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

Access Partnership Google Cloud

### DRIVING ECONOMIC ACTIVITY

The Google Cloud Region is estimated to contribute a cumulative **USD109 billion** in higher gross economic output in Saudi Arabia between 2024 and 2030.

### JOB CREATION

The increased economic activity driven by the Google Cloud Region in Saudi Arabia is estimated to support the creation of **148,600 jobs** (arising from direct, indirect, and spillover economic activities) in 2030 alone.

### SUPPORTING SMALL BUSINESS GROWTH

Google Cloud services eliminate the need for customers to own or operate physical data centers and servers by themselves. Access to cloud computing will support the growth ambitions of **1.2 million small and medium-sized enterprises (SMEs).**[1]

### PROMOTING SUSTAINABILITY

Migration of on-premise data centers to Google Cloud can enable organizations to reduce their energy consumption and associated emissions – hyperscale data centers are **5 times less carbon-intensive**[2], supporting customers and partners to work towards their sustainability goals.

### ENABLING SKILLS DEVELOPMENT

Google Cloud services and training programs **promote human capital development** in Saudi Arabia.

### BOOSTING PRODUCTIVITY FOR SMALL BUSINESSES

By 2030, the increase use of cloud computing by small businesses is estimated to **improve business efficiency and lift productivity by up to 3.5%** in that year.[3]

**The Google Cloud Region in Saudi Arabia is estimated to contribute a cumulative USD109 billion in higher gross economic output between 2024 and 2030 (equivalent to 10% of 2022 real GDP), and support the creation of 148,600 jobs in 2030 alone.**

The Google Cloud Region lifts gross economic output in Saudi Arabia through (1) investments in the construction and ongoing operations of Google Cloud infrastructure; (2) the revenue opportunities created for its partner ecosystem; and (3) the spillover effects from increased economic output enabled by the productivity gains to businesses and the public sector that use Google Cloud Services. Increased production activity, in addition to real wage growth driving higher consumption, will increase the demand for labor—supporting job creation (Exhibit 1).

Accelerated adoption of Google Cloud services by businesses and the public sector will drive efficiency gains, cost savings, risk mitigation, and support greater scalability. These effects will enable businesses and the government to produce the same output with fewer inputs and help free up resources to be reinvested into other productive uses. The greater efficiency of firms and government will enable the overall output of the economy to increase – thereby lifting the 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.

[1] Monshaat (2023), SME Monitor: Monsha'at Quarterly Report Q1 2023. Available at: https://monshaat.gov.sa/sites/default/files/2023-05/Monshaat%20Q1%2023%20_EN.pdf

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

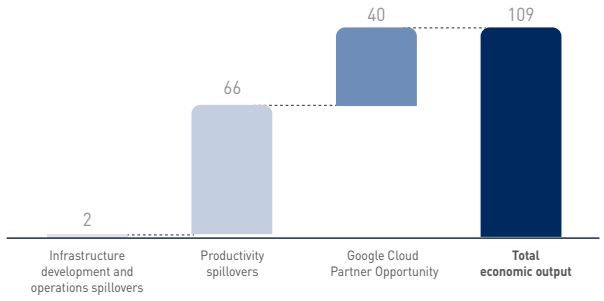
[3] Gal, P., Nicoletti, G., Renault, T., Sorbe, S., & C. Timiliotis (2019), Digitalisation and productivity: In search of the holy grail Firm-level empirical evidence from European countries, OECD Working Paper No. 1533.

EXHIBIT 1

The Cloud Region will contribute a cumulative USD109 billion to Saudi Arabia's gross economic output over 2024-2030

Breakdown of cumulative gross economic output driven by Google Cloud Region

USD billion

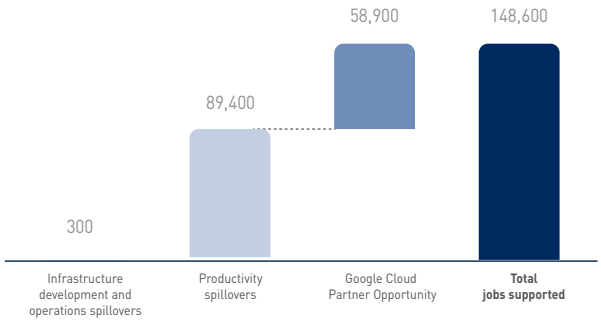



NOTE: Components may not sum due to rounding
SOURCE: IMF, OECD, National statistics offices, Access Partnership analysis

Economic activity driven by the Cloud Region will support 148,600 jobs in 2030 alone

Jobs supported in 2030 by higher economic activity driven by Google Cloud Region

Total FTE jobs




NOTE: Components may not sum due to rounding
SOURCE: IMF, OECD, National statistics offices, Access Partnership analysis

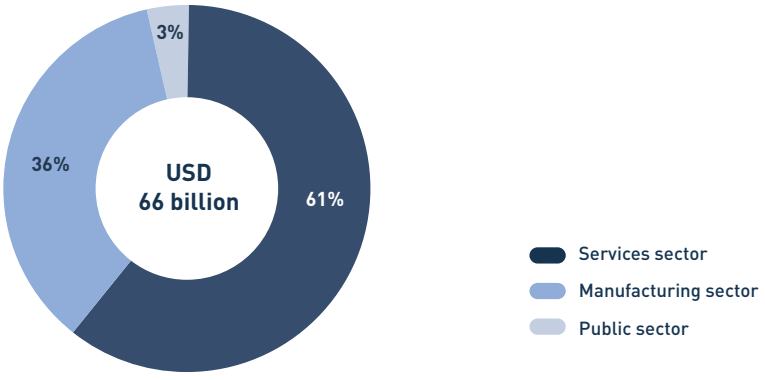
The services sector is expected to contribute almost two-thirds (61%) of the estimated increase in economy-wide production activity arising from cloud-enabled productivity gains, reflecting that the services sector comprises a large share of Saudi Arabia's economy (Exhibit 2). While the contribution of improved public sector service delivery to increased economy-wide production activity is relatively small, this is a conservative estimate, as this only reflects the effects arising from improvements in public health outcomes (see below). As public sector service delivery improves more broadly, its impacts are also expected to be larger and more broad-based.

EXHIBIT 2

Services sector productivity gains are the largest contributor to higher production activity

Cumulative increase in economy-wide production activity over 2024-2030 due to productivity spillovers

% contribution by sector




Notes: The services sector includes Wholesale and Retail Trade; Restaurant and Hotels; Transport, Storage and Communication; Finance, Insurance, Real Estate and Business Services; and Community, Social and Personal Services.
SOURCE: Access Partnership analysis

## By 2030, the use of Google Cloud services by the Saudi Arabian public sector would facilitate greater efficiency of public sector service delivery.

The adoption of Google Cloud 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 healthcare. For instance, increased investment in cloud technologies by 2030 is estimated to contribute to more efficient delivery of public health services equivalent to an increase in annual public health spending of around **USD890 million.**

## Google Cloud Region will create new opportunities for its partners.

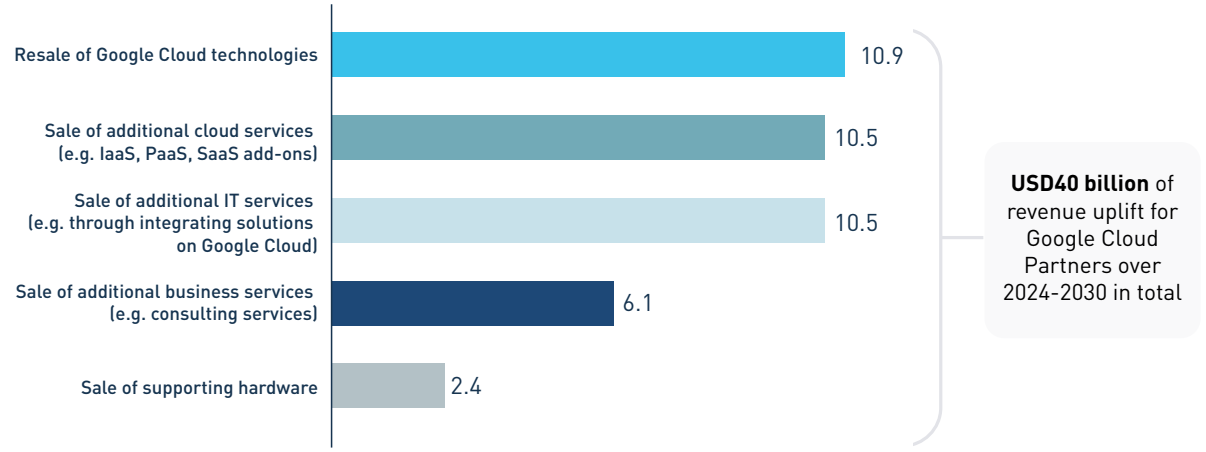
The accelerated adoption of public cloud due to the establishment of the Google Cloud Region also creates opportunities for the Google Cloud partner ecosystem. Google Cloud partners are expected to benefit from revenue uplift through the resale of Google Cloud technologies, the sale of additional cloud services, as well as by offering clients additional IT services (Exhibit 3).

EXHIBIT 3

The Google Cloud Region enables partners to earn higher revenues due to increased cloud adoption

Cumulative revenue uplift opportunities for Google Cloud partners over 2024-2030, by partner activity

USD billion




NOTE: Components may not sum due to rounding
SOURCE: Access Partnership analysis

## Google Cloud and its training programs help support a digital-ready and inclusive workforce.

### CASE STUDY: Google Cloud

**Developing human capital in Saudi Arabia [4]**

In 2022, Google Cloud launched the Center of Excellence (CoE) in Saudi Arabia to provide training and certification in cloud technologies. The CoE offers free courses in artificial intelligence, machine learning, application and infrastructure modernization, which are open to professionals of all ages. The CoE provides cloud skills training programs that empower local talent with the latest knowledge and tools required to drive a digital transformation roadmap. The CoE has delivered over 25 training programs and learning initiatives since its launch, and it continues to welcome training cohorts and provide cloud certification programs.

### CASE STUDY: SDAIA

**Empowering women with cloud skills [5]**

To better support the development of cloud in Saudi Arabia, Google Cloud is partnering with the Saudi Data and Artificial Intelligence Authority to train workers on cloud skills under the Elevate initiative. The initiative, launched during the Global AI Summit in Riyadh, will train more than 25,000 women over the next five years. These trainings equip women in the workforce with skills needed for various cloud roles, empowering more women to excel in the technology sector in Saudi Arabia.

[4] Zawya (2022), "Google Cloud launches center of excellence in Saudi Arabia to develop in-demand cloud skills in the Kingdom". Available at: https://www.zawya.com/en/press-release/companies-news/google-cloud-launches-center-of-excellence-in-saudi-arabia-to-develop-in-demand-cloud-skills-in-the-kingdom-fglgl035

[5] Arab News (2022), "Google Cloud partners with Saudi Aramco to launch a new data center in the Kingdom: Top official". Available at: https://www.arabnews.com/node/2168906/business-economy

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

In October 2021, Saudi Arabia announced a national climate change action plan, which included targets to achieve net zero emissions by 2060.[6] Migration of on-premise data centers to Google Cloud would enable organizations to reduce their energy consumption and associated emissions. Hyperscale data centers are 5 times less carbon-intensive to operate than on-premise data centers.[7]

## Google Cloud Platform can support small business growth.

Google Cloud provides an IT infrastructure solution that is scalable with the growth ambitions of the 1.2 million small and medium-sized enterprises (SMEs) in Saudi Arabia.[8] It eliminates the need for customers to own or operate physical data centers and servers by themselves, which can be cost-prohibitive, particularly for SMEs who often face financial and skill gaps.

Small businesses are likely to benefit even more from cloud adoption – the increase in cloud adoption by 2030 is estimated to improve business effciency and lift productivity in that year by up to 3.5%.[9] More broadly, the Google Cloud will provide SMEs with greater access to technology and and help better position SMEs to benefit from the potential productivity gains from adopting cloud services, in line with the Saudi Arabia Vision 2030.

[6] Reuters (2021), " Top oil exporter Saudi Arabia targets net zero emissions by 2060". Available at: https://www.reuters.com/business/cop/saudi-arabia-worlds-biggest-oil-exporter-unveil-green-goals-2021-10-23/

[7] Hessam, L. (2022), Measuring greenhouse gas emissions in data centres: the environmental impact of cloud computing. Available at: https://www.climatiq.io/blog/measure-greenhouse-gas-emissions-carbon-data-centres-cloud-computing

[8] Monshaat (2023), SME Monitor: Monsha'at Quarterly Report Q1 2023. Available at: https://monshaat.gov.sa/sites/default/files/2023-05/Monshaat%20Q1%2023%20_EN.pdf

[9] 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

The estimates of Google Cloud Region's impact on economic activity comprises three components: (1) increased economic contribution from the infrastructure construction and operations; (2) increased gross economic output enabled by higher productivity; and (3) revenue uplift for its ecosystem partners. No proprietary data nor validation was provided by Google.

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

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 the construction and operations of Google Cloud Region infrastructure is based on the profile of capital expenditure (CAPEX) and operating expenditure (OPEX) over the 2024-2030 period. CAPEX over the period is estimated based on publicly available data on historical investment sizes of Google Cloud data centers.[10] OPEX over the period is estimated based on a share of CAPEX, by applying industry standard assumptions on data center total lifetime costs.[11]

***Estimating the spillover effects***

The profile of CAPEX and OPEX are used as inputs into a multi-year Input-Output (IO) model for the country's economy. This will estimate the following effects between 2024 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 result of this modeling is a measure of the direct, indirect, and induced contribution to gross output in the country's 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.[12]

### 2 | PRODUCTIVITY-ENABLED HIGHER PRODUCTION

This component refers to the catalytic effects from the 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 spillover 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 labor 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.[13] 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 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.

[10] 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/

[11] 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/(TUI3011B)SimpleModelDeterminingTrueTCO.pdf

[12] 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

[13] 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.

***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. have 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.[14] An econometric analysis has been used to estimate the relationship between 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 country's economy. The approach is equivalent to that described under *"Economic Contribution of Infrastructure Construction and Operations"*.

**3 | ECOSYSTEM PARTNER REVENUE BENEFITS**

This component refers to the revenue benefits to Google Cloud Partners from the sale of Google Cloud Services. The revenue benefits for Google Cloud partners are based on the multipliers estimated by IDC (2020).[15] The inputs into this estimation include estimates of public cloud spending in the country and estimates of Google's share of cloud spending. These estimates are equivalent to that described under "Productivity-enabled Higher Production". The breakdown of revenue benefits by partner activity is then estimated based on the margin shares estimated by IDC (2020).[16]

[14] Bloom, D., Canning, D. and Fink, G, (2009), Disease and development revisited. NBER Working Paper No. 15137.

[15] 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

[16] 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