

# Google Cloud Region: Driving Higher Economic Activity in the Qatari Economy



## DRIVING ECONOMIC ACTIVITY

The Google Cloud Region is estimated to contribute a cumulative **USD18.9 billion** in higher gross economic output in Qatar between 2023 and 2030.

## JOB CREATION

The increased economic activity driven by the Google Cloud Region in Qatar is estimated to support the creation of **25,000** jobs in 2030 alone.

## SUPPORTING SMALL BUSINESS GROWTH

Google's Cloud services eliminates the need for customers to own or operate physical data centers and servers by themselves, supporting the growth ambitions of micro, small and medium-sized enterprises (MSMEs) in Qatar, which make up **97% of all registered private sector companies**.

## PROMOTING SUSTAINABILITY

Migration of on-premise data centres to Google Cloud would enable organisations to reduce their energy consumption and associated emissions – hyperscale data centres are **5 times less carbon intensive**.

## ENABLING INNOVATION

Google's Cloud services support **the use of innovative tools such as AI and ML in various sectors**, including in the public sector, healthcare, energy, and FinTech industries.

## BOOSTING PRODUCTIVITY FOR SMALL BUSINESSES

By 2030, the increase in cloud adoption by micro and small businesses is estimated to **lift productivity by up to 3.5%** in that year.

The Google Cloud Region lifts gross economic output in Qatar through its investments in the construction and ongoing operations of Google Cloud infrastructure; the revenue opportunities it creates for its partner ecosystem; and the spillover effects from increased economy-wide production enabled by the productivity gains to businesses and the public sector that use Google Cloud Services.

Accelerated adoption of Google's Cloud services by businesses and the public sector will drive efficiency gains, cost savings, risk mitigation, and support greater scalability. These effects will enable business and government to produce the same output for fewer inputs, and help free up resources to be reinvested into other productive uses. The greater efficiency of firms and government enable the overall output of the economy to increase – thereby lifting productivity of the economy and contributing to economic growth. The estimates of the productivity gains to businesses and the government from adopting Google Cloud services contribute directly to higher GDP.

Google's Cloud services also facilitate more efficient delivery of public services, and could also support broader benefits, including addressing challenges around sustainability, enabling innovation to deliver social impact, and supporting small business growth.

**The Google Cloud region in Qatar is estimated to contribute a cumulative USD18.9 billion in higher gross economic output between 2023 and 2030 (equivalent to 11% of 2021 real GDP), and support the creation of 25,000 jobs in 2030 alone.**

The productivity gains from increased adoption of Google's Cloud services will contribute to economic growth and employment. These effects will benefit both businesses as well as consumers, who will enjoy cost savings and improved quality on products and services, and real wage growth.

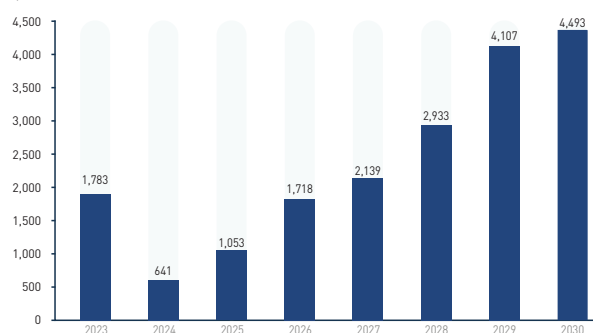
Productivity gains allow businesses to free up resources for broader investment. This effect, in addition to real wage growth driving higher consumption, will increase the demand for labour – supporting job creation.

#### EXHIBIT 1

The Cloud Region will contribute US\$18.9 billion to Qatar's gross economic output between 2023 and 2030

Gross economic output driven by Google Cloud Region

US \$ million

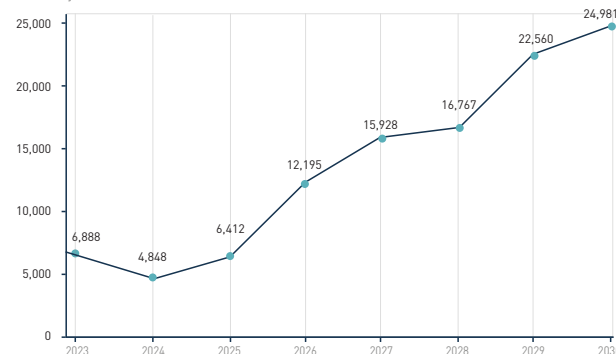


SOURCE: Access Partnership analysis

Economic activity driven by the Cloud Region will support the creation of 25,000 jobs in 2030 alone

Annual jobs supported by higher economic activity driven by Google Cloud Region

Total FTE jobs



SOURCE: Access Partnership analysis



**Google Cloud can promote sustainability by reducing energy use through cloud storage.**

In October 2021, Qatar announced a national climate change action plan, which included targets to reduce greenhouse gas emissions by 25% by 2030.<sup>1</sup> Migration of on-premise data centres to Google Cloud would enable organisations to reduce their energy consumption and associated emissions. Hyperscale data centres are 5 times less carbon intensive to operate than internal data centres.<sup>2</sup>



**By 2030, use of Google's cloud services by the Qatari public sector would facilitate greater efficiency of service delivery.**

Google Cloud adoption by the public sector will enable more efficient delivery of public services. By reducing costs in the public sector, resources in the economy would be freed up and redeployed for more productive uses. More efficient delivery of public services would also lead to better outcomes for citizens, such as in health. For instance, increased investment in cloud technologies in 2030 is estimated to contribute to more efficient delivery of public health services that is equivalent to an increase in annual public health spending of around 1 percent.

<sup>1</sup> Reuters (2021), Qatar targets 25% cut in greenhouse gas emissions by 2030 under climate plan. Available at: <https://www.reuters.com/business/cop/qatar-targets-25-cut-greenhouse-gas-emissions-by-2030-climate-change-plan-2021-10-28/>

<sup>2</sup> Hessam, L. (2022), Measuring greenhouse gas emissions in data centres: the environmental impact of cloud computing. Available at: <https://www.climateiq.io/blog/measure-greenhouse-gas-emissions-carbon-data-centres-cloud-computing>



**Google's Cloud services support the use of innovative tools such as AI and ML in various sectors, including in the public sector and FinTech industry.**

#### **CASE STUDY:**



#### **Supporting digital transformation of the Qatari government<sup>3</sup>**

Google Cloud is partnering with the Ministry of Communications and Information Technology (MCIT) to deploy cloud technologies in the public sector. Under the MCIT Framework Agreement, all government entities can leverage Google Cloud technologies such as data and analytics, Artificial Intelligence (AI) and Machine Learning (ML), in their line of work. Digitalization of the public sector is an essential part of Qatar's digital roadmap, and is expected to accelerate the process of digital transformation in the private sector.

#### **CASE STUDY:**



#### **Empowering fintech companies with digital transformation tools**

The Qatar Financial Center Authority (QFC) will collaborate with Google Cloud to build an innovation platform targeted at the financial services industry. The platform, once up, will support more than 70 fintech companies operating under QFC in their adoption of emerging technologies such as Artificial Intelligence (AI) and Machine Learning (ML). Through this platform, fintech companies will gain access to Google Cloud technologies.



**Google Cloud Platform can support small business growth.**

Google Cloud Platform provides an IT infrastructure solution that is scalable with the growth ambitions of micro, small and medium-sized enterprises (MSMEs) in Qatar, which comprise 97% of registered private sector companies.<sup>4</sup> It eliminates the need for customers to own or operate physical data centres and servers by themselves, which can be cost-prohibitive particularly for MSMEs who often face financial and skill gaps.

Micro-and small businesses are likely to benefit even more from cloud adoption – the increase in Cloud adoption by 2030 is estimated to lift productivity in that year by up to 3.5% more than otherwise.<sup>5</sup> More broadly, Google Cloud Platform will provide MSMEs with greater access to technology and help put digitalised MSMEs in a better position to benefit from the potential gains, in line with the Qatar National Vision 2030.

<sup>3</sup> MCIT (2023), MCIT and Google Cloud Brief Government Agencies on the Framework Agreement for Cloud Computing Services. Available at: <https://mcit.gov.qa/en/media-center/news/mcit-and-google-cloud-brief-government-agencies-framework-agreement-cloud>

<sup>4</sup> Business Start-up (2022), SMEs are key contributors to Qatar's economy. Available at: <https://www.businessstartupqatar.com/news/smes-key-contributors-qatar-economy/>

<sup>5</sup> Gal, P., Nicoletti, G., Renault, T., Sorbe, S., & C. Timiliotis (2019), Digitalisation and productivity: In search of the holy grail Firm-level empirical evidence from European countries, OECD Working Paper No. 1533.

## METHODOLOGY

This methodology differs from methodologies used in previous studies by Access Partnership to analyze the impact following the launch of Google Cloud Regions around the world. This new methodology extends the scope of previous studies to be more comprehensive, going beyond productivity impacts to also capture the economic spillover effects from higher production activity as well as the benefits to the Google Cloud partner ecosystem. No proprietary data nor validation of the methodology or results were provided by Google.

The estimates of Google Cloud Region's impact on economic activity comprises three components: (1) increased economic contribution from the infrastructure construction and ongoing operations; (2) increased gross economic output enabled by higher productivity; and (3) revenue uplift for its ecosystem partners.

### 1 | ECONOMIC CONTRIBUTION OF INFRASTRUCTURE CONSTRUCTION AND ONGOING OPERATIONS.

The analysis is based on publicly available information. No proprietary data nor validation was provided by Google.

This component refers to the contribution of the construction and ongoing operations of Google Cloud Region infrastructure (for example, data center) to gross economic output (which is measured by the revenues of all firms) throughout the economy. The contribution from construction and operations of Google Cloud Region infrastructure is based on the profile of capital expenditure (CAPEX) and operating expenditure (OPEX) over the 2023-2030 period. CAPEX over the period is estimated based on publicly available data on historical investment sizes of Google Cloud data centers.<sup>6</sup> OPEX over the period is estimated based on a share of CAPEX, by applying industry standard assumptions on data center total lifetime costs.<sup>7</sup>

#### *Estimating the spillover effects*

The profile of CAPEX and OPEX are used as inputs into a multi-year Input-Output (IO) model for the Qatar economy. This will estimate the following effects between 2023 and 2030:

- Direct effects: Contribution attributed to the production activities of firms directly involved in the construction and ongoing operations of Google Cloud Region infrastructure.
- Indirect effects: Contribution attributed to the production activities of other firms along the supply chain of those firms directly involved, e.g., electricity generation.
- Induced effects: Contribution from the consumption activity of workers who earned an income by participating in the production activities of the directly and indirectly involved firms.

The Qatar national statistics office does not publish an IO Table, so a recent IO model for Qatar is estimated based on:

- Qatar (2005) IO model from the Global Trade Analysis Project (GTAP) Database, which is an adjusted Kuwait IO model; and
- Rest-Of-World (2014) IO model from the World Input-Output Database.

The result of this modelling is a measure of the direct, indirect, and induced contribution to gross output in the Qatar economy from the construction and ongoing operations of Google Cloud Region infrastructure. Gross Output is principally a measure of sales or revenue from production for most industries.<sup>8</sup>

### 2 | PRODUCTIVITY-ENABLED HIGHER PRODUCTION

The analysis is based on publicly available information. No proprietary data nor validation was provided by Google.

This component refers to the catalytic effects from use of Google Cloud Services by firms, which lifts their productivity, and in turn frees up resources to be deployed to other productive uses. This can enable these firms to increase output (i.e., revenues), and by doing so create spill over activity throughout their supply chain.

The catalytic effects are comprised of economy-wide impacts, with the analysis disaggregating the economy into four sectors. Three are subsectors of the private sector—manufacturing, financial services, and other services—while the fourth is the public sector. The decision to adopt this four-sector disaggregation reflects that the impact of technology adoption on productivity in each of these sectors will differ.

Productivity improvements relate to higher GDP insofar as greater technical efficiency enables private sector firms to produce higher levels of output for the same level of input, and earn higher incomes. On the other hand, public sector productivity is more difficult to measure, as public sector outputs can be intangible and may not have a market value. For the purposes of this analysis, public sector productivity improvements are reflected in a decline in the unit cost of delivering public sector outcomes. That is, should the quality of public sector outcomes remain unchanged, declines in the unit cost of delivering these outcomes reflect greater technical efficiency. The relationship to GDP in the case of public sector productivity improvements reflects an improvement in economy-wide allocative efficiency – resources that would otherwise be deployed in the public sector could be deployed in the private sector for more productive uses.

#### *Estimating the impact on private sector productivity and jobs*

Productivity in the private sector reflects the overall efficiency with which labour and capital inputs are used together in production. It is measured by changes in the amount of outputs for a given amount of inputs. Increases in the quality of inputs as well as changes in the way in which the inputs are combined for production, such as due to improvements in skills and technology, can lead to productivity growth. There have been various studies that have examined the relationship between technology use and productivity. Gal et. al. (2019) assesses how the adoption of a range of digital technologies affects firm-level productivity.<sup>9</sup> The findings of Gal et. al. (2019) provide evidence of a positive relationship.

The private sector productivity gains are estimated for a three-sector disaggregation of the economy – manufacturing, financial services, and other services. The distribution of productivity gains by sector is based on an assessment of the workforce automation potential of each sector. This is determined by mapping the degree of automation of the specific activities

<sup>6</sup> Zhang, M. (2022, September 12). Google Cloud's Data Center Locations: Regions and Availability Zones. Dgtl Infra. <https://dgtlinfra.com/google-cloud-data-center-locations/>

<sup>7</sup> Koomey, J., Brill, K., Turner, P., Stanley, J., & Taylor, B. (2007). A Simple Model for Determining True Total Cost of Ownership for Data Centers [White Paper]. Uptime Institute. [https://www.missioncriticalmagazine.com/ext/resources/MC/Home/Files/PDFs/\(TU13011B\)SimpleModelDeterminingTrueTCO.pdf](https://www.missioncriticalmagazine.com/ext/resources/MC/Home/Files/PDFs/(TU13011B)SimpleModelDeterminingTrueTCO.pdf)

<sup>8</sup> Bureau of Economic Analysis (2018, February 12). What is gross output by industry and how does it differ from gross domestic product (or value added) by industry?. <https://www.bea.gov/help/faq/1197>

<sup>9</sup> Gal, P., Nicoletti, G., Renault, T., Sorbe, S., & C. Timiliotis (2019). Digitalisation and productivity: In search of the holy grail Firm-level empirical evidence from European countries, OECD Working Paper No. 1533.

undertaken by all occupations within the workforce in each industry, based on the US Department of Labor O\*Net database.

The relationship between technology use and productivity is applied to projections of Cloud adoption by industries into the future, calculated based on IDC forecasts of expenditure, to estimate the productivity growth attributable to the private sector. The contribution of Google Cloud to this estimate is apportioned using a projected market share of Google Cloud.

#### ***Estimating the impact of public sector efficiency***

Productivity growth in the public sector is typically framed as improvements in the efficiency of delivering public sector outcomes, such as in health, a major area of government expenditure. Improvements in health outcomes in an economy have a relationship with GDP, based on an extensive body of literature. Improvements in health outcomes driven by more efficient public sector delivery are expected to generate productivity gains for the economy, e.g. increased workforce participation, reduced private health spending. Bloom et. al has also shown through an error-correction model that while a long-run relationship between health and GDP exists, convergence to the equilibrium is gradual in the short term.<sup>10</sup> An econometric analysis has been used to estimate the relationship between the government spending on ICT and the delivery of public health outcomes. This relationship is found to be positive, and applied to projections of public sector expenditure on Cloud into the future based on IDC forecasts of expenditure. The increase in health outcomes attributable to future increases in Cloud expenditure (a subset of ICT expenditure) is applied to estimates of the short-run relationship between health outcomes and GDP. The contribution of Google Cloud to this estimate is apportioned using the projected market share of Google Cloud. The equivalent health expenditure required to generate a similar improvement in health outcomes is also estimated. Given that this analysis only focuses on productivity gains arising from improvements in health outcomes, this is likely a conservative estimate of the impact of public sector efficiency.

#### ***Estimating Google's market share***

In the absence of a Cloud Region launch, Google's market share growth is assumed to experience a linear decline (from its historical CAGR) over the next 10 years. This is based on the rationale that market share growth slows as competition dynamics stabilize.

The launch of a Cloud Region will lead to an exponential market share growth for Google for the first two years of launch, fuelled by Google's more intensive marketing efforts, allowing it to gain an edge and increase market share rapidly. Following which, Google's market share growth remains the same as pre-launch. This assumes that marketing efforts by Google will become less intense and be on par with competitors after the first two years of launch.

#### ***Estimating the spillover effects***

The use of Google Cloud Services by firms lifts their productivity, which enables increased production activity. The latter is estimated using the historical relationship between Value Added and Gross Output in the economy. The profile of increased production activity is used as input into a multi-year IO model for the Qatar economy. The approach is equivalent to that described under "Economic Contribution of Infrastructure Construction and Operations".

### **3 | ECOSYSTEM PARTNER REVENUE BENEFITS**

The analysis is based on publicly available information. No proprietary data nor validation was provided by Google.

This component refers to the revenue benefits to Google Cloud Partners from sale of Google Cloud Services. The revenue benefits for Google Cloud partners are based on the multipliers estimated by IDC (2020).<sup>11</sup> The inputs into this estimation include estimates of public cloud spending in Qatar, and estimates of Google's share of cloud spending. These estimates are equivalent to that described under "Productivity-enabled Higher Production".

<sup>10</sup> Bloom, D., Canning, D. and Fink, G. (2009), Disease and development revisited. NBER Working Paper No. 15137.

<sup>11</sup> IDC (2022). Partner Opportunity in a Cloud World: How Partners Are Winning in the Google Cloud Economy. [https://www.ingrammicrocloud.com/lp/ca/en/google-cloud/idc\\_partner\\_opportunity\\_in\\_a\\_cloud\\_world.pdf](https://www.ingrammicrocloud.com/lp/ca/en/google-cloud/idc_partner_opportunity_in_a_cloud_world.pdf)