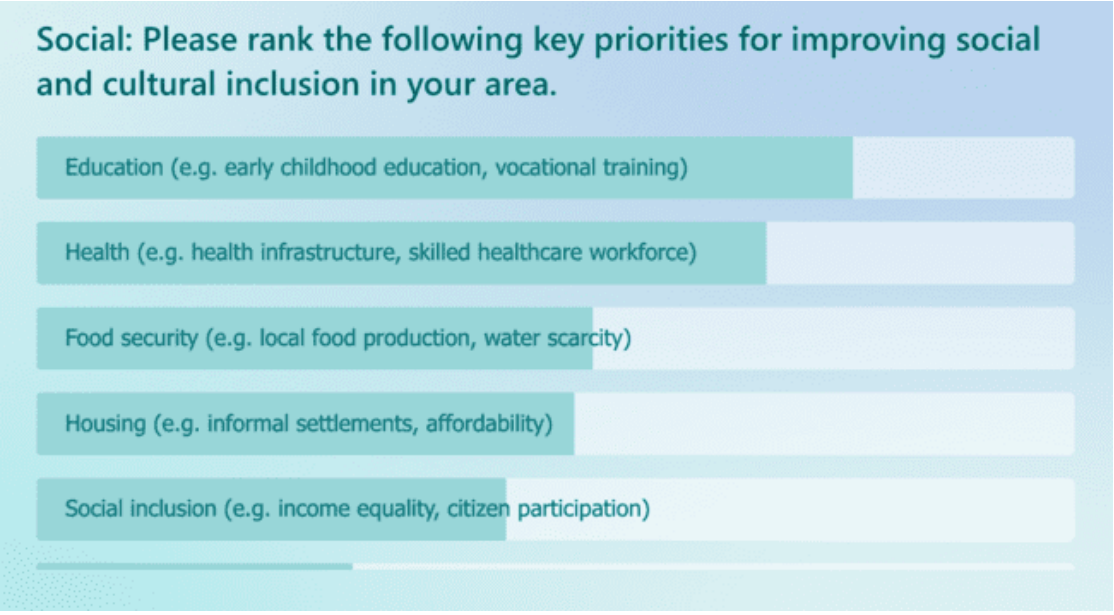
Source: Jordan Immersive Study Survey, July 2024

The top three priorities indicated for improving the environment were 1) **Public spaces and nature**; 2) **Water and sanitation**; and 3) **Energy**.



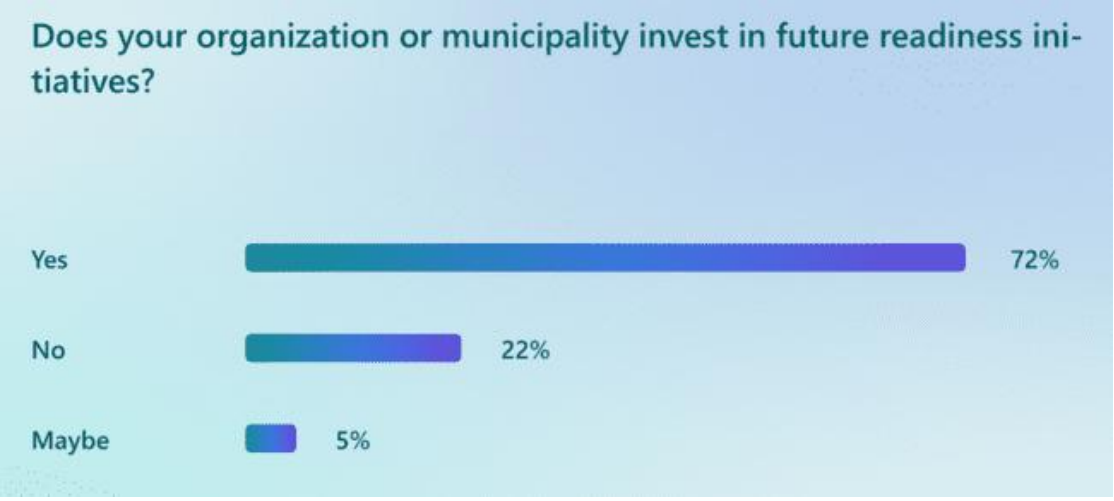
Source: Jordan Immersive Study Survey, July 2024

While the top three priorities indicated for improving social and cultural inclusion were 1) **Education**; 2) **Health**; and 3) **Food security**.



Source: Jordan Immersive Study Survey, July 2024

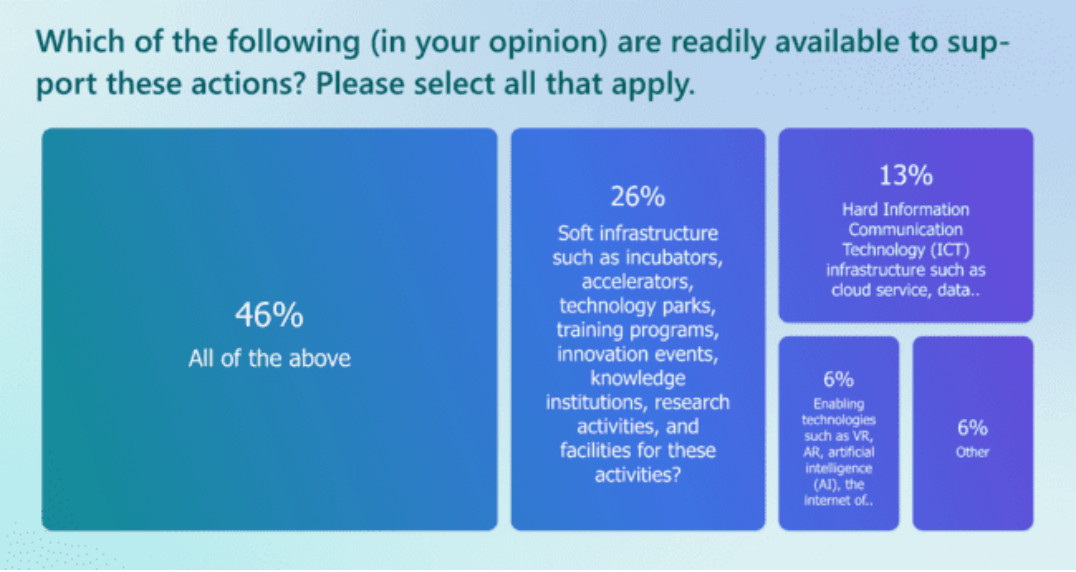
In considering readiness and potential to adopt immersive technologies, **72%** of respondents said their organization or municipality **invests in future readiness initiatives**, with **29%** indicating that these initiatives relate specifically to the adoption of immersive technologies and most saying that the initiatives also address success factors including trust and transparency, fit for purpose, sustainability, and skills and talent.



Source: Jordan Immersive Study Survey, July 2024

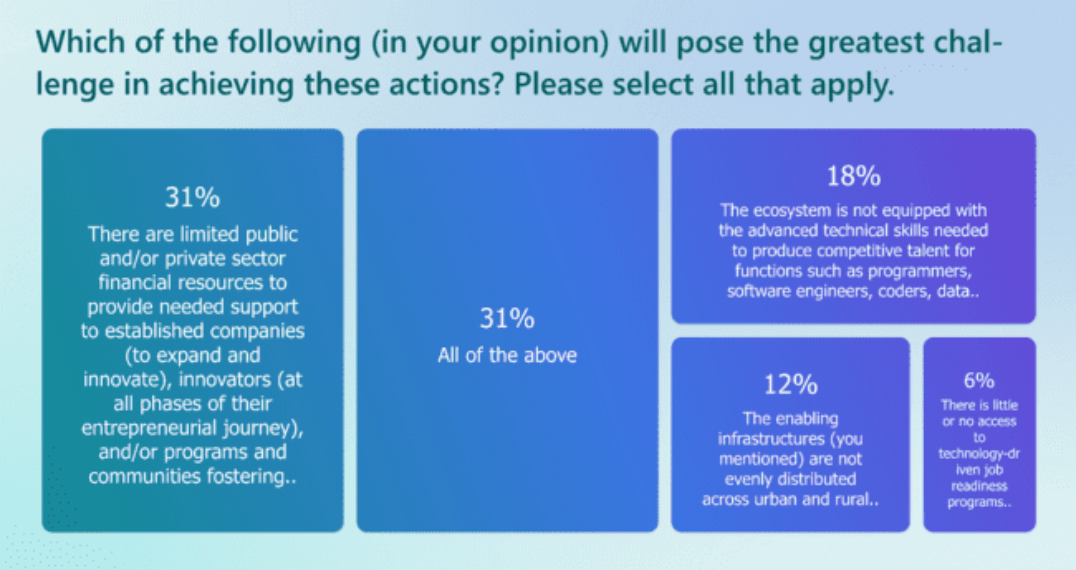
46% of respondents believe that Jordan has the support structures required to adopt immersive technologies. A significant number indicated the presence of skills and talent related to digital transformation and innovation within their organizations; while others pointed to the availability of soft infrastructure such as incubators and accelerators and the presence of hard ICT infrastructure, noting that hard ICT infrastructure is less accessible.

Common challenges cited include the ecosystem's **lack of advanced technologies necessary for immersive technology adoption**, and concerns about limited support from both public and private sectors in fostering an environment conducive to immersive technology growth.



Source: Jordan Immersive Study Survey, July 2024

On what aspects will pose the greatest challenge to adoption, it was a mixed bag, with **most concerned about financial constraints** and others indicating concerns relating to **infrastructure** and current **regulatory and policy environment**.



Source: Jordan Immersive Study Survey, July 2024

There were also mixed responses on current initiatives relating to immersive technologies. Some organizations have already initiated immersive technology projects, while others are still considering or have not yet started. For example, one respondent mentioned extending the use of augmented reality in education, while another highlighted AI in education projects.

Annex C: Insights from August 2024 Stakeholder Interviews.

In August 2024, ITU, UNESCWA and MoDEE collaborated on one-on-one interviews of Jordanian government stakeholders relating to the Kingdom's readiness and potential to adopt immersive technologies to achieve its national development targets. A view emerging from these interviews includes:

Current Landscape

- **Relevance**: Immersive technologies, particularly AR and VR, are recognized as relevant but not yet mature enough for immediate implementation. There is a growing interest, especially among the younger populations, but significant gaps remain in infrastructure and awareness.
- **Local Use Cases**: Applications in gaming, education, and healthcare are emerging, however, the focus on practical applications is still developing.

Strengths

Jordan has a promising foundation for adopting immersive technologies.

- **Strong ICT Infrastructure**: Jordan has robust internet connectivity, with 95% internet penetration and the nationwide launch of 5G networks underway.
- **Tech-Savvy Population**: Over 66% of Jordanians are under 30 and have high technology adoption rates.
- **Entrepreneurial Ecosystem**: Jordan has a vibrant startup landscape, with about 21 incubators and accelerators, and six venture capital funds.
- **Government Support:** There are several government initiatives and strategies to promote digital transformation and emerging technologies.

Challenges

Significant work is needed to address infrastructure gaps, enhance educational programs, and create a supportive regulatory environment.

- **Skills Gap**: There is a notable gap between the skills produced by educational institutions and the needs of the market. Many graduates lack the necessary expertise in emerging technologies.
- **Funding Limitations**: Access to early-stage funding, especially for entrepreneurs at the pre-seed level, is limited.
- **Uneven Distribution**: While ICT infrastructure is relatively strong in urban areas, rural regions face significant challenges. Access to transportation, advanced technologies and devices is uneven.
- **Regulatory Framework**: Although it is improving, the regulatory environment for emerging technologies needs enhancement.

63% ***of interviewees agree that Jordan should assess its readiness and potential to adopt immersive technologies.***

Opportunities

63% of interviewees agree that by leveraging its young population and existing technology initiatives, Jordan could start to position itself as a regional leader in the immersive technology sector.

- **Economic Growth**: Immersive technologies could enhance digital skills, promote job creation, and position Jordan as a regional hub for technology innovation. The potential for sectors like tourism and education to leverage these technologies is significant.
- **Education**: Enhancing learning experiences and accelerating the learning curve, especially in STEM fields.
- **Tourism**: Virtual tourism applications to showcase Jordan's historical and cultural sites.
- **Healthcare**: Improving medical training and potentially supporting medical tourism.
- **E-Gaming and E-Sports**: Building on Jordan's existing strengths in the gaming industry.
- **Military and Security Training**: Utilizing VR for realistic training simulations.

Recommendations

With targeted strategies and investments, most interviewees believe that Jordan could position itself to fully leverage immersive technologies by:

1. Developing a specific strategy for immersive technologies, like Jordan's AI strategy.
2. Enhancing curricula to include immersive technologies and practical applications. Upskilling programs and vocational training should be prioritized.
3. Establishing clear regulations and support to help attract investment and foster innovation.
4. Encouraging more pre-seed and angel investment to support early-stage startups.
5. Promoting public-private partnerships to drive innovation and adoption.
6. Expanding infrastructure and opportunities to rural areas to ensure inclusive growth.

List of Interviewees (MoDEE)

1. Abdelkader Al Batayneh, Executive Director Strategies, Future and Entrepreneurship
2. Lama Arabiat, Director of Artificial Intelligence and Advanced Technologies
3. Tawfiq Abu-Baker, Personal Data Protection Director
4. Sarah Fanous, Investment and Entrepreneurship Director
5. Saja Jaber, Director of Innovation Management Unit
6. Baha Halassa, Director of Strategies, Future, and Policies
7. Dana Darwish, Jordan Source Program Manager

Annex D: Global and Regional Good Practices.

Immersive technologies like virtual reality (VR), augmented reality (AR), and mixed reality (MR) are rapidly evolving and being adopted across various industries globally to fuel ambitions of more interactive, engaging and realistic digital experiences. Major technology companies and startups are investing heavily in developing the needed infrastructure, including hardware, software, and content for immersive platforms.

Global Good Practices.

As adoption of immersive technologies grows, some good practices have emerged that highlight their potential to transform government and private sector services, improve user experiences, and drive national priorities across the world.

1. **Seoul. Metaverse Seoul**: In 2023 the Seoul Metropolitan Government launched Metaverse Seoul, the world's first urban metaverse platform of its kind developed by a city. This hyper-realistic virtual municipal world allows residents to create personalized avatars and gives them 24/7 access to public services, including paying local taxes and filing civil complaints. Users may also visit Seoul's iconic landmarks, play games and participate in public contests.[38]

Image: Seoul Metropolitan Government

2. **United States. VA Immersive**: Since 2017, the Department of Veterans Affairs (VA) has been exploring immersive technologies as a tool to support mental health treatment, physical rehabilitation, and pain management. Recognizing a need for more nonpharmacological and noninvasive pain management options in healthcare for example, the VA now leads the country in clinical implementation of immersive technology, deploying more than 3,500 VR headsets across more than 170 VA medical centers and outpatient clinics. The results have been transformative, with nearly 85% of users experiencing a reduction in anxiety and more than 65% experiencing less pain with an average of 30% decrease in pain intensity.[39]

Image: VA Immersive Team

3. **United Kingdom. British Army Recruitment**: In 2017, the British Army developed a custom 360-degree VR application to give potential recruits a realistic experience of some of the most exhilarating experiences that new recruits can have. This initiative increased applications to join the army by 66% across the country.[40]

Image: Visualise

4. **Singapore. Virtual Singapore**: Created in 2022, Virtual Singapore is a 3D digital model of Singapore and the world's first country-scale digital twin. The second most densely populated country in the world, this land-scarce city-state has experienced significant vertical development both above and below ground. With more and more people living in high-rises and more and more utilities housed underground, use of traditional 2D maps became a challenge that was overcome by collecting high resolution 3D map data of the country to develop a 3D digital model which was then transformed into the most sophisticated digital twin to date. This is already helping Singapore respond to various challenges such as the impact of climate change.[41]

Image: Infrastructure Global

5. **Private Sector. Walmart's VR Training**: In 2016 Walmart recognized an emerging issue, training 1.5 million workers with no disruption to customer experience. Its implementation of VR training programs did not just solve the issue, it reduced training time by 96%,[42] increased employee scores by 70%, and increased trainee satisfaction by 30%.[43]

Image: Walmart

6. **Public-Private Partnerships. Metaverse Alliance**: The first country with an inclusive strategic blueprint to foster its metaverse industry; in 2021, South Korea's Ministry of Science and ICT announced the launch of a Metaverse Alliance.[44] The Ministry earmarked USD 167 million with the goal of activating an ecosystem for metaverse platforms, nurturing professionals, fostering companies and setting up a safe environment for all metaverse users. This alliance has brought together 500 firms including Samsung and Hyundai Motors. South Korea also plans to nurture 40,000 metaverse professionals and 220 metaverse focused companies; and enable foreign talent and startups to achieve its goal of becoming the fifth largest country in the global metaverse market by 2026.[45]

Image: Metaverse Entertainment

From these use cases and others across the world, several best practices have emerged for the effective implementation of immersive technologies.

- **Identify Technological Needs**: Ensure the necessary equipment, connectivity, and software are available and functional.
- **Prepare Learners and Users**: Introduce users to both the content and the technology in stages, using key personnel to champion and demonstrate the platform, thereby motivating users to embrace the experience.
- **Design for Active Engagement**: Design immersive experiences that promote active participation rather than passive consumption. This can include interactive elements and dynamic content to enhance engagement.
- **Consider Accessibility and Inclusivity**: Prioritize accessibility for users with special needs and consider alternative approaches for those without access to immersive gear.
- **Connect to Priorities**: Align immersive technology applications with broader strategies and goals to ensure they address quantifiable challenges and enhance performance.

Regional Good Practices.

The Arab region has been rapidly adopting immersive technologies over some years. Several countries have developed comprehensive national strategies and roadmaps to facilitate their adoption in a bid for global leadership in this emerging field. UNESCWA has also recently published a report on the metaverse in the context of the region.[46]

1. **Saudi Arabia. SEHA Virtual Hospital (SVH)**: In 2022, Saudi Arabia launched the region's first, and the world's largest, virtual hospital. A key initiative of the Kingdom's Vision 2030, SVH supports over 160 hospitals, employs more than 75 physicians and has a capacity of 400,000 patients annually; leveraging technologies like AR to transmit live surgical procedure images, and provide guidance and insights to doctors during complex procedures.[47]

Image: Seha Virtual Hospital

2. **United Arab Emirates (UAE). Dubai Metaverse Strategy**: The strategy was launched in 2022 to transform Dubai into the region's lead metaverse economy and one of the world's top 10, by fostering innovation and talent, investing in future capabilities, and developing Web3 technology and its applications.[48] It aims to generate 40,000 virtual jobs and attract over 1,000 companies specializing in blockchain and metaverse technologies; to infuse USD 4 billion into Dubai's GDP by 2030.[49]

Image: Palm Island, Dubai, UAE (Adobe Stock)

3. **Qatar. Qatar Museums**: In 2023, the nation's preeminent institution for art and culture, launched a digital twin of itself to create intelligent, interactive exhibits for deeper educational experiences in accessible environments without physical restrictions or spatial boundaries. Its recent launch of a virtual experience on Google Arts & Culture further promotes tourism and helps preserve its cultural heritage.[50]

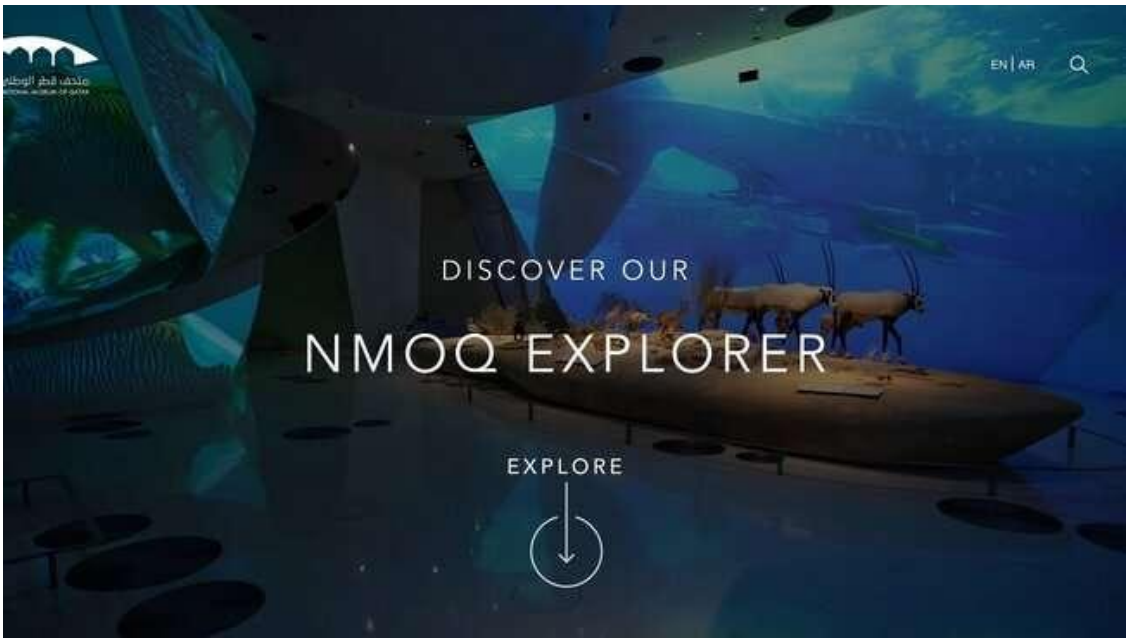


Image: Qatar Museums

4. **Saudi Arabia. Virtual Black Stone Initiative**: Launched in 2021, this metaverse initiative transports Muslims across the world to the Great Mosque of Mecca in Makkah to give unprecedented and unrestricted access to the Black Stone of Kaaba, transforming a sacred pilgrimage that brings millions of Muslims to Mecca every year.[51]

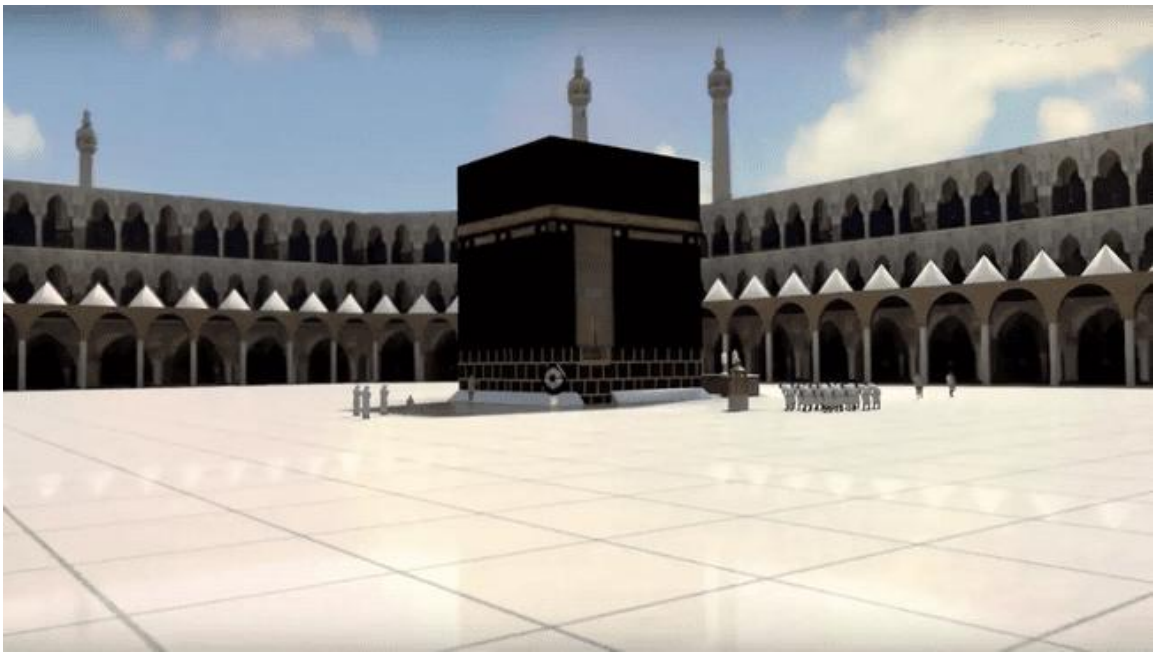


Image: Experience Makkah

In this dynamic environment—with immersive technologies boosting innovation across government services, healthcare, education, tourism, retail, and entertainment—several best practices are emerging in the region that can serve as models for adoption.

- **Strategic Sector Integration**: Immersive technologies are crucial in attracting tourists by offering novel ways to explore destinations including user personalization. Countries like Egypt and Qatar are leveraging VR to create virtual tours of heritage sites, while Saudi Arabia is investing a vast number of resources on the use of advanced technologies to meet their goal of attracting 100 million tourists by 2030.
- **Revolutionizing Education Outcomes**: The use of these technologies in the education sector helps educational institutions improve teaching outcomes and methodologies by leveraging elements like personalized learning, gamification, real-time feedback; and engaging emotions to deepen understanding of the subject matter, boost critical thinking, and enhance empathy. For example, INSEAD's campus in Abu Dhabi has created the world's most extensive VR library for management education.
- **Innovative Use in Entertainment and Retail**: The retail sector in the region is increasingly adopting AR and VR to enhance customer experiences. This includes virtual try-ons, immersive product demonstrations, and multi-sensory entertainment that help bridge the gap between online and offline shopping experiences. For example, Dreamscape at the Mall of the Emirates' use of VR and motion sensors to offer interactive adventures.
- **Healthcare Applications:** The use of VR and AR in healthcare is gaining traction in the region with a shift to virtual consultations and immersive therapy providing more access, efficiency and personalization. A "moonshot" region and a cradle of innovation, the Middle East is well-positioned to leverage immersive technologies' potential to improve healthcare delivery and training through surgical simulations, patient care management, and rehabilitation. One example is the launch of the world's first healthcare metaverse platform at Emirates Health Service in Dubai.
- **Government Support and Investment**: Countries in the Arab region, including Saudi Arabia and UAE, are actively supporting the development of immersive technologies through government initiatives and funding. This includes developing digital strategies, creating innovation hubs, and providing incentives for foreign and domestic talent, startups, and mature companies to innovate and integrate these technologies into various sectors.

Annex E: Jordan's Readiness Factors.

This study utilizes a novel Build n Blaze Immersive Readiness Framework[13] to assess Jordan's readiness and potential to utilize immersive technologies to achieve its national development targets. The four-step approach:

1. Analyzes local context and use cases across the world to extrapolate relevant best practices,
2. Identifies an illustrative standard setting model to extract evaluation mechanisms,
3. Converts resulting insights into readiness factors for analysis, and
4. Analyzes these factors to surface data on readiness and potential.

Illustrative Standard Setting Model.

Global standards build trust that is critical to the adoption of new technology. This need for trust is the reason why ITU established its first expert focus group to work towards international technical standards for the metaverse in December 2022. In its first executive briefing on the metaverse, the focus group introduced a model that presents metaverse components in five core building elements as illustrated in Figure 1.[52]

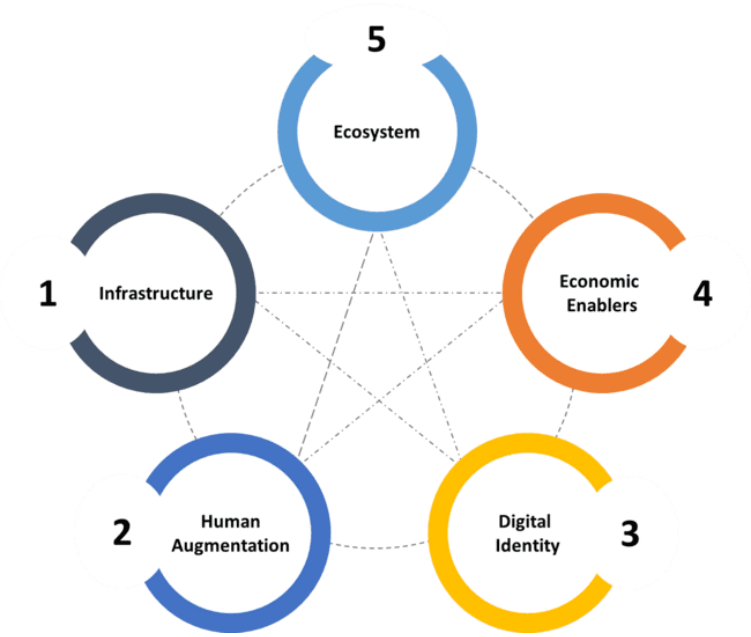


Figure 1: Illustrative Standard Setting Model

This model can illustrate baseline components of an immersive ecosystem as follows:

- **Infrastructure**: Includes networks and connectivity, computing power, graphic processing units, storage capacity, sensing and perception, cloud and edge infrastructure, semiconductor (chips and processors), etc.
- **Human Augmentation**: Mobile devices, creation platforms, and assets.
  - Mobile devices include headsets (for VR), smart glasses (for AR), other wearables; haptics, holographic, brain-machine interface.

    - Creation platforms include interaction platform, content moderation platform, 3D design and modelling, game engines, AI (including machine learning services), creator tools, search (including visual search).
    - Asset: 3D interoperable assets, asset market.
- **Digital Identity**: Includes avatar, agent, multiuser and multitasking, social graphs, rating, social curation, security, privacy.
- **Economic Enablers**: Includes decentralized, blockchain, cryptocurrency, NFT, commerce, advertising, payment, transactions.
- **Ecosystem**: Includes entertainment, shopping, education, games, e-sports, industrial applications, regulation, governance, ethics.

Jordan's Readiness Factors.

Extrapolating from the above illustrative model, and a general analysis of the global, regional, and local environment, the Build n Blaze Immersive Readiness Framework yields the following readiness factors unique to Jordan's context and current circumstances:

1. Infrastructure and Connectivity
    - Availability of necessary hardware, software, and broadband coverage.
    - Computing infrastructure and cloud service availability.
    - Initiatives for improving digital infrastructure.

2. Technology Ecosystem
    - Existing immersive technology companies, startups, and research institutions.
    - Availability of skilled talent in AR/VR development.
    - Initiatives for reskilling/upskilling workforce for the digital economy.
    - Government support for technology innovation and entrepreneurship.

3. Regulatory and Data Governance Framework
    - Policies related to data privacy, security, and intellectual property for immersive technology.
    - Regulations enabling innovative business models (e.g. virtual tourism).
    - Participation in global immersive technology standards development.

4. Investment and International Collaboration
    - Availability of public and private funding for immersive technology R&D and startups.
    - Tax incentives and support for foreign direct investment in the sector.
    - Venture capital ecosystem maturity for deep technology investments.
    - Engagement in international and regional initiatives to enable emerging technology adoption.

5. Privacy and Security
    - Privacy and protection at the individual and system levels.
    - Security implications including securing immersive environments.

Annex F: Insights from November 2024 Public Consultation.

MoDEE, in collaboration with ITU and UNESCWA, conducted a two-day public consultation workshop from November 10-11, 2024, in Amman, Jordan, based on this study and with the theme, "Co-Creating Recommendations for a Thriving Immersive Ecosystem in Jordan". The consultation brought together stakeholders from the public, private, and non-profit sectors and academia.

Key Discussions and Findings.

1. **Current Landscape**: Participants acknowledged Jordan's potential to integrate immersive technologies, highlighting the need for increased awareness and technical skills development across various sectors.
2. **Infrastructure and Connectivity**: Discussions emphasized the importance of improving digital infrastructure, particularly in rural areas. Participants identified the need for enhanced internet connectivity as a crucial factor for the widespread adoption of immersive technologies.
3. **Education and Capacity Building**: A significant focus was placed on the need for specialized education and training programs. Participants recommended creating bachelor's degrees and certificates in AR and VR to develop a skilled workforce. The importance of practical applications and aligning education with market needs was stressed. The lack of educators with expertise was also raised as of particular concern.
4. **Policy and Regulation**: Participants emphasized the need for a comprehensive national strategy for immersive technologies. Discussions stressed the importance of creating a supportive regulatory environment that encourages innovation while addressing safety, privacy, and ethical concerns.
5. **Sector-Specific Applications**: Participants explored potential applications of immersive technologies in various sectors including education (virtual labs and enhanced learning experiences), healthcare (medical training and remote treatment), tourism (virtual tours of historical sites like Petra), and gaming and e-sports (economic growth and job creation).
6. **Challenges Underscored**: a) Limited awareness of immersive technologies' potential; b) Lack of technical skills and expertise; c) Need for improved infrastructure in rural areas; and d) Concerns about privacy and data security.
7. **Opportunities Highlighted**: a) Job creation in the technology sector; b) Enhanced educational experiences; c) Potential for increased tourism through virtual experiences; and d) Improved healthcare training and services.

Recommendations.

1. Develop a national strategy for immersive technology adoption.
2. Invest in digital infrastructure, particularly in rural areas.
3. Create specialized educational programs and curricula for immersive technologies.
4. Establish expert focus groups to tailor immersive experiences for different sectors.
5. Promote public-private partnerships to drive innovation and adoption.
6. Implement awareness campaigns to educate the public about immersive technologies.
7. Develop a regulatory framework that balances innovation with safety and ethical considerations.
8. Encourage international cooperation and knowledge sharing in the field of immersive technologies.

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