Impact of Hyperscale Cloud on the UAE's SMEs and Start-ups.

November 2022

Background information on research

This research was conducted by Access Partnership and commissioned by Amazon Web Services (AWS) in partnership with Dubai Chamber of Digital Economy. It relies on third party data and does not include any commercial information from AWS and Dubai Chamber of Digital Economy. All information in this report is derived or estimated by Access Partnership analysis using both proprietary and publicly available information. AWS and Dubai Chamber of Digital Economy have not supplied any additional data, nor does it endorse any estimates made in the report. Where information has been obtained from third party sources and proprietary sources, this is clearly referenced in the footnotes.

Exchange rate used for this report: 1 USD to 3.6725 AED[1]

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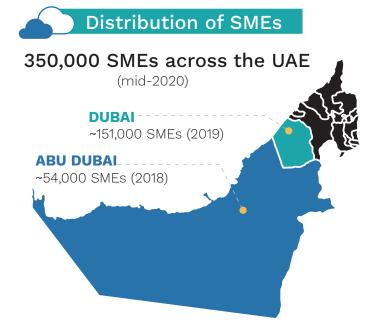
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1. Midmarket rate, retrieved 25 February 2022. XE (2022), "1 USD to AED - Convert US Dollars to Emirati Dirhams". Available at: https://www.xe.com/currencyconverter/convert/?Amount=1&From=USD&To=AED

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Impact of Hyperscale Cloud on the UAE's SMEs and Start-ups

A robust digital infrastructure is necessary to support UAE's growth path of non-oil economic diversification, with SMEs and start-ups expected to drive much of this growth

Distribution of SMEs

350,000 SMEs across the UAE
(mid-2020)

DUBAI
~151,000 SMEs (2019)

ABU DUBAI
~54,000 SMEs (2018)

Contribution of SMEs

In 2021, non-oil sector contribution to GDP has increased to **72%**

SMEs are already estimated to contribute **60%** **of non-oil GDP** with this share expected to rise in the coming years

Hyperscale cloud helps the UAE's SMEs and start-ups realise their growth potential by supporting SMEs' global expansion, government policy goals, and the wider technology ecosystem

USD 10.1 billion
Potential economic benefits for start-ups and SMEs in the UAE from hyperscale cloud adoption between 2022 to 2030

USD 7.0 billion
Potential economic benefits for local technology partners and resellers in the ecosystem between 2022 to 2030

133,000
Potential cloud-enabled jobs to be created in the UAE between 2022 to 2030

2.2 million
Metric tonnes of CO_2 equivalents potentially reduced

Hyperscale cloud enables the UAE's start-ups and SMEs to scale globally and serve customers around the world

EXECUTIVE **SUMMARY**

The United Arab Emirates (UAE) is making significant progress on its growth path towards economic diversification. The UAE is a highly competitive economy, ranking 12th on the International Institute for Management Development's (IMD) 2022 World Competitiveness Ranking and 2nd in information and communication technology (ICT) adoption on the World Economic Forum's 2020 Global Competitiveness Report.[2] The UAE's competitiveness is strengthened by the presence of international corporations, as well as a dynamic start-up culture that encourages entrepreneurship. In addition, residents in the UAE are among the most connected in the world, with Internet penetration rates exceeding 99 percent, according to the World Bank.[3] This is attributable to forward-thinking government policy that has supported the growth of the ICT market and accelerated digital transformation in recent years.

Small and medium enterprises (SMEs) and start-ups are expected to take up the mantle as the UAE's next engine of growth, but digitalisation among these firms needs to be accelerated. SMEs accounted for around 60 percent of non-oil gross domestic product (GDP) in 2021, a figure which is expected to reach even higher levels in the coming years.[4] New SMEs and start-ups are also springing up at an impressive rate, with Dubai registering a compound annual growth rate (CAGR) of nine percent in SME business formation since 2008.[5] The UAE is also visibly transitioning from a primarily Trading-oriented economy to a 'knowledge-based' Services economy. The proportion of service-based enterprises has gone up considerably, from 35 percent in 2008 to 48 percent in 2017.[6] Data-intensive sectors such as technology, healthcare and education have constituted a significant proportion of newly incorporated SMEs in the past five years.[7] However, there is still significant potential for digitalisation levels to increase among SMEs in the UAE. Almost three in four SMEs are using manual processes and basic communication tools to engage with customers and suppliers, with little to no cloud adoption, reflecting a ground reality that can be better aligned with the UAE's new growth engine of digitalisation. A robust digital infrastructure is necessary to bridge this digital transformation gap and capture the untapped potential for SMEs and start-ups in the UAE.
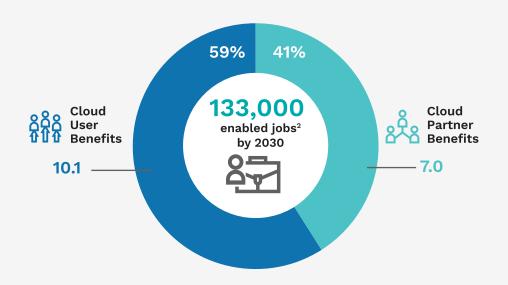
This report finds that between **2022 and 2030, the UAE's SMEs and start-ups stand to gain a total of USD 17.1 billion (AED 62.6 billion) in economic benefits from hyperscale cloud computing, consisting of USD 10.1 billion (AED 37 billion) in user benefits, and USD 7.0 billion (AED 25.7 billion) in partner benefits.**

2. Sources include IMD (2021), "World Competitiveness Ranking". Available at: https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/; and WEF (2020), *The Global Competitive Report.* Available at: https://www.weforum.org/reports/the-global-competitiveness-report-2020/in-full
3. World Bank (2019), "Individuals using the Internet (% of population) – United Arab Emirates". Available at: https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=AE
4. Exports News (2020), "UAE SMEs' contribution expected to rise from 53% to 60% in country's non-oil economy". Available at: https://exportsnews.com/post/uae-smes-contribution-expected-to-rise-from-53-to-60-in-country-s-non-oil-economy#:~:text=According%20to%20Younis%20Haji%20Al,levels%20in%20the%20coming%20years.%E2%80%9D
5. Dubai SME (2019), *The State of Small & Medium Enterprises (SMEs) in Dubai.* Available at: https://sme.ae/SME_File/Files/SME%20REPORT%202019.pdf.
6. Dubai SME (2019), *The State of Small & Medium Enterprises (SMEs) in Dubai.* Available at: https://sme.ae/SME_File/Files/SME%20REPORT%202019.pdf.
7. Diligencia (2019), *SMEs in the UAE.* Available at: https://f.hubspotusercontent40.net/hubfs/4190844/diligencia-gulf-capital-sme-awards-report.pdf

Hyperscale cloud can bring USD 17.1 billion in economic benefits and 133,000 jobs for UAE's SMEs and start-ups from 2022 to 2030

Economic benefits from hyperscale cloud for UAE's SME and start-ups, 2022-2030
USD billion[1]

59%　　41%

133,000
enabled jobs[2]
by 2030

Cloud User Benefits — 10.1

Cloud Partner Benefits — 7.0

1. These estimates do not represent GDP or market size (revenue), but rather economic impact, including GDP increments, productivity gains, cost savings, time savings, increased revenues, increased wages and increased tax collection.
2. These enabled jobs account for the direct employment impact (demand for additional employment due to revenue gains), indirect employment impact (supply chain and supporting industries) and induced employment impact (multiple rounds of household spending that ripple through the economy).

SOURCE: Access Partnership analysis

Hyperscale cloud helps the UAE's SMEs and start-ups realise their growth potential

Hyperscale cloud computing brings significant benefits to the UAE's SMEs and start-ups by serving their data needs. Providers such as Amazon Web Services run state-of-the-art technologies at high utilisation in their data centres, providing reliable and scalable cloud storage and compute service on a pay-as-you-go basis, while ensuring low latency, security, and enabling cloud customers to comply with data localisation requirements. In addition, hyperscalers offer an innovative edge through the breadth and depth of world-class cloud services and capabilities, the simplification of operational processes for global expansion, and the institutional expertise to help SMEs and start-ups navigate operational and regulatory issues when expanding overseas.

The increased adoption of hyperscale cloud technologies, supported by the presence of a hyperscale regional data centre in the UAE, and the ecosystem generated around such a presence, holds transformative potential for SMEs and start-ups to drive the next phase of economic growth. From the perspective of cloud users, access to a hyperscale regional data centre in the UAE can accelerate hyperscale cloud adoption and unlock significant economic and non-economic benefits, including increased productivity and cost savings, revenue boosts, job creation, improved sustainability, security, and operational resilience (Exhibit E2).

EXHIBIT E2

Hyperscale cloud can bring USD 17.1 billion in economic benefits and 133,000 jobs for UAE's SMEs and start-ups from 2022 to 2030

Cost savings
Hyperscale cloud offers pay-as-you-go delivery of computing and storage services at low costs

Job creation
More jobs will be supported as demand increases for cloud professional services, and household earnings and spending increase within the economy

Productivity benefits
Employees become more efficient through cloud collaboration tools and cloud-enabled analytics

Revenue boosts
Hyperscale cloud enables SMEs and start-ups to scale globally, increase business agility, and serve customers with data localisation requirements in the UAE

Operational resilience
Hyperscale regional data centres invest heavily into cloud security, and can achieve a security incident reduction of more than 30 percent

Sustainability improvements
A hyperscale regional data centre can achieve a 78 percent reduction in carbon footprint due to high utilisation compared to on-premises servers

The user benefits from hyperscale cloud computing for the UAE's SMEs and start-ups are expected to total USD 10.1 billion (AED 37 billion) between 2022 and 2030, equivalent to about 2.3 percent of the UAE's GDP in 2021. Below is a breakdown of these benefits:

Increased productivity and cost savings for the UAE's SMEs and start-ups.
Hyperscale cloud collaboration tools increase employee productivity especially across geographically dispersed operations, while cloud-enabled analytics and related advancements provided by hyperscalers, such as Artificial Intelligence (AI) and Machine Learning (ML), improve decision making and cost efficiencies across organisations. Hyperscale cloud migration can reduce average IT infrastructure spend by more than 27 percent compared to on-premises IT, while IT employees can be freed up to do more innovative and productive tasks, supported by more streamlined IT environments, and increased system administration efficiency.

Revenue boosts for SMEs and start-ups from scaling up markets and products.
With access to the innovative tools and capabilities provided by hyperscalers, SMEs and start-ups will benefit from the agility and scalability offered by cloud computing. This helps them identify new business opportunities, iterate more quickly for product development, and launch their products and services swiftly and at scale across multiple geographies, thereby benefiting from a global infrastructure and unlimited computational power. A hyperscale regional data centre located in the UAE will also help SMEs and start-ups serve and innovate for customers with data localisation requirements, such as healthcare and public sector organisations, and companies that develop and deploy Internet of Things (IoT) solutions. Hyperscale cloud also serves as the foundation of multiple technologies that improve the efficiency of export processes for SMEs and start-ups, such as digital solutions for trade information and operations, machine-to-machine (M2M) tracking of exported goods, and the application of Internet-of-Things (IoT) technologies relying on the hyperscale cloud.

Job Creation.
The increased scale, productivity and revenue for the UAE's SMEs and start-ups, enabled by hyperscale cloud computing, will lead to the creation of 133,000 direct, indirect, and induced jobs by 2030.

Beyond economic benefits, hyperscale cloud computing supported by a regional data centre in the UAE also enables business goals related to sustainability and operational resilience.
Achieving up to a 78 percent reduction in carbon footprint compared to other IT infrastructure models, hyperscale cloud will potentially reduce carbon dioxide emissions by 2.2 million metric tonnes between 2022 and 2030. The UAE's SMEs and start-ups will also benefit from operational resilience and reliability, as hyperscalers make significant investments to ensure the availability, security, and compliance of their services, reducing risk exposure for cloud users. For example, security incidents are reduced by more than 30 percent through the use of hyperscale cloud computing.

Hyperscale cloud supports the development of the wider innovation ecosystem in the UAE

From the perspective of cloud partners, the adoption of hyperscale cloud computing supported by the presence of a hyperscale regional data centre also enables local technology partners in the UAE to be part of a global ecosystem of IT partners and generate up to USD 7 billion in benefits between 2022 to 2030. Technology partners or Independent Software Vendors (ISVs) will be able to sell intellectual property and integrate functionalities for customers, while channel partners such as Value-Added Resellers (VARs), System Integrators (SIs), and Managed Service Providers (MSPs) will be able to engage customers across the life cycle of technology deployment. The presence of a hyperscale regional data centre in the UAE will result in the growth of the partner ecosystem, supported by the breadth and depth of hyperscale cloud services and solutions compared to local cloud providers. Local partners can generate more revenue by serving customers worldwide, through offerings that range across resale, cloud consulting services, proprietary cloud management software and service add-ons, skills development, distribution, supporting hardware, networking, and Information Technology (IT) services.

Adoption of the hyperscale cloud also enhances the UAE's status as a global start-up and innovation hub, while future-proofing its data needs. The UAE has been ranked first in the 2022 Global Entrepreneurship Index and is aiming to have 20 tech unicorns (start-ups with a valuation of more than USD 1 billion) by 2030, underlining its big ambition to be a global 'Entrepreneurial Nation'.[8] Empirical studies have shown that superior data centre infrastructure tends to create local concentrations of enabling factors for innovation, such as early-stage venture capital funding and the development of skilled local talent, generating long-term start-up ecosystem benefits and attractiveness. In this respect, a hyperscale regional data centre in the UAE will serve to support the government's long-term objectives. Beyond an entrepreneurial culture, key policy objectives at the subsector level will also necessitate greater technology adoption and an accompanying increase in data needs. For example, medium-term plans such as the Dubai Autonomous Transportation Strategy, which aims to automate a quarter of all transportation in Dubai by 2030, will require robust digital infrastructure and cloud access. Such key policy goals will require significant public cloud data services with low latency, high availability and reliability, and access to Artificial Intelligence and Machine Learning capabilities provided by hyperscale cloud, underlining the importance of having state-of-the-art digital infrastructure to support future-readiness.

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8. World Economic Forum (2022), *Which are the best countries in the world for entrepreneurs in 2022?*, Available at: https://www.weforum.org/agenda/2022/04/new-research-reveals-best-countries-entrepreneurs

Recommendations to maximise the potential of hyperscale cloud in the UAE

To truly become a global start-up and innovation hub, Access Partnership has identified three recommendations for the UAE that highlight the importance of collaboration between the government and businesses.

First, UAE government organisations can lead the way in digital transformation and technology adoption, creating the demand that can be served by the UAE's SMEs, start-ups, and technology partners, this requires harmonizing and simplifying digital and data regulations on the federal and emirate levels, in addition to the implementation of a risk-based data classification system that enables government organisations to improve data security, and facilitate technology adoption.

Second, the UAE government can work with the private sector and technology companies to bridge the digital skill gap through digital training and upskilling programmes, building the foundations for a digitally enabled local workforce that can take the lead in innovation and entrepreneurship.

Finally, there is potential to increase collaboration between regulators and technology companies to ensure current and future regulations do not hinder widespread technology adoption. Technology companies can provide insights on emerging and future technologies, and how they can be impacted by regulation.

01 HYPERSCALE CLOUD HELPS THE UAE's SMES AND START-UPS REALISE THEIR GROWTH POTENTIAL

Digitalisation through hyperscale cloud is a growth opportunity for SMEs and start-ups in the UAE

Almost three-quarters of SMEs (74 percent) in the UAE today have significant room to reap benefits from digitalisation.[9] Classified as 'digital newcomers' in a 2021 Arthur D. Little analysis, this archetype of SMEs in the UAE rely on manual processes and basic communication tools to engage with customers and suppliers, with little to no adoption of cloud technologies.

With a significant number of companies still in the planning phase or yet to start their digital journeys, there is great potential for companies with leadership teams that are educated and willing to adopt advanced cloud technologies (such as AI and ML) to transform more quickly and gain a competitive edge over companies that do not choose to transform. At a national level, the UAE government provides support through national strategies and programmes focused on skills development and capability building. SMEs and start-ups can take advantage of such initiatives.

This report seeks to outline the economic benefits that hyperscale cloud computing can present for SMEs and start-ups on the path to digitalisation, particularly through the provision of world-class, reliable, advanced, and scalable cloud services, as well as access to digital skills and capacity building programs.

What are the benefits of hyperscale cloud computing?

The term 'hyperscale' refers to a computer architecture's ability to scale in response to increasing demand, such as computing ability, memory, networking infrastructure and storage resources.[10] Hyperscale computing works by horizontal scaling (networking servers to enable them to be quickly added or removed as capacity demands change), and vertical scaling (adding additional power to the machines already in service). The market intelligence firm International Data Corporation (IDC) generally defines a data centre as 'hyperscale' when it exceeds 5,000 servers and 10,000 square feet. Hyperscalers are companies with the largest hyperscale data centre footprint. According to a Synergy Research Group report, the number of hyperscale data centres surpassed 700 at the end of 2021.[11] On the server side, hyperscale cloud operators design server systems with great attention paid to power optimisation, using the very latest components. These servers have higher levels of utilisation, leveraging the ability to share and dynamically allocate resources to serve customers' workloads on the cloud. Hyperscalers also design their data centre sites to be highly efficient and use less energy for both cooling and power distribution.[12]

9. The Entrepreneurial Nation (2021), *SME digitalisation for productive and resilient economies.* Available at: https://theentrepreneurialnation.com/wp-content/themes/moetheme/tcpdf/SME_Digitization_White_Paper.pdf.
10. BMC (2018), "What is a Hyperscale Data Center?". Available at: https://www.bmc.com/blogs/hyperscale-data-center/
11. Sources include Synergy Research (2021), "Hyperscalers Surpass 700 Data Centers Globally". Available at: https://www.sdxcentral.com/articles/news/hyperscalers-surpass-700-data-centers-globally/2021/11/; and Synergy Research (2020), "Microsoft, Amazon, and Google operate half the world's 600 hyperscale data centers." Available at: https://www.datacenterdynamics.com/en/news/microsoft-amazon-and-google-operate-half-the-worlds-600-hyperscale-data-centers/
12. 451 Research (2021), *The Carbon Reduction Opportunity of Moving to the Cloud for APAC.* Available at: https://d1.awsstatic.com/institute/The%20carbon%20opportunity%20of%20moving%20to%20the%20cloud%20for%20APAC.pdf.

In addition to the cost advantage, hyperscalers also tend to have an innovative edge through the breadth and depth of cloud services. Providing more services and solutions is an important differentiator for cloud service providers (CSPs) as businesses seek to leverage capabilities that they did not even know existed. With its first mover advantage, AWS continues to be the market leader in terms of the breadth and depth of cloud services, with more than 200 services across compute, storage, database, analytics, networking, mobile, developer tools, management tools, IoT, security and enterprise applications.[13] With hyperscalers' strong orientation towards innovation and constant improvement, their users are assured of receiving the most up-to-date services necessary to leapfrog and reach higher levels of productivity.

Hyperscalers can also simplify and facilitate the expansion of global operations for businesses. When expanding to new geographies, SMEs find that contract negotiations with IT service providers in each country can be very onerous and can delay project deliveries. Overarching global contracts allow hyperscale cloud customers to undergo this process only once and save significant time and money. Additionally, providing the same Service-Level Agreement (SLA) to customers and defining that across regions can help improve service and management of international activities.[14] Furthermore, access to a global hyperscale cloud infrastructure footprint maximises network availability and performance around the world, enhancing customer satisfaction and employee productivity.

Hyperscale cloud computing supported by a regional data centre in the UAE can also bring other qualitative business, societal and environmental benefits resulting from increased job opportunities, reduced carbon emissions, reduced data breaches and security incidents, as well as greater operational resilience for local businesses.

Hyperscale Cloud is expected to create up to USD 10.1 billion (AED 37 billion) between 2022 and 2030 in Economic Benefits for the UAE's SMEs and Start-ups

The presence of a hyperscale regional data centre in the UAE will drive the increased adoption of hyperscale cloud technologies among the UAE's SMEs and start-ups, by providing access to world-class technologies, including AI and ML, and the breadth and depth of cloud solutions, which will lead to significant economic benefits that can reach up to USD 10.1 billion (AED 37 billion) cumulatively between 2022 and 2030. This additional value represents 2.3 percent of the UAE's total GDP in 2021, and 3.3 percent of its total non-oil GDP in the same year. This comes from several user benefits, including productivity benefits and cost savings, and higher revenues gained by new cloud users as they leverage cloud tools and technologies.

Productivity benefits and cost savings for SMEs and start-ups

While the overall productivity of micro-sized SMEs in Dubai, in terms of labour productivity or Gross Value Add (GVA) per employee, exhibited a CAGR of 6.2 percent between 2008 and 2017 due to increased levels of innovation and digital readiness, it still is at 80 percent of the European Union's (EU), and 60 percent of Singapore's levels.[15] The presence of a regional data centre will drive hyperscale cloud adoption among the UAE's SMEs and start-ups, closing the employee productivity gap for UAE businesses.

13. Amazon Web Services (n.d.), "Cloud computing with AWS". Available at: https://aws.amazon.com/what-is-aws/
14. Iland (2020), "Why do you need a global footprint for your cloud?" Available: https://iland.com/blog/why-do-you-need-a-global-footprint-for-your-cloud/
15. Dubai SME (2019), *The State of Small & Medium Enterprises (SMEs) in Dubai*. Available at: https://sme.ae/SME_File/Files/SME%20REPORT%202019.pdf
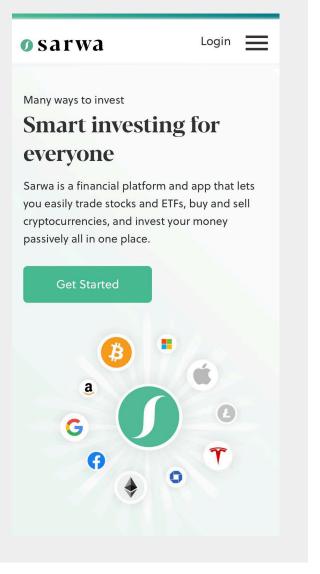
By leveraging hyperscale cloud, businesses will reap significant gains in their IT and non-IT productivity. Employees will gain quicker access to new functionalities, communication, and collaboration tools, they will also benefit from seamless collaboration across geographically dispersed operations. These benefits have been amplified even more during the COVID-19 pandemic, when organisations switched from traditional workplaces to remote work. Hyperscale cloud technologies also have a positive impact on company-level productivity in the manufacturing sector, where micro enterprises and small enterprises increased their productivity by 2.2 percent and 0.8 percent respectively when using hyperscale cloud.[16]

Using cloud-enabled analytics and other advances provided by hyperscalers, such as AI and ML, organisations can improve decision making processes, leading to increased agility, responsiveness, and reduced costs. For example, in the Air Transport sector, increased cloud adoption through enhanced broadband connectivity to aircraft is spurring greater analytics with increased annual potential efficiency forecasts of two to five percent.[17]

BOX 1.   **Breaking growth and productivity constraints through the use of hyperscale cloud**

Sarwa: Achieving scalability rapidly through AWS to make investing accessible for everyone.

Founded in 2017, Sarwa is an online platform that aims to help young, busy, digitally savvy people in the Middle East build their savings by removing the cost and complexity of investing.[18] Customers can sign up online and get a diversified portfolio of Exchange-Traded Funds (ETFs) based on their risk profile within minutes, with a minimum investment of only USD 500 (AED 1,840). With a minimum viable product (MVP) at its inception, Sarwa required scalability and speed at launch, particularly in a very innovative and disruptive space, while ensuring security and compliance when handling customers' sensitive financial data, and under strict regulatory requirements. Born in the cloud, Sarwa built its business on hyperscale cloud services such as AWS Elastic Compute Cloud (EC2), Lambda and Elastic Beanstalk to operate as quickly as possible and ensure data availability and protection. The breadth of AWS services also helped Sarwa quickly bring new features to market for its customers. These cloud benefits at an early stage helped Sarwa to grow by 30 percent month-on-month in 2019, becoming the fastest growing online financial advisor in the Middle East and North Africa (MENA) region.

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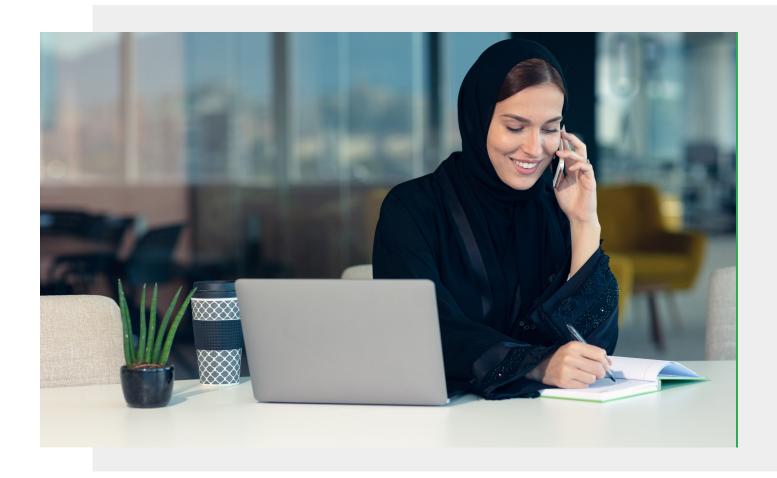
Get Started

16. Romanko, O (2021), Digital Opportunity: How Cloud Computing Changes the Shape of the UK Economy. Available at: https://iariw.org/wp-content/uploads/2021/07/Romanko_Paper.pdf
17. London School of Economics and Political Science (2019), *The Transformative Effect of Cloud on Firm Productivity and Performance:* Defining the benefits and impact of cloud as a 21st Century digital enabler. Available at: https://d1.awsstatic.com/executive-insights/en_GB/report-transformative-effect-of-cloud-on-productivity-and-performance-exec-summary.pdf
18. Amazon Web Services (2019), "Sarwa Takes the Stress out of Investing." Available at: https://aws.amazon.com/solutions/case-studies/sarwa-video/?did=cr_card&trk=cr_card

Additionally, hyperscale cloud economics are suited to the needs of small businesses and start-ups. On-premises server utilisation in enterprises is estimated to be between 15 to 20 percent across multiple geographies, compared with well over 50 percent in hyperscale cloud servers.[19] As a result, significant economies of scale from server utilisation can be passed on to SMEs and start-ups through lower costs for deployment. Companies that migrate to the hyperscale cloud also eliminate the power, space, cooling, maintenance, and other operational costs associated with on-premises technology, freeing up critical cash-flow. According to AWS, hyperscale cloud migration achieves a 27.4 percent reduction in average IT infrastructure spend per user compared to on-premises IT, reaching to 62 percent lower costs for companies with more than 50 percent of their IT infrastructure in hyperscale cloud.[20] Efficiency improvements from development, maintenance and IT support also abound from cloud migration if optimised or remediated correctly. Development and Operations (DevOps) can create significant efficiencies in the cloud, delivering greater agility and speed in launching applications, features and functionalities for employees and customers. AWS reports a 57.9 percent increase in virtual machines (VMs) managed per administrator, rising to an 86.7 percent increase for applications leveraging DevOps.[21] Consequently, SMEs can allow employees to transition from day-to-day IT support to other more innovative and business-focused projects.

19. The 2021 APAC sample is estimated at just under 15%, compared with an estimated 18% in the 2019 U.S. sample. 451 Research (2021), *The Carbon Reduction Opportunity of Moving to the Cloud for APAC*. Available at: https://d1.awsstatic.com/institute/The%20carbon%20opportunity%20of%20moving%20to%20the%20cloud%20for%20APAC.pdf.
20. Amazon Web Services (2020), *Cloud Value Benchmarking Study Quantifies the Benefits of Cloud Adoption*. Available at: https://pages.awscloud.com/rs/112-TZM-766/images/cloud-value-benchmarking-study-quantifies-cloud-adoption-benefits.pdf
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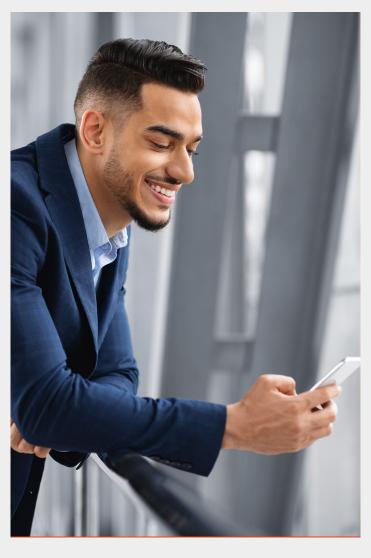
AWS initiatives help reduce operational costs and kickstart business innovation[22]

AWS Activate is a free programme that aims to assist start-ups and early-stage entrepreneurs in getting started on AWS cloud infrastructure. It offers free tools and resources such as customised content, exclusive offers from reputable service providers, continual training, and technical assistance, and up to $100,000 in AWS Activate credits to cover their use of cloud services, hence providing significant cost savings.[23] Both funded and unfunded start-ups can apply for the two programme tiers within AWS Activate – Activate Founders and Activate Portfolio.[24]

In addition, start-ups need to build fast and build right. Whether they have access to venture capital funding or are bootstrapped, they are always racing to get a viable product out in front of customers before the competition. Even if start-ups build fast, building right is not easy. Starting from scratch when building infrastructure is tricky. For example, the architecture chosen may run the risk of being too large and cost-ineffective for their stage of growth, requiring a costly rightsizing or starting over to prevent performance issues along the way. Within the AWS Activate console, Build On AWS enables founders and developer teams to reference architectures validated by experienced solutions architects. AWS recommends templates based on the start-up's industry, products, and type of technology.[25] By hand-selecting reference architectures and creating cloud-formation templates that are most relevant for start-ups, AWS makes it easier for them to build their business in the cloud.

22. IMDA (n.d.), "Cloud Computing and Services". Available at: https://www.imda.gov.sg/regulations-and-licensing-listing/ict-standards-and-quality-of-service/IT-Standards-and-Frameworks/Cloud-Computing-and-Services
23. These credits are not included in the estimates of benefits for SMEs
24. Amazon Web Services (n.d.), "AWS Activate". Available at: https://aws.amazon.com/activate/
25. Forbes (2021), "How Startups Can Grow Faster with the Cloud." Available at: https://www.forbes.com/sites/awsstartups/2021/09/29/how-startups-can-grow-faster-with-the-cloud/?sh=3c2ad8fe5c6a

Scaling Up Products and Markets and Generating Additional Revenue for the UAE's SMEs and Start-ups

Hyperscale cloud is a key enabler for businesses' top line through increased agility and scalability. Access to innovative tools and capabilities offered by hyperscalers improves and accelerates research and development (R&D) at lower costs, allowing SMEs and start-ups to fail fast, learn, and innovate, experimenting quickly as they develop new products and solutions, reducing time to market through streamlined deployment processes. In some cases, time to market for new features was reduced by 30-75 percent.[26] Hyperscale cloud allows product and feature launches to be executed more quickly and at scale, with access to near-unlimited infrastructure capacity and computational power, which enables SMEs and start-ups to meet demand and expand globally. This is especially important for internet and mobile-first start-ups, also called digital native businesses (DNBs), where hyperscale cloud is crucial to a business model that is reliant on engaging international customers quickly and repeatedly.

The ability to scale fast and serve more customers will help local SMEs and start-ups increase their revenues and expand operations, leading to increased demand for talent and creating more job opportunities. In the UAE, every USD 1 million (AED 3.7 million) increase in GDP supports the creation of an additional 11.5 jobs.[27] This is in addition to the indirect impact on employment in the supply chain and supporting industries, such as real estate, logistics, and professional cloud services, thereby increasing household earning, which contributes to the local economy. Combining the direct, indirect, and induced impact on job creation, hyperscale cloud adoption supported by the presence of a regional data centre is expected to enable a total of 133,000 jobs by 2030.

Hyperscale cloud infrastructure in the UAE will enable local SMEs, start-ups, and technology partners to serve local customers with strict data localisation requirements, such as financial services, healthcare, and government organisation. Given the high sensitivity and critical nature of these services, customers face the need to balance high security and localisation with service availability and reliability, which can be made possible by local cloud infrastructure. Local SMEs, start-ups and partners will be able to serve more customers, expanding their business lines and generating more revenue.

For import-export businesses, there are numerous solutions based on hyperscale cloud computing that help improve efficiencies, streamline operations, and enable the secure movement of shipments, including solutions relating to machine-to-machine (M2M) tracking, and IoT technologies. For instance, Tradeling has become the dominant business-to-business (B2B) e-commerce marketplace ecosystem in MENA within just two years, leveraging the hyperscale cloud to help support companies face challenges around pricing, trade finance, logistics, and last-mile delivery, by finding trading partners and products from verified sellers and providing trade finance facilities through direct credit lines and several partnerships with banks and credit insurance companies across the UAE (Box 3).[28]

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26. Sources include Amazon Web Services (2021), "Unlocking the Trillion Dollar Value of Cloud". Available at: https://aws.amazon.com/blogs/enterprise-strategy/unlocking-the-trillion-dollar-value-of-cloud/; Amazon Web Services (2018), "Halodoc Reduces Time-to-Market by 30% using AWS". Available at: https://aws.amazon.com/solutions/case-studies/halodoc/; and McKinsey (2018), Creating value with the cloud. Available at: https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Creating%20value%20with%20the%20cloud%20compendium/Creating-value-with-the-cloud.ashx

27. Access Partnership analysis. Sources include: Federal Competitiveness and Statistics Centre (2020), National account. Available at: https://fcsc.gov.ae/_layouts/download.aspx?SourceUrl=%2Fen-us%2FLists%2FD_StatisticsSubjectV2%2FAttachments%2F1391%2F%D8%AA%D9%82%D8%AF%D9%8A%D8%B1%D8%A7%D8%AA_%D8%A7%D9%84%D8%AD%D8%B3%D8%A7%D8%A8%D8%A7%D8%AA_%D8%A7%D9%84%D9%82%D9%88%D9%85%D9%8A%D8%A9_2010_2020.xlsx. Statista (2021), "Number of employed persons in the United Arab Emirates in 2019, by economic sector". Available at: https://www.statista.com/statistics/638515/uae-total-number-of-workforce-by-economic-sector/.

28. CCI France UAE (2022), ""Following the Success of Tradeling DIEZ Highlights Growth Opportunities in B2B eCommerce". Available at: https://www.ccifranceuae.com/actualites/n/news/following-the-success-of-tradeling-diez-highlights-growth-opportunities-in-b2b-ecommerce.html

BOX 3.

Box 3. Growing with AWS to serve global customers

Tradeling: Swiftly scaling up with AWS to capture a new post-COVID B2B e-commerce opportunity

Since day one, Tradeling has been running its workloads on the AWS cloud. Tradeling has acknowledged AWS as a big enabler for its growth, ranging from the ease of managing reliable and scalable infrastructure, supply of cloud credits and a large inventory of ready-to-use solutions. These advantages provided Tradeling with a foundation to minimise its development efforts, experiment with ideas more easily and develop prototypes quicker.

> *AWS is more than a service for us, it's our success partner and a big enabler for our growth. The AWS cloud is extremely reliable, with a great ecosystem and suite of services that integrate to provide us with world-class managed services, starting from basic cloud infrastructure to all kind of related services such as monitoring and security, resulting in a fully reliable and sustainable foundation for infrastructure. Our experience with the AWS support team has been amazing. The team has been always so open to supporting and proactively providing consultations and training, introducing us to the new solutions and updates on the AWS ecosystem.*
>
> **Ahmed Moawad**
> Chief Technology Officer, Tradeling

Tradeling now boasts over 700,000 product listings and over 126,000 registered buyers and sellers from over 55 countries.[29] B2B transactions in the MENA online space still only make up 1 percent or less of the USD 1 trillion (AED 3.7 trillion) market, with strong potential to grow into a USD 50 billion (AED 184 billion) market. Tradeling believes that having a data centre based in the UAE will be important even as they expand their offering to more countries in the region like Saudi Arabia, Egypt, and the rest of the Gulf countries.

> *It will be a must to have a local cloud to store customers' data locally and comply with regulatory requirements. In addition to this, it will make more sense to have our infrastructure close to our customers for a better experience. Support on how to serve customers in different regions through the same infrastructure and comply with regulations at the same time will be crucial. I believe this will also open new opportunities for businesses that require low latency like IoT and Gaming, making it easier to develop and build solutions that fit the region's customers' need and provide first-class local support.*
>
> **Ahmed Moawad**
> Chief Technology Officer, Tradeling

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29. Mid East Information (2022), "Tradeling Celebrates Two Years of Dominating The B2B Marketplace". Available at: https://mid-east.info/tradeling-celebrates-two-years-of-dominating-the-b2b-marketplace/

Hyperscale Cloud Helps UAE Businesses Achieve Sustainability and Operational Resilience Goals

Sustainability impact

From an environmental standpoint, a hyperscale regional data centre and associated cloud adoption will significantly improve the energy efficiency and reduce the carbon footprint of SMEs and start-ups in the UAE, potentially reducing carbon dioxide emissions by 2.2 million metric tonnes between 2022 and 2030 (Exhibit 1). Compared to on-premises and local cloud data centres, hyperscale cloud data centres have higher resource utilisation and greater energy efficiency. Due to the lack of publicly available sustainability data in the region, the potential improvements can be estimated based on similar APAC and United States (U.S.) case analyses.

Being highly utilised, hyperscale cloud servers can achieve up to a 78 percent reduction in carbon footprint compared to typical on-premises servers.[30] This comprises 67 percent from energy savings and 11 percent from the use of more efficient power and cooling systems.[31] A similar report on the U.S. market estimates that moving-on premises workloads to AWS can lower the workload carbon footprint by 80 to 93 percent for the middle 90 percent of enterprises.[32]

Additionally, hyperscale cloud provides smart solutions and tools based on AI and ML to help customers achieve their sustainability goals. For instance, the AWS Customer Carbon Footprint Tool helps customers track, measure, review, and forecast the carbon emissions generated from their cloud usage.[33] Such tools are likely to help companies enhance long-term sustainability planning and articulate coherent strategies on this front.

30. 451 Research (2021), *The Carbon Reduction Opportunity of Moving to the Cloud for APAC*. Available at: https://d1.awsstatic.com/institute/The%20carbon%20opportunity%20of%20moving%20to%20the%20cloud%20for%20APAC.pdf

31. 451 Research (2021), *The Carbon Reduction Opportunity of Moving to the Cloud for APAC*. Available at: https://d1.awsstatic.com/institute/The%20carbon%20opportunity%20of%20moving%20to%20the%20cloud%20for%20APAC.pdf451

32. Research (2019), *The Carbon Reduction Opportunity of Moving to Amazon Web Services*. Available at: https://d39w7f4ix9f5s9.cloudfront.net/e3/79/42bf75c94c279c67d777f002051f/carbon-reduction-opportunity-of-moving-to-aws.pdf

33. Amazon Web Services (n.d.,), "Customer Carbon Footprint Tool". Available at: https://aws.amazon.com/aws-cost-management/aws-customer-carbon-footprint-tool/

EXHIBIT 1

Hyperscale cloud computing in the UAE also enables business goals related to sustainability and operational resilience

BUSINESS GOALS RELATED TO SOCIAL & ENVIRONMENTAL BENEFITS

CO_2 emissions in the UAE could be reduced

2.2 million metric tonnes

from 2022 to 2030 from using cloud in UAE, through more efficient IT infrastructure

Security incidents involving data loss or exposure due to targeted attacks could be reduced by

34%

potentially resulting in Cumulative saving of

USD 1.9 billion

from 2022 to 2030

Security and operational resilience impact

At the same time, with petabytes of data generated and stored daily for business processes, data security and reliability are key elements of a digital-focused strategy. At scale, hyperscalers invest heavily into ensuring application availability, security, and regulatory compliance in cloud architecture, thereby reducing risk exposure in these aspects relative to small scale or on-premises infrastructure. For example, AWS provides automated security tools and solutions that enable customers to have more secure environments and comply with regulatory requirements in a cost-effective manner.[34]

As a result, AWS reports a 34.2 percent security incident reduction for customers, contributing to an overall 56.7 percent reduction in application downtime, allowing SMEs and start-ups to continue delivering business-critical services to support customer engagements and continual workplace productivity.[35] It is estimated that SMEs and start-ups could reap an additional USD 1.9 billion (AED 7 billion) in cost savings between 2022 and 2030 from reducing data-related security incidents (Exhibit 1).[36]

34. International Data Corporation (2018). *Fostering Business and Organizational Transformation to Generate Business Value with Amazon Web Services.* Available at: https://pages.awscloud.com/rs/112-TZM-766/images/AWS-BV%20IDC%202018.pdf
35. Amazon Web Services (2020), Cloud Value Benchmarking Study Quantifies the Benefits of Cloud Adoption. Available at: https://pages.awscloud.com/rs/112-TZM-766/images/cloud-value-benchmarking-study-quantifies-cloud-adoption-benefits.pdf
36. Access Partnership estimates. See Appendix for methodology

02 HYPERSCALE CLOUD SUPPORTS THE DEVELOPMENT OF THE WIDER INNOVATION ECOSYSTEM IN THE UAE

Hyperscale cloud adoption supported by a regional data centre enables local technology partners to be a part of a global ecosystem of IT partners and generate USD 7 billion in benefits between 2022 and 2030

Partner gains – Revenue boosts for cloud service partners

Increased hyperscale cloud adoption supported by a regional data centre in the UAE will significantly boost the revenue potential and growth of local IT partners with estimated revenue gains of USD 7.0 billion (AED 25.7 billion) between 2022 and 2030. A significant portion of these partner gains will accrue to local SME partners that support cloud migration and implementation in a variety of ways. Local technology partners and Independent Software Vendors (ISVs) will benefit from the support, capability, and tools brought by hyperscalers in developing new solutions, with the opportunity to sell intellectual property (IP) and integrate functionalities. Depending on the type of channel partnership, the partner may sell their CSP's product or service in its original form (Reseller), as a bundle with a sum greater than its parts (Value-Added Reseller or VAR), as a new combined system (System Integrator or SI), or as an ongoing service that complements a partner's product or service (Managed Service Provider or MSP).[37]

As such, the emergence of local partnerships will generate revenue from a full suite of service offerings ranging across resale, cloud consulting services, proprietary cloud management software and service add-ons, skills development, distribution, supporting hardware, networking, and IT services. For example, in 2020, the AWS Marketplace and AWS Data Exchange was launched in the UAE and Bahrain to further enable the partner community in the Middle East. The two platforms provide an avenue for Independent Software Vendors (ISVs), data providers, and consulting partners based in the UAE and Bahrain to access and sell to AWS's millions of customers worldwide.

With a tremendous breadth and depth of features and services within the AWS ecosystem, AWS partners can help customers in adopting and integrating the best suited solutions for their businesses. To enable AWS partners to capitalise on this opportunity and serve customer needs better, AWS Training and Certification helps AWS Partners deepen their technical and business understanding of the AWS ecosystem and validate their AWS knowledge and skills through certifications. AWS currently offers 11 certifications covering both foundational and niche cloud computing topics.[38] These training programmes and certifications for individuals within AWS Partner organisations serve to better position and differentiate the organisation in front of customers, validating its expertise through its attainment of successive AWS Partner Tier levels.[39] With the launch of each AWS region, AWS provides thousands of professional Training & Certifications sessions to local SME employees to skill up, and help local vendors increase revenue opportunities.

37. Crossbeam (2020), "Partners 101: ISVs, VARs, SIs, MSPs, and the Glue that Holds them Together". Available at: https://www.crossbeam.com/blog/partnerships-101-isv-vs-var-vs-si-vs-msp-vs-oem/
38. Cloud Academy (2022), "The 11 AWS Certifications: Which is Right for You and Your Team?". Available at: https://cloudacademy.com/blog/choosing-the-right-aws-certification/
39. Amazon Web Services (n.d.), "AWS Services Partner Tiers". Available at: https://aws.amazon.com/partners/services-tiers/

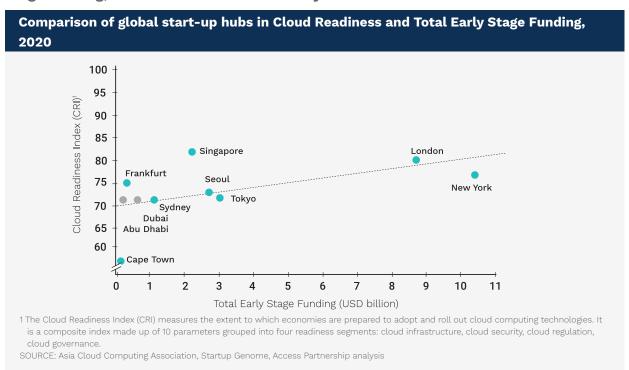## Securing UAE's global hub status as part of national objectives

The UAE is widely regarded as a regional hub for entrepreneurship, with 35.5 percent of MENA start-ups basing their operations in the UAE.[40] The UAE is not stopping there and has expressed ambition to become home to 20 unicorns by 2031, and solidifying its position as a top destination for international investment and skilled talent in the Gulf.[41] Most notably, the UAE has attained its objective of being ranked first globally in the Global Entrepreneurship Index in 2022, up from fourth in 2021.[42]

Analysing hub dynamics and economies of concentration worldwide, there is a mutually reinforcing effect between hyperscale data centre infrastructure and digital innovation, serving as fundamental drivers for each other's growth and expansion. A major regional data centre presence is one of the key factors start-ups, investors, and skilled talent consider when choosing to operate in a particular geography.

As seen in Exhibit 2, countries such as the U.S., the United Kingdom (U.K.), Singapore, and South Korea that score higher on the Cloud Readiness Index (CRI, which measures the extent to which economies are prepared to adopt and roll out cloud computing technologies), tend to have cities with start-ups that attract more early-stage funding relative to the two major cities in the UAE (i.e., Abu Dhabi and Dubai).[43] Silicon Valley attracts 470 times and 48 times more in early-stage funding compared to Abu Dhabi and Dubai respectively, which is a testament to high concentrations of both quality local and foreign start-ups and venture capital inflows in countries with higher CRI.

■ EXHIBIT 2

Higher cloud readiness is essential to position as a start-up hub and attract early-stage funding, for unicorns and wider ecosystem benefits

Comparison of global start-up hubs in Cloud Readiness and Total Early Stage Funding, 2020

1 The Cloud Readiness Index (CRI) measures the extent to which economies are prepared to adopt and roll out cloud computing technologies. It is a composite index made up of 10 parameters grouped into four readiness segments: cloud infrastructure, cloud security, cloud regulation, cloud governance.

SOURCE: Asia Cloud Computing Association, Startup Genome, Access Partnership analysis

40. TradeArabia (2020), "UAE 'remains regional hub for entrepreneurship'." Available at: https://www.zawya.com/mena/en/business/story/UAE_remains_regional_hub_for_entrepreneurship-SNG_166819669/.
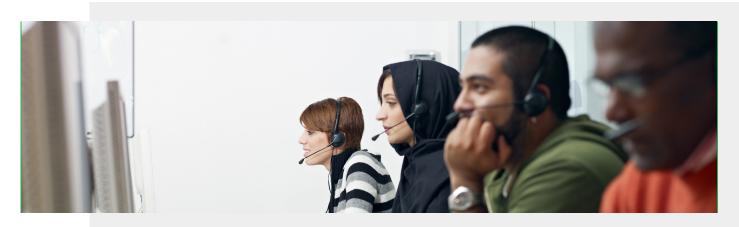41. KhaleejTimes (2021), "UAE eyes 20 unicorns by 2031". Available at: https://www.khaleejtimes.com/start-ups/uae-eyes-20-unicorns-by-2031
42. Sources include TradeArabia (2020), "UAE 'remains regional hub for nrateprneeurship'." Available at: https://www.zawya.com/mena/en/business/story/UAE_remains_regional_hub_for_entrepreneurship-SNG_166819669/; and KhaleejTimes (2022), "UAE ranks 1st in Global Entrepreneurship Index 2022". Available at: https://www.khaleejtimes.com/business/uae-ranks-1st-in-global-entrepreneurship-index-2022
43. Sources include Asia Cloud Computing Association (2020), *Cloud Readiness Index 2020.* Available at: https://www.digitalcentre.technology/wp-content/uploads/2020/06/CRI2020_ACCA_Final.pdf; and Startup Genome (2021), The Global Startup Ecosystem Report 2021. Available at: https://startupgenome.com/report/gser2021

Moreover, countries that perform better on the CRI also tend to have cities with greater cloud availability and capabilities in AI, Big Data, Analytics and Fintech, which are offered by hyperscalers.[44] They also appear in the top 30 cities in terms of start-up ecosystem attractiveness in the Global Start-up Ecosystem Report 2021, indicating that the availability of cloud and supporting data centre infrastructure are important factors in attracting foreign start-ups.[45]

A robust digital infrastructure can also contribute to greater ecosystem effects that serve to reinforce the value offering of the UAE. According to Essam Disi, Director of Strategy & Policy at Dubai SME, Dubai is seeing a lot of tech-related start-ups choosing not only to be based in Dubai, but to also scale up and test their products and solutions, with soft landing services facilitating that process. "Besides simply investment, innovative start-ups in Europe and the United States are also attracted by the opportunity to test the proof of concept with different demographics, as well as experiment and collaborate with the support of government entities, such as the Dubai Health Authority for healthcare start-ups." The government also made a concerted effort to develop coding skills in the country's workforce and attract coders from abroad to build a strong base of coders for the UAE's ambitions towards developing AI. The UAE launched Coders HQ in January 2022, in partnership with 40 local and multinational companies including hyperscalers. The HQ offers advanced technological infrastructure including event spaces, workspaces, and a supercomputer.[46] As such, the presence of hyperscale regional data centres and associated cloud adoption will support the UAE government's ambitions in digitalisation and the development of subsector strengths in AI.

Hyperscale Cloud Infrastructure Helps the UAE Achieve Strategic Ambitions and Future-proof Its Data Needs

The UAE government's medium-term transformative plans, such as the Dubai Autonomous Transportation Strategy and Dubai 3D Printing Strategy, require a robust digital infrastructure and access to cloud.[47] The Dubai Autonomous Transportation Strategy aims to automate 25 percent of the total transportation in Dubai by 2030.[48] Additionally, the government identified a number of promising sectors such as agricultural technology (agritech), fintech and renewable energy.[49] The growth of these sectors is premised on the development of a digital economy with its associated infrastructure. These key policy objectives, which involve greater technology adoption, are expected to increase data volumes.

44. Sources include Kevin Imboden (2022), *Global Data Centre Market Comparison*. Cushman & Wakefield's Data Centre Advisory Group. Available at: https://cushwake.cld.bz/2022-Global-Data-Center-Market-Comparison/12/; and Startup Genome (2021), The Global Startup Ecosystem Report 2021. Available at: https://startupgenome.com/report/gser2021
45. Startup Genome (2021), *The Global Startup Ecosystem Report 2021*. Available at: https://startupgenome.com/report/gser2021
46. Khaleej Times (2022), "UAE launches Coder HQ with supercomputer to facilitate work; 6 more hubs coming soon". Available at: https://www.khaleejtimes.com/uae/uae-launches-coder-hq-with-supercomputer-to-facilitate-work-6-more-hubs-coming-soon
47. The UAE Government (2021), "2021-2030". Available at: https://u.ae/en/more/uae-future/2021-2030
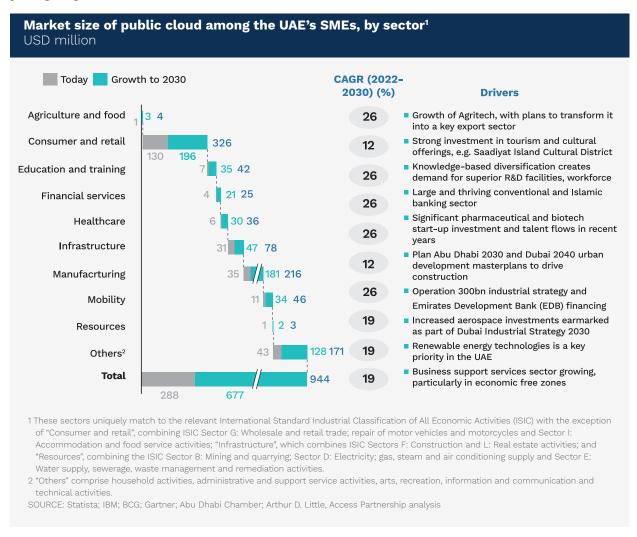48. The UAE Government (2021), "Dubai Autonomous Transportation Strategy". Available at: https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/local-governments-strategies-and-plans/dubai-autonomous-transportation-strategy
49. UAE Ministry of Economy (2021), "Promising Economic Sectors". Available at: https://www.moec.gov.ae/en/promising-sectors

The value of public cloud data services used by SMEs in the UAE could grow by three times, from USD 270 million (AED 980 million) in 2022 to over USD 940 million (AED 3.5 billion) in 2030 (Exhibit 3).[50] Out of all the sectors analysed, education, financial services and healthcare are expected to see the largest annual increase in cloud demand at 26 percent. This is expected considering the rising numbers of innovative SMEs and start-ups setting up in the UAE in the fields of education technology (edtech), financial technology (fintech), pharmaceutical and biotechnology (biotech).[51] While consumer, retail, and business support service sectors have the largest concentrations of SMEs, they are expected to grow more moderately in terms of cloud demand as businesses adjust to digitalisation needs. However, these sectors are expected to exert a strong impact on overall cloud demand by 2030.[52]

■ EXHIBIT 3

In UAE, SMEs' use of cloud data services will grow 3x by 2030, linked to key policy objectives

Market size of public cloud among the UAE's SMEs, by sector[1]
USD million

Sector	Today	Growth to 2030	Total	CAGR (2022-2030) (%)	Drivers
Agriculture and food	1	3	4	26	Growth of Agritech, with plans to transform it into a key export sector
Consumer and retail	130	196	326	12	Strong investment in tourism and cultural offerings, e.g. Saadiyat Island Cultural District
Education and training	7	35	42	26	Knowledge-based diversification creates demand for superior R&D facilities, workforce
Financial services	4	21	25	26	Large and thriving conventional and Islamic banking sector
Healthcare	6	30	36	26	Significant pharmaceutical and biotech start-up investment and talent flows in recent years
Infrastructure	31	47	78	12	Plan Abu Dhabi 2030 and Dubai 2040 urban development masterplans to drive construction
Manufacrturing	35	181	216	26	Operation 300bn industrial strategy and Emirates Development Bank (EDB) financing
Mobility	11	34	46	19	Increased aerospace investments earmarked as part of Dubai Industrial Strategy 2030
Resources	1	2	3	19	Renewable energy technologies is a key priority in the UAE
Others[2]	43	128	171	19	Business support services sector growing, particularly in economic free zones
Total	288	677	944	19	

1 These sectors uniquely match to the relevant International Standard Industrial Classification of All Economic Activities (ISIC) with the exception of "Consumer and retail", combining ISIC Sector G: Wholesale and retail trade; repair of motor vehicles and motorcycles and Sector I: Accommodation and food service activities; "Infrastructure", which combines ISIC Sectors F: Construction and L: Real estate activities; and "Resources", combining the ISIC Sector B: Mining and quarrying; Sector D: Electricity; gas, steam and air conditioning supply and Sector E: Water supply, sewerage, waste management and remediation activities.

2 "Others" comprise household activities, administrative and support service activities, arts, recreation, information and communication and technical activities.

SOURCE: Statista; IBM; BCG; Gartner; Abu Dhabi Chamber; Arthur D. Little, Access Partnership analysis

50. Access Partnership estimates. Public cloud services spending by SMEs in the UAE was estimated by multiplying the overall public cloud service market by the share of spend by commercial customers, and then by the share of IT spending by SMEs. Sources include International Data Corporation (2021), "United Arab Emirates Public Cloud Market 2020 Analysis and 2021–2025 Forecast". Available at: https://www.idc.com/getdoc.jsp?containerId=META48197721; TechChannel (2021), "Public cloud services spending in META to reach $11.6b in 2025 from $3.7b in 2020". Available at: https://www.techchannel.news/09/07/2021/public-cloud-services-spending-in-meta-to-reach-11-6-in-2025-from-3-7b-in-2020/;   International Data Corporation (2019), "Report: Cloud and digital service providers fuel ICT spending". Available at: https://www.fiercetelecom.com/telecom/report-cloud-and-digital-service-providers-fuel-ict-spending; and Gartner (2017), "SMBs Spending Big on IT! Are They Spending Right?". Available at: https://blogs.gartner.com/anthony_bradley/2017/11/01/smbs-are-spending-big-on-it-are-they-spending-right/
51. Diligencia (2019), *SMEs in the UAE*. Available at: https://f.hubspotusercontent40.net/hubfs/4190844/diligencia-gulf-capital-sme-awards-report.pdf
52. Diligencia (2019), *SMEs in the UAE*. Available at: https://f.hubspotusercontent40.net/hubfs/4190844/diligencia-gulf-capital-sme-awards-report.pdf

03 RECOMMENDATIONS TO MAXIMISE THE POTENTIAL BENEFITS OF HYPERSCALE CLOUD IN THE UAE

To truly become a global start-up and innovation hub, Access Partnership has identified recommendations that highlight the importance of collaboration between the government and the private sector

So far, this report has analysed how hyperscale cloud computing can bring about significant economic benefits for the UAE's SMEs and start-ups as they kickstart their digitalisation journey, while enabling local companies to be part of a global ecosystem and enhancing the UAE's status as a global start-up and innovation hub. Access Partnership has identified the following recommendations for the UAE government to fully achieve this potential. Firstly, we recommend that UAE government organisations lead the way in digital transformation and technology adoption, creating the demand that can be served by the UAE's SMEs, start-ups, and technology partners. This requires harmonizing and simplifying digital and data regulations on the federal and emirate levels, in addition to the implementation of a risk-based data classification system that enables government organisations to improve data security, and facilitate technology adoption. Secondly, we encourage the UAE government to work with the private sector and technology companies to bridge the digital skill gap through digital training and upskilling programmes, building the foundations for a digitally enabled local workforce that can take the lead in innovation and entrepreneurship. Finally, we recommend increased collaboration between regulators and technology companies to ensure current and future regulations do not hinder widespread technology adoption. Technology companies can provide insights on emerging and future technologies, and how they can be impacted by regulation.

EXHIBIT 4

Three enabling factors will enable the UAE to become a global start-up and innovation hub, creating a domino effect for growth

Lead the way in digital transformation

Address skills-related gaps

Collaborate with technology companies

1 These sectors uniquely match to the relevant International Standard Industrial Classification of All Economic Activities (ISIC) with the exception of "Consumer and retail", combining ISIC Sector G: Wholesale and retail trade; repair of motor vehicles and motorcycles and Sector I: Accommodation and food service activities; "Infrastructure", which combines ISIC Sectors F: Construction and L: Real estate activities; and "Resources", combining the ISIC Sector B: Mining and quarrying; Sector D: Electricity; gas, steam and air conditioning supply and Sector E: Water supply, sewerage, waste management and remediation activities.
2 "Others" comprise household activities, administrative and support service activities, arts, recreation, information and communication and technical activities.
SOURCE: Statista; IBM; BCG; Gartner; Abu Dhabi Chamber; Arthur D. Little, Access Partnership analysis

APPENDIX ◥

Key Terminology

Definition of Small-and-Medium Enterprises (SMEs) and Start-ups

Definitions for micro, small, and medium-sized enterprises (MSMEs) vary significantly across countries and even within a particular country. In 2016, Cabinet Resolution No. 22 was published, which sets out the 'unified' definition of an SME, in UAE law.[53] This report largely follows that definition, which pertains to the two metrics of employment headcount and annual turnover.[54] The Resolution distinguishes between enterprises operating in the services, trading, and manufacturing sectors as follows (Exhibit A1):

■ EXHIBIT A1

Hyperscale cloud can bring USD 17.1 billion in economic benefits and 133,000 jobs for UAE's SMEs and start-ups from 2022 to 2030

Economic benefits from hyperscale cloud for UAE's SME and start-ups, 2022-2030 USD billion[1]	**Services**	**Trading**	**Manufacturing**
Micro Enterprise	• Less than 5 employees; or • Less than AED 2 million annual revenues	• Less than 5 employees; or • Less than AED 3 million annual revenues	• Less than 9 employees; or • Less than AED 3 million annual revenues
Small Enterprise	• 6 – 50 employees; or • Less than AED 20 million annual revenues	• 6 – 50 employees; or • Less than AED 50 million annual revenues	• 10 – 100 employees; or • Less than AED 50 million annual revenues
Medium Enterprise	• 51 – 200 employees; or • Less than AED 200 million annual revenues	• 51 – 200 employees; or • Less than AED 250 million annual revenues	• 101 – 250 employees; or • Less than AED 250 million annual revenues

1. These estimates do not represent GDP or market size (revenue), but rather economic impact, including GDP increments, productivity gains, cost savings, time savings, increased revenues, increased wages and increased tax collection.
2. These enabled jobs account for the direct employment impact (demand for additional employment due to revenue gains), indirect employment impact (supply chain and supporting industries) and induced employment impact (multiple rounds of household spending that ripple through the economy).
SOURCE: Access Partnership analysis

53. Mondaq (2016), "United Arab Emirates: SMEs in the UAE". Available at: https://www.mondaq.com/corporate-and-company-law/530664/smes-in-the-uae
54. The SME definition in Dubai maintains some slight variations. Dubai SME (2019), *The State of Small & Medium Enterprises (SMEs) in Dubai*. Available at: https://sme.ae/SME_File/Files/SME%20REPORT%202019.pdf.

For the purposes of this report, start-ups are defined as rapidly scalable business ventures with the aim of innovating, improving, or transforming the current way of doing things.[55] This definition includes both the 'start-up' and scaleup phases of the business lifecycle when companies exhibit high revenue and headcount growth while refining and delivering their value proposition. We place greater emphasis on technology-driven start-ups – companies with technology-enabled business models and a focus on hyperconnectivity between networks, people, businesses, things, and hardware.[56]

We utilise the following definition of an entrepreneurial ecosystem:

'A set of interconnected entrepreneurial actors, organisations (e.g. firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies), and entrepreneurial processes (e.g. the business establishment, growth, levels of 'blockbuster entrepreneurship', number of serial entrepreneurs, degree of sell-out mentality within firms and levels of entrepreneurial ambition) which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment.'[57]

Cloud Service Models (IaaS, PaaS, SaaS)

Cloud services are infrastructure, platforms, or software hosted by third-party providers and made available to users through the internet, facilitating user data flows from front-end clients, through the internet, to the provider's systems, and back.[58] Typically provided on a subscription pricing model, three cloud service models dominate the landscape today, namely Infrastructure-as-a-service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS).

IaaS provides users with computer, networking, and storage resources without the need to own expensive on-premises investments in IT infrastructure. The cloud service provider (CSP) detaches computing capabilities from its own managed hardware components – e.g., processing power from central process units (CPUs), active memory from random access memory (RAM) chips, or data storage availability from data centres for provision to users. One example of an IaaS offering is Amazon Web Services (AWS) Elastic Compute Cloud (EC2).

PaaS provides on-demand access to online environments where users (e.g., application developers) can develop code or run apps – otherwise known as cloud platforms. The platform, for instance AWS Elastic Beanstalk, is managed by the CSP and housed on the CSP's IT infrastructure and requires additional levels of development to incorporate technologies like containerisation, orchestration, application programming interfaces (APIs), routing, security, management, and automation.

SaaS provides users with a software application hosted remotely on the CSP's IT infrastructure and running on the CSP's platform.[59] Users (e.g., business professionals) can access software applications on demand using a web browser or application, such as online collaboration tools and customer relationship management (CRM) software like Slack and Salesforce.

55. Schumpeter J. (1942), *Capitalism, Socialism, and Democracy.* New York: Harper & Bros.
56. OC&C (2018), *Tech Entrepreneurship ecosystem in the United Arab Emirates.* Available at: https://www.occstrategy.com/media/1898/tech-entrepreneurship-ecosystem-in-the-united-arab-emirates.pdf
57. Collin Mason and Ross Brown (2014), *Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship.* OECD LEED. Available at: https://www.oecd.org/cfe/leed/entrepreneurial-ecosystems.pdf
58. RedHat (2019), "What are cloud services?" Available at: https://www.redhat.com/en/topics/cloud-computing/what-are-cloud-services
59. BSA (2018), *Moving to the Cloud: A Primer on Cloud Computing.* Available at: https://www.bsa.org/files/reports/2018BSA_MovingtotheCloud.pdf

Data Residency vs Data Sovereignty vs Data Localisation

The terms 'data residency', 'data sovereignty', and 'data localisation' are sometimes used interchangeably, but are fundamentally three degrees of increasing magnitude of how data privacy constrains cross-border data flows.[60]

Data residency refers to the country in which an organisation specifies that their data is stored, usually for regulatory, policy and commercial reasons, such as tax benefits. Data sovereignty differs from data residency in that not only is the data stored in a designated location, but it is also subject to the laws of the country in which it is physically stored. This difference is crucial, as data subjects (any person whose personal data is being collected, stored, or processed) will have different privacy and security protections according to where the data centres housing their data are physically located.

Methodology

These estimates quantify the total benefits between 2022 and 2030 from hyperscale public cloud for SMEs and start-ups in the UAE. To obtain the incremental benefit each year, the general approach is to multiply three components: (1) the potential benefit each year in the hypothetical event of full cloud adoption, (2) multiplied by the projected cloud adoption level each year based on the projected growth in public cloud spending by consensus industry estimates; (3) the additional percentage benefit of hyperscale public cloud over other cloud deployment types.

The next few sections will demonstrate how each type of economic benefit in the event of full cloud adoption is calculated.

Productivity boosts and Cost savings (e.g., IT infrastructure costs, IT staff efficiency gains)

To estimate the total sales of SMEs that use on-premises infrastructure but are not on the cloud, we used the gross value-added contribution of SMEs in the UAE, the value-added ratio to sales at a national aggregated level, and the estimated proportion of such SMEs.[61] Next, we estimated the IT infrastructure costs by multiplying the estimated total sales of these SMEs by the average proportion of IT expenditure as a percentage of sales for SMEs, and subsequently by the share of spend dedicated to IT hardware infrastructure.[62] Cost savings were then calculated based on AWS' analysis of IT infrastructure cost savings from cloud migration.[63]

Using the percentage of SMEs with at least one dedicated IT employee and proportion of SMEs that use on-premises infrastructure but are not on cloud, we estimated the number of IT staff that would be impacted by enhanced productivity through cloud computing.[64] This staff figure constitutes a conservative estimate because some of these SMEs may employ more than one full-time IT employee. Manhour savings were derived using average industry estimates of efficiency gains across IT support,

60. McAfee (2021), "Data Localisation – The Magic Bullet?". Available at: https://www.mcafee.com/blogs/enterprise/data-security/data-localisation-the-magic-bullet/

61. Multipliers calculated from national IO tables. Sources include The Entrepreneurial Nation (2021), SME digitalisation for productive and resilient economies. Available at: https://theentrepreneurialnation.com/wp-content/themes/moetheme/tcpdf/SME_Digitization_White_Paper.pdf; and KGM & Associates (2022), Eora National IO Tables. Available at: https://worldmrio.com/countrywise/

62. Sources include The Entrepreneurial Nation (2021), *SME digitalisation for productive and resilient economies.* Available at: https://theentrepreneurialnation.com/wp-content/themes/moetheme/tcpdf/SME_Digitization_White_Paper.pdf; TechVera (2020), "How Much Should a Company Spend on IT?". Available at: https://techvera.com/how-much-should-a-company-spend-on-it/; SWZD (2021), The 2022 State of IT. Available at: https://swzd.com/resources/state-of-it/#:~:text=While%20hardware%20will%20continue%20to,2020%20to%2030%25%20in%202022.

63. Amazon Web Services (2020), *Cloud Value Benchmarking Study Quantifies the Benefits of Cloud Adoption.* Available at: https://pages.awscloud.com/rs/112-TZM-766/images/cloud-value-benchmarking-study-quantifies-cloud-adoption-benefits.pdf

64. Dubai SME (2019), *The State of Small & Medium Enterprises (SMEs) in Dubai.* Available at: https://sme.ae/SME_File/Files/SME%20REPORT%202019.pdf.

application development and management, and system administration.[65] By multiplying the average annual pay of IT system administrators in the UAE and accounting for projected real wage annual growth in the ICT sector, we tabulated the benefits of higher IT staff productivity from the use of cloud computing.[66] Based on labour efficiency and utilization of SMEs on cloud, we conservatively assume a 10 percent cost saving for hyperscale public cloud compared to private cloud.[67]

We also tabulated the number of employees in SMEs not using cloud services using the SME share of the private workforce as well as the share of SMEs not on the cloud.[68] To be conservative, we leveraged multiple industry reports estimating the percentage impact of cloud computing on employee productivity, and applied the lower end of the range, to calculate manhour savings. We then proxied the average annual pay of SME employees in the UAE using both total employees and total compensation paid to workers in Dubai-based SMEs, which is likely to be a slightly higher estimate of average SME compensation across the UAE. Multiplying annual manhour savings in the form of full-time equivalents by the annual SME pay, we arrive at business productivity benefits from the adoption of cloud computing.

Revenue boosts (from scaling up markets and products)

Potential cloud adopters are defined as those who use on-premises infrastructure but are not on cloud, or do not employ any dedicated IT resources (which include many micro-enterprises). To estimate the total sales of these potential cloud adopters, we break down the gross value-added contribution of these SMEs in the UAE by business size and utilise the value-added ratio to sales at a national aggregated level.[69] Using average industry estimates of the impact of cloud computing and related digitalisation on revenue growth, we sized the revenue boosts, accounting only for the value-added impact on profits and salaries, to prevent duplication with other sizing components (cloud user costs may overlap with cloud service partner revenue gains).[70] We conservatively estimate hyperscale cloud to comprise 50 percent of this revenue boost.

With the potential final demand supported by hyperscale cloud computing driven by increased revenues for businesses adopting cloud services, we applied a value-added Type II multiplier to also account for direct, indirect and induced employment effects from additional spending by industries supplying intermediate inputs and households.[71] The employment coefficient (number of jobs per USD million of GDP) and the SME share of non-oil jobs in UAE were applied to the multiplied sizing, before accounting

65. Sources include IDC (2020), *Fostering Business and Organizational Transformation to Generate Business Value with Amazon Web Services.* Available at: https://pages.awscloud.com/rs/112-TZM-766/images/AWS-BV%20IDC%202018.pdf; McKinsey (2021), "Cloud's trillion-dollar prize is up for grabs". Available at: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/clouds-trillion-dollar-prize-is-up-for-grabs
66. Payscale (2021), "Average Systems Administrator Salary in United Arab Emirates". Available at: https://www.payscale.com/research/AE/Job=Systems_Administrator/Salary/65bd04fd/Dubai
67. 451 Research (2021), *The Economic Case for Hybrid Cloud.* Available at: https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/products/cloud-foundation/vmw-451-research-the-economic-case-for-hybrid-cloud.pdf
68. Sources include Government of the United Arab Emirates (2020), "Small and Medium Enterprises (SMEs)". Available at: https://u.ae/en/information-and-services/business/small-and-medium-enterprises/small-and-medium-enterprises; Statista (2020), "Number of employed persons in the private sector in the United Arab Emirates from 2016 to 2020". Available at: https://www.statista.com/statistics/1148070/uae-number-of-private-sector-employees/; and The Entrepreneurial Nation (2021), SME digitalisation for productive and resilient economies. Available at: https://theentrepreneurialnation.com/wp-content/themes/moetheme/tcpdf/SME_Digitization_White_Paper.pdf.
69. Multipliers calculated from national IO tables. Sources include Dubai SME (2019), *The State of Small & Medium Enterprises (SMEs) in Dubai.* Available at: https://sme.ae/SME_File/Files/SME%20REPORT%202019.pdf; and KGM & Associates (2022), Eora National IO Tables. Available at: https://worldmrio.com/countrywise/
70. Multipliers calculated from national IO tables. Sources include McKinsey (2017), The case for digital reinvention. Available at: https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20case%20for%20digital%20reinvention/The-case-for-digital-reinvention-vF.pdf; Deloitte (2018), *Economic and social impacts of Google Cloud.* Available at: https://www2.deloitte.com/content/dam/Deloitte/es/Documents/tecnologia/Deloitte_ES_tecnologia_economic-and-social-impacts-of-google-cloud.pdf; KGM & Associates (2022), *Eora National IO Tables.* Available at: https://worldmrio.com/countrywise/

for projected cloud adoption rates and productivity gains between 2022 and 2030 tampering actual job creation during this period.[72]

Partner Gains

We project the initial number of AWS Partners that will enter the market upon the opening of the data centres in 2022 based on industry estimates. Projected growth for the number of partners in the UAE is calculated from the UAE's estimated share of global partner growth for AWS.[73] Average annual revenue growth for partners is proxied from Access Partnership's internal analysis of typical revenue ratios between hyperscale providers and their ecosystem partners. Value added from cloud service partner revenue gains are calculated by multiplying the number of partners with the average annual revenue growth per partner, and then accounting only for the value-added impact on profits and salaries, to prevent duplication with other sizing components (cloud user costs may overlap with cloud service partner revenue gains).[74]

Carbon Reduction

We estimate the energy expenditure of an SME using typical on-premises IT infrastructure by the average number of employees of SMEs (correlated to business size), average ratio of servers to deployed Personal Computers (PCs) to total employees and average daily energy consumption of a small business server.[75] To estimate the total carbon reduction from SME cloud migration, the number of SMEs using on-premises infrastructure, comparative energy savings reaped by hyperscale data centres on a percentage basis and the local electricity emission factor (relating carbon emissions to energy consumption) was applied.[76]

Operational Resilience Impact

To estimate the number and cost of security incidents averted due to cloud migration, we used global statistics of the percentage of SMEs experiencing security incidents encompassing data loss or exposure due to targeted attacks and its associated costs, and AWS' estimation of the percentage reduction of such security incidents due to cloud migration.[77]

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71. Multipliers calculated from national IO tables. KGM & Associates (2022), Eora National IO Tables. Available at: https://worldmrio.com/countrywise/

72. Sources include Federal Competitiveness and Statistics Centre (2020), National account. Available at: https://fcsc.gov.ae/_layouts/download.aspx?SourceUrl=%2Fen-us%2FLists%2FDStatisticsSubjectV2%2FAttachments%2F1391%2F%D8%AA%D9%82%D8%AF%D9%8A%D8%B1%D8%A7%D8%AA_%D8%A7%D9%84%D8%AD%D8%B3%D8%A7%D8%A8%D8%A7%D8%AA_%D8%A7%D9%84%D9%82%D9%88%D9%85%D9%8A%D8%A9_2010_2020.xlsx; Statista (2021), "Number of employed persons in the United Arab Emirates in 2019, by economic sector". Available at: https://www.statista.com/statistics/638515/uae-total-number-of-workforce-by-economic-sector/; and UAE Govt (2021), "The impact of SMEs on the UAE's economy". Available at: https://u.ae/en/information-and-services/business/crowdfunding/the-impact-of-smes-on-the-uae-economy#:~:text=According%20to%20Ministry%20of%20Economy,of%20the%20private%20sector's%20workforce

73. Channel Partner Insight (2020), "AWS – 'We have more than 50 new partners joining every single day' ". Available at: https://www.channelpartnerinsight.com/news/4024537/aws-partners-joining-single-day

74. Multipliers calculated from national IO tables. Sources include McKinsey (2017), *The case for digital reinvention.* Available at: https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20case%20for%20digital%20reinvention/The-case-for-digital-reinvention-vF.pdf; Deloitte (2018), Economic and social impacts of Google Cloud. Available at: https://www2.deloitte.com/content/dam/Deloitte/es/Documents/tecnologia/Deloitte_ES_tecnologia_economic-and-social-impacts-of-google-cloud.pdf; and KGM & Associates (2022), Eora National IO Tables. Available at: https://worldmrio.com/countrywise/

75. Sources include Dubai SME (2019), *The State of Small & Medium Enterprises (SMEs) in Dubai.* Available at: https://sme.ae/SME_File/Files/SME%20REPORT%202019.pdf; Applied Computer Research (2011), Identifying IT Markets and Market Size By Number of Servers. Available at: https://www.missioncriticalmagazine.com/ext/resources/MC/Home/Files/PDFs/WP_ACR-IT-Server-Market.pdf; and MTG (2021), "How much does a server cost for small & medium businesses (UK)". Available at: https://www.manxtechgroup.com/how-much-will-a-server-cost-uk/

76. Sources include GulfBusiness (2021), "UAE businesses keen to embrace hybrid cloud: report". Available at: https://gulfbusiness.com/uae-businesses-keen-to-embrace-hybrid-cloud-report/; 451 Research (2021), *The Carbon Reduction Opportunity of Moving to the Cloud for APAC.* Available at: https://d1.awsstatic.com/institute/The%20carbon%20opportunity%20of%20moving%20to%20the%20cloud%20for%20APAC.pdf; and Carbon Footprint (2020), Country Specific Electricity Grid Greenhouse Gas Emission Factors. Available at: https://www.carbonfootprint.com/docs/2020_06_emissions_factors_sources_for_2020_electricity_v1_1.pdf

77. Sources include Kaspersky (2016), "Report: Measuring the Financial Impact of IT Security on Businesses". Available at: https://usa.kaspersky.com/blog/security_risks_report_financial_impact/#:~:text=Main%20findings&text=Average%20annual%20spending%20on%20security,%241M%2B%20for%20large%20companies.&text=The%20average%20cost%20of%20recovery,and%20%24861k%20for%20enterprises; and Amazon Web Services (2020), Cloud Value Benchmarking Study Quantifies the Benefits of Cloud Adoption. Available at: https://pages.awscloud.com/rs/112-TZM-766/images/cloud-value-benchmarking-study-quantifies-cloud-adoption-benefits.pdf