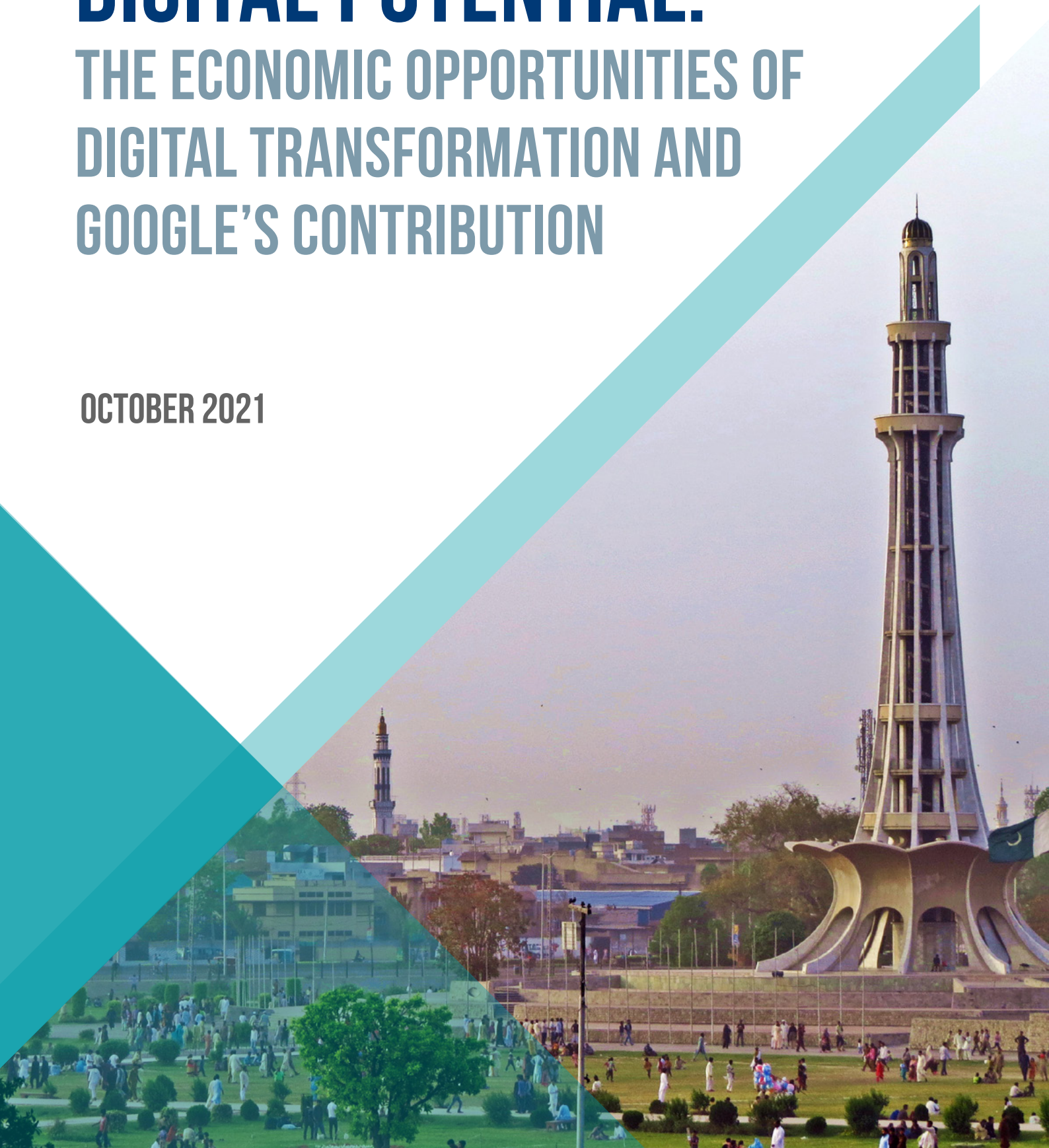
UNLOCKING PAKISTAN'S DIGITAL POTENTIAL:

THE ECONOMIC OPPORTUNITIES OF DIGITAL TRANSFORMATION AND GOOGLE'S CONTRIBUTION

αlphaβeta
strategy x economics

OCTOBER 2021



CONTENTS

UNLOCKING PAKISTAN'S DIGITAL POTENTIAL

BY 2030, IF LEVERAGED FULLY, DIGITAL TRANSFORMATION CAN CREATE UP TO...

PKR9.7 TRILLION (USD59.7 BILLION) in annual economic value[1]

THREE PILLARS OF ACTION

1 DEVELOP INFRASTRUCTURE TO SUPPORT THE LOCAL TECH ECOSYSTEM

2 CREATE A CONDUCIVE ENVIRONMENT FOR INFORMATION TECHNOLOGY (IT) EXPORTS

3 PROMOTE INNOVATION AND DIGITAL SKILLS

EXAMPLES OF GOOGLE'S CONTRIBUTIONS TO EACH PILLAR

Android (Go Edition) provides a lighter Android operating system to power affordable smartphones

YouTube enables Pakistani creators to export local content and reach international audiences

Over 40,000 Pakistani app and software developers participated in Google's Developer programmes in 2020

GOOGLE'S BROADER ECONOMIC BENEFITS

BUSINESSES

Google supports **PKR1 TRILLION (USD6.3 BILLION)** in annual benefits to businesses in Pakistan[2]

CONSUMERS

Google supports **PKR210.2 BILLION (USD1.3 BILLION)** in annual benefits to consumers in Pakistan[2]

SOCIETY

By enabling businesses to unlock new revenue streams and expand their businesses, Google indirectly supports **OVER 410,000 JOBS** in Pakistan. Its other initiatives, such as extending digital skilling opportunities to underrepresented communities, also provide intangible benefits to the wider society

1. Economic value refers to GDP increments, productivity gains, cost savings, time savings, increased revenues, increased wages and increased tax collection.
2. Figures are estimated based on the latest available annual data as at time of research in 2020

Note: Estimates are based on AlphaBeta analysis using a range of original and third-party sources. See Appendix for methodology.

EXECUTIVE SUMMARY

Pakistan's vibrant technology sector has grown significantly in recent years and is well-positioned for further growth. The country is home to more than 300,000 Information Technology (IT) professionals, produces over 25,000 IT graduates annually, has nurtured over 700 tech start-ups since 2010, and has the fourth-highest-earning IT workforce in the world.[1] In recent years, over 40 Pakistani start-ups have secured more than USD1 million in funding and the start-up ecosystem is on track to raise more than USD230 million in 2021.[2] Pakistan's technology sector also has a large export element, with annual revenue from exports of IT and IT-enabled Services (ITeS) accounting for over USD2.1 billion in 2021 – which has grown at around 15 percent per year since 2010.[3] In the past year alone, exports of IT and ITeS have increased by 47 percent.[4] Exports are expected to continue growing to reach USD3.5 billion in 2022.[5] Furthermore, the government has identified the creation of a holistic digital ecosystem – most prominently in its "Digital Pakistan Policy" – as one of the key levers of economic growth.[6]

Despite these significant achievements, the country can go further in its digital transformation journey. Pakistan's online population has grown rapidly at 68 percent per annum from 2016 to 2019, and the Internet penetration rate reached 54 percent in 2021.[7] The country faces several hurdles to full digital transformation. For example, the World Economic Forum's "Global Competitiveness Index 2019" ranked Pakistan as 73rd out of 141 countries on the ability of the active working population to possess and use digital skills.[8] Moreover, as one of the youngest countries in the world (about 60 percent of its

1. Sources include: Ministry of Information Technology & Telecommunication (2020), Pakistan's IT Industry Overview. Available at: http://www.moit.gov.pk/SiteImage/Misc/files/Pakistan%27s%20IT%20Industry%20Report-Printer.pdf. Board of Investment, Pakistan (2020), "Sector brief," Available at: https://invest.gov.pk/it-ites; McKinsey & Company (2019), Starting-up: Unlocking entrepreneurship in Pakistan. Available at: https://www.mckinsey.com/featured-insights/middle-east-and-africa/pakistans-start-up-landscape-three-ways-to-energize-entrepreneurship and Invest Pakistan (2021), "Information Technology". Available at: https://invest.gov.pk/it-ites

2. YouTube (2021), " Pakistan's Journey to Digital". Available at: https://www.youtube.com/watch?v=7mlSvA7MyWo

3. IT-enabled Services (ITeS) include services which leverage IT to improve or provide business operations. The Pakistani Government specifically includes the following services as ITeS: inbound or outbound call centres, medical transcription, remote monitoring, graphics design, accounting services, HR services, telemedicine centres, data entry operations, locally produced television programmes and insurance claims processing. The World Bank (2020), Digital Pakistan: A Business and Trade Assessment. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/33880/Digital-Pakistan-Economic-Policy-for-Export-Competitiveness-A-Business-and-Trade-Assessment.pdf; Pro Pakistani (2021), "Pakistan's IT Exports Cross $2 Billion Mark For The First Time". Available at: https://propakistani.pk/2021/07/19/pakistans-it-exports-cross-2-billion-mark-for-the-first-time/?__cf_chl_jschl_tk__=pmd_SeoE4W8QJwnBj0tAyOsGPC9EjRlf1N2ZSKVVql9QMHE-1629269849-0-gqNtZGzNAiWjcnBszQa9 and State Bank of Pakistan (2020), Export of Goods by Commodity / Country and Services by Type / Country. Available at: https://www.sbp.org.pk/departments/stats/Annual_Export_Receipt/FY20/4.pdf

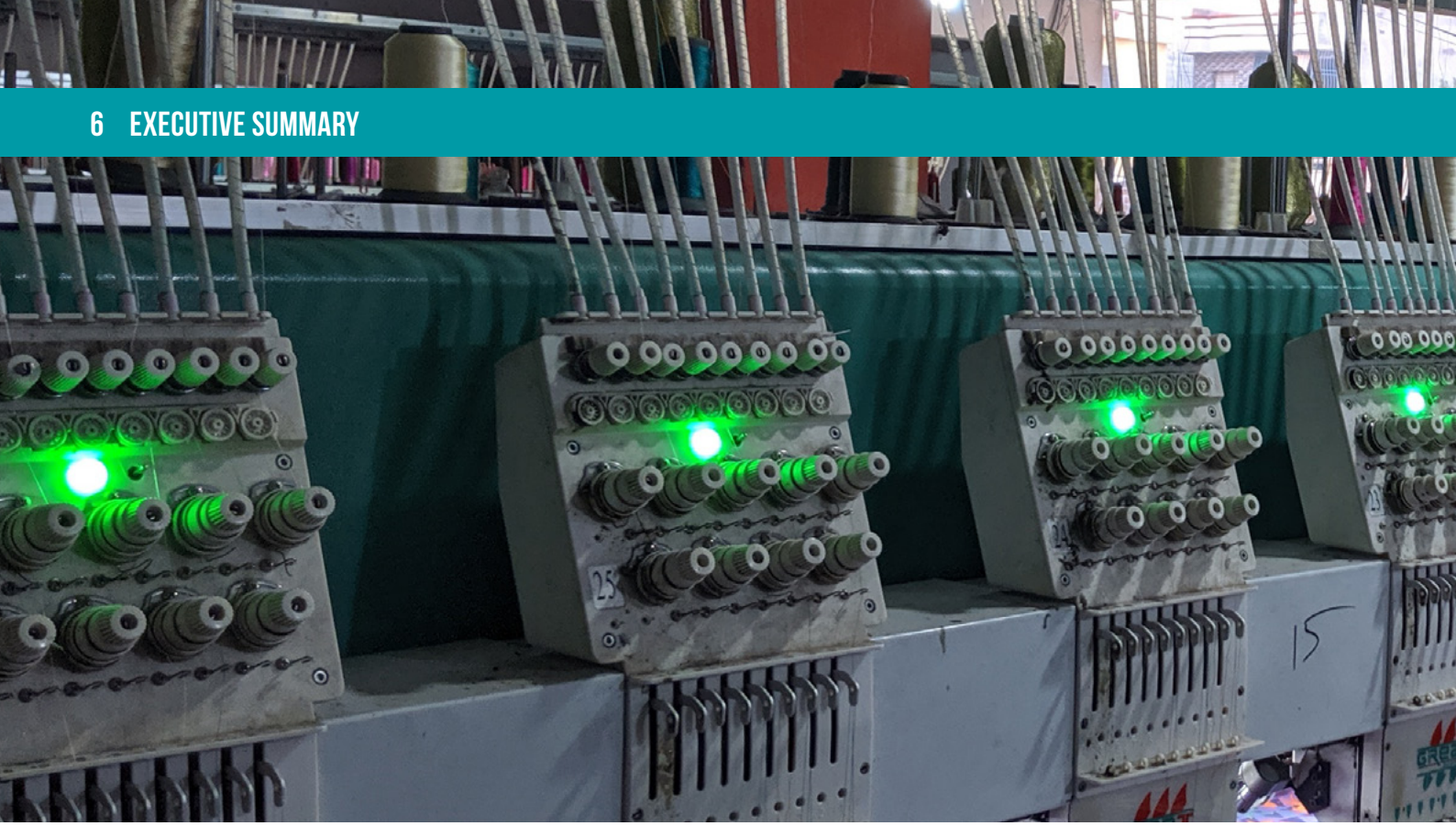
4. Pro Pakistani (2021), "Pakistan's IT Exports Cross $2 Billion Mark For The First Time". Available at: https://propakistani.pk/2021/07/19/pakistans-it-exports-cross-2-billion-mark-for-the-first-time/?__cf_chl_jschl_tk__=pmd_SeoE4W8QJwnBj0tAyOsGPC9EjRlf1N2ZSKVVql9QMHE-1629269849-0-gqNtZGzNAiWjcnBszQa9

5. Pro Pakistani (2021), "IT Exports Cross $1.5 Billion For The First Time". Available at: https://propakistani.pk/2021/04/24/it-exports-cross-1-5-billion-for-the-first-time/?__cf_chl_jschl_tk__=pmd_n3i3TC6gT09CcNkPbK8.91l.yA24.cUO8TqrAEMbvxw-1629272313-0-gqNtZGzNAiWjcnBszQnl

6. Ministry of IT and Telecom, Pakistan (2018), Digital Pakistan Policy. Available at: http://moib.gov.pk/Downloads/Policy/DIGITAL_PAKISTAN_POLICY(22-05-2018).pdf

7. Sources include: Think with Google (2019), "Digital is transforming consumer shopping behavior in Pakistan. Here's what that means for marketers". Available at: https://www.thinkwithgoogle.com/intl/en-apac/consumer-insights/consumer-journey/digital-is-transforming-consumer-shopping-behavior-in-pakistan-heres-what-that-means-for-marketers/; Datareportal (2020), "DIGITAL 2020: PAKISTAN". Available at: https://datareportal.com/reports/digital-2020-pakistan and YouTube (2021), "Pakistan's Journey to Digital". Available at: https://www.youtube.com/watch?v=7mlSvA7MyWo

8. World Economic Forum, (2019) "The Global Competitiveness Report 2019". Available at: http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf



population, based on Census 2017, is in the 15 to 29 age group), Pakistan must develop its digital skills base in order to fully harness its productive potential.[9] Ensuring that all firms benefit from digital skills is also important in Pakistan given that micro, small and medium enterprises (MSMEs) constitute 90 percent of all enterprises, employ 80 percent of the non-agricultural labour force, and contribute to 40 percent of national gross domestic product (GDP).[10]

Digital transformation will be important for Pakistan to address the long-term implications of the COVID-19 pandemic and gain long-term resilience. Globally, the pandemic has effectively pushed forward the digital revolution by five years, accelerating the need for digital adoption across countries. In Pakistan, digital transformation will be important to boost its economic recovery efforts and enhance the long-term resilience of businesses in adapting to future "black swan" events in the post-pandemic era.[11]

This report finds that digital transformation could deliver an annual economic value of PKR9.7 trillion (USD59.7 billion) by 2030.[12] To put this in perspective, this is equivalent to about 19 percent of Pakistan's GDP in 2020.[13]

The key messages of this report include:

- **Eight key technologies hold transformative potential for businesses and workers in Pakistan.** These include the mobile Internet; cloud computing; big data; artificial intelligence (AI); financial technology (Fintech); Internet of things (IoT) and remote sensing; advanced robotics; and additive manufacturing. By allowing the creation of new business models and productivity savings, these technologies could create significant economic value for Pakistan.

- **If leveraged fully, digital transformation can unlock PKR9.7 trillion (USD59.7 billion) worth of economic value in Pakistan by 2030.** By generating productivity gains, revenue boosts, cost savings and GDP increments, digital technologies can unlock up to PKR9.7 trillion (USD59.7 billion) worth of economic value annually in Pakistan's economy by 2030. The sectors projected to be

9. Ministry of IT and Telecom, Pakistan (2018), Digital Pakistan Policy. Available at: http://moib.gov.pk/Downloads/Policy/DIGITAL_PAKISTAN_POLICY(22-05-2018).pdf
10. Small and Medium Enterprises Development Authority (2020). Available at: https://smeda.org/index.php?option=com_content&view=article&id=2&Itemid=689
11. A black swan is an unpredictable event that is beyond what is normally expected of a situation and has potentially severe consequences. Examples include the current COVID-19 pandemic.
12. Economic value refers to GDP increments, productivity gains, cost savings, time savings, increased revenues, increased wages and increased tax collection.
13. Based on AlphaBeta analysis. See Appendix A for details on the methodology.

the largest beneficiaries are agriculture and food; consumer, retail and hospitality; and education and training.

- **Digital adoption is also crucial for the country to gain resilience in the post-pandemic future.** Beyond its immediate economic impacts, the COVID-19 pandemic is likely to have long-term implications in three aspects of Pakistan's economy, namely: 1) Severe disruptions to the business operations of MSMEs; 2) Travel restrictions threatening the survival of international tourism, and 3) Remote work driving growth in digital freelancing. By providing MSMEs access to global markets, boosting domestic tourism offerings and facilitating digital freelancing, technology applications can help businesses manage the long-term economic implications of the COVID-19 pandemic, while staying resilient against future "black swan" events.

- **Three pillars of action are required for Pakistan to fully capture its digital opportunity.** While Pakistan is already making progress in some areas, there is scope for the country to push further on its policy agenda.

  – First, it is crucial that the country ***develops the necessary infrastructure to support the local tech ecosystem***. Centred on accelerating the adoption of digital technologies, the country's "Digital Pakistan Policy" aims to enhance access and connectivity, improve the country's digital infrastructure, promote e-government services, equip the nation with digital skills, and promote innovation and entrepreneurship. However, the country could go further in two areas. Firstly, it could address existing gaps in the coverage of its digital infrastructure by increasing Internet availability through infrastructure investments, following the example of programmes like Thailand's "Net Pracharat," which expands broadband coverage to rural areas through a public-private partnership. Secondly, in tandem with its increasing adoption of emerging technologies such as cloud computing, the country could consider introducing data

policies to support the smooth delivery of government services.

- Second, the country should ***continue to create a conducive environment for IT export***. The Pakistan government is already very advanced in this regard and has a range of incentives in place to support freelancers and enterprises in the country to tap on growing global demand for IT services. For businesses to fully maximise the growing digital trade opportunity, policymakers can consider easing restrictive data policies that could hinder businesses from capturing productivity gains. A useful first step would be for Pakistan to establish baseline standards for personal data that are consistent with global norms. This should include aligning with tools and policy instruments – such as the APEC Cross-Border Privacy Rules – that are designed to enable transfer of personal data between legal jurisdictions. To encourage greater participation in digital trade, the country could participate in multilateral digital trade agreements such as the "Digital Economy Partnership Agreement" (DEPA) signed between Singapore, New Zealand and Chile to facilitate cross-border data flows.

- Third, the government could ***promote innovation and digital skills in the country***. To promote innovation and entrepreneurship, government agencies such as Punjab Information Technology Board (PITB) and Khyber Pakhtunkhwa Information Technology Board (KPITB) have introduced technology incubators and platforms such as the "Digital Youth Summit". While the start-up ecosystem has been growing, entrepreneurs still face several challenges such as the lack of access to financing. The Pakistani Government could consider various risk-sharing approaches from Hong Kong and South Korea to expand the funding options for start-ups. In addition, the government has placed a strong focus on equipping MSMEs and the current workforce with the digital skills required to access digital opportunities. By establishing physical "e-Rozgaar" centres, the provincial government of Punjab has equipped over 20,000 youths with professional skills in online freelancing. Through the "DigiSkills" initiative, the government has partnered with universities and industry leaders to deliver digital skills training, ranging from e-commerce to search engine optimisation, for over 750,000 people. While these initiatives are important steps towards enabling greater access to digital skills, the country could go further to forge close public-private partnerships and improve the relevance of skills training. The "Philippine Talent Mapping Initiative" that involves a country-wide mapping exercise of "21st-century skills" provides a positive example in this regard. Finally, Pakistan could leverage its strong foundation in IT education to cultivate digital talent for the local gaming industry, following the example of Vietnam.

- **Through its platforms and initiatives, Google is making significant contributions to Pakistan's digital transformation journey.** By introducing a lightweight operating system, Android (Go Edition), Google is helping people from lower socio-economic backgrounds participate in the digital economy and access the Internet. Through YouTube, local content creators such as Village Food Secrets can share their content with international audiences and amass huge popularity. Google has also launched multiple initiatives ranging from digital skilling programmes for MSMEs to Computer Science programmes in schools, support for the growing app developer and YouTube creator communities, and training programmes in emerging technologies like Machine Learning. Google's dedicated programmes for web and app developers, such as "Nest I/O" technology incubator to

the "Google Developer Groups", have reached over 40,000 people in 2020. In addition, its "Grow with Google" programme trained over 5,500 SMEs on how to leverage digital tools to support the development of a digitally skilled workforce.

Google's products also deliver wider benefits to businesses, consumers and the broader society in Pakistan. Businesses and consumers in Pakistan are estimated to derive annual economic benefits from these products worth **PKR1 trillion (USD6.3 billion)** and **PKR210.2 billion (USD1.3 billion)**, respectively.[14] These products include Google Search, Google Ads, AdSense, Google Play, Google Maps, YouTube, Google Drive, and Google Docs, Sheets and Photos.

For businesses, such benefits come in the form of increased revenue through better customer outreach and access to new markets, as well as improved productivity through time savings. Consumers experience greater convenience, access to information, and more avenues for learning and skills development opportunities. Beyond its economic contributions to businesses and individuals, Google also supports benefits to the broader society in Pakistan. By enabling businesses to unlock new revenue streams and expand their businesses through the use of Google Ads, AdSense, and YouTube, Google indirectly supports over 410,000 jobs in Pakistan.[15] Furthermore, Google delivers intangible benefits through its programmes, such as extending digital skilling opportunities to underrepresented communities and promoting safe Internet use.

14. Based on AlphaBeta analysis. See Appendix B for details on the methodology.
15. Jobs supported refer to new jobs that may have been created through a business' use of Google's platforms, as well as ongoing employment of jobs that previously existed.

SIZING THE PRIZE — THE ECONOMIC OPPORTUNITY OF DIGITAL TRANSFORMATION IN PAKISTAN

Digital transformation is not just about the technology sector – it affects every sector in Pakistan. Neglecting the impact of digital technology on traditional sectors like agriculture, healthcare, and banking would risk overlooking the full transformative impact of technologies. If leveraged fully, digital transformation can create up to PKR9.7 trillion (USD59.7 billion) worth of economic value annually in Pakistan by 2030. This is equivalent to about 19 percent of the country's GDP in 2020. The largest projected beneficiary of digital transformation in Pakistan is its agriculture and food sector, which is estimated to account for about 30 percent of the total economic value.

Digital adoption is also crucial for the country to manage COVID-19's implications and boost resilience in the post-pandemic future. By providing MSMEs access to diverse global markets through digital channels, boosting domestic tourism offerings with data analytics and virtual reality, facilitating digital freelancing, technology applications can help businesses manage the long-term economic implications of the COVID-19 pandemic.

"SIZING THE PRIZE"
THE ECONOMIC VALUE OF DIGITAL TRANSFORMATION

IF LEVERAGED FULLY, DIGITAL TRANSFORMATION CAN CREATE AN IMPACT OF UP TO...

PKR9.7 TRILLION (USD59.7 BILLION)

in annual economic value[1] in Pakistan by 2030 – this is equivalent to 19% of Pakistan's GDP in 2020

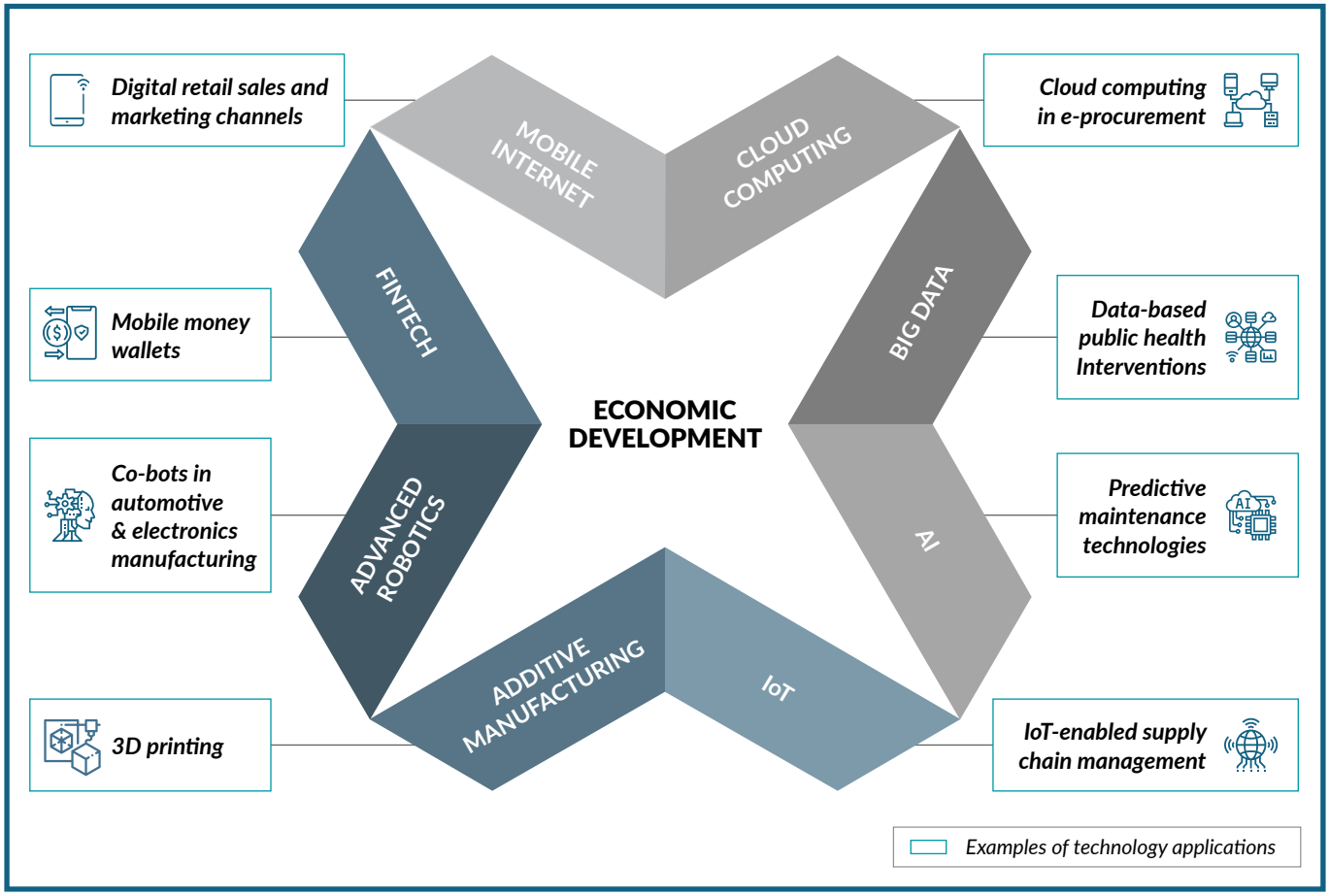
1. Economic value refers to GDP increments, productivity gains, cost savings, time savings, increased revenues, increased wages and increased tax collection.
Note: Figures are estimated based on the latest available annual data, (i.e., in 2019, or where available, more recent data spanning a 12-month period between 2019 and 2020). Estimates are based on AlphaBeta analysis using a range of original and third-party sources. See report's Appendix for methodology.

1.1 DIGITAL TRANSFORMATION CAN UNLOCK UP TO PKR9.7 TRILLION (USD59.7 BILLION) WORTH OF ECONOMIC VALUE IN 2030

Digital technologies can unlock significant economic value in Pakistan. In particular, eight key technologies hold transformative potential for the country (Exhibit 1). Box 1 shows an overview of these technologies and the potential each has for creating productivity boosts for businesses and workers in Pakistan. 43 technology applications – each mapping to one of the eight technologies – were identified across ten industry sectors. To assess the economic potential of digital transformation in Pakistan, the economic value of each technology application was estimated under a full adoption scenario in 2030 (Exhibit 2).[16]

EXHIBIT 1:

CURRENT RESEARCH REFLECTS EIGHT TRANSFORMATIVE TECHNOLOGIES WITH STRONG ECONOMIC POTENTIAL



16. The report considers the feasibility of the 43 technology applications in Pakistan and finds existing examples of adoption for most applications.

BOX 1.
EIGHT KEY TECHNOLOGIES WITH TRANSFORMATIVE POTENTIAL FOR PAKISTAN

Drawing upon an extensive range of literature on emerging technologies and their potential economic benefits, eight key technologies that hold transformative potential for workers, businesses and the government have been identified.[17] These include:

- **Mobile Internet.** The rapid rise of the smartphone and associated increase in mobile Internet penetration rates, which reached 76 percent in 2018, have accelerated the growth of Internet services worldwide.[18] While the number of active mobile phone subscribers and Internet penetration in Pakistan has been growing, the adoption of new business models such as the app economy, over-the-top (OTT) services and mobile-commerce (or "m-commerce"), has yet to see full adoption in the country.[19] These include the use of mobile telehealth applications in the healthcare sector, and the use of smartphone-based government e-services to streamline the delivery of public services.

- **Cloud computing.** Referring to the delivery of information technology (IT) resources over the Internet, cloud computing technologies allow individuals and entities to access technology services such as enhanced computing power, data storage and management tools on an as-needed basis. Buying, owning, and maintaining physical data centres and servers can be cost-prohibitive particularly for small and medium-sized enterprises (SMEs). In addition, public cloud hosting boosts productivity by providing tailored productivity tools, enabling improved security and making resources available on an on-demand basis. Cloud computing has also become essential for leveraging other technologies such as AI and machine learning.

- **Big data.** Big data, and the analysis of it, refers to the ability to analyse extremely large volumes of data, extract insights and act on them – often in or close to real-time. Predictive analytics can help workers and businesses analyse customer preferences more effectively to increase customer satisfaction. With the information derived from analytics, businesses can also design targeted programmes for customer engagement.

- **Artificial Intelligence (AI).** AI refers to the ability of software or hardware to exhibit human-like intelligence. This entails a set of technologies that enable computers to perceive, learn, reason and assist in decision-making to solve problems in ways that are similar to what people do.[20] Examples of AI applications include virtual assistants, autonomous vehicles and speech recognition tools.

- **Financial technology (Fintech).** Sometimes referred to as Digital Financial Services (DFS), Fintech has been instrumental in boosting the financial services sector through facilitating deposits, payments and providing individuals with access to more advanced financial products

17. Sources include: McKinsey Global Institute (2013), Disruptive technologies: Advances that will transform life, business, and the global economy. Available at: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/disruptive-technologies; Wilkinson (2019), "5 frontier technology trends shaping international development", Bond News. Available at: https://www.bond.org.uk/news/2019/06/5-frontier-technology-trends-shaping-international-development; Google and AlphaBeta (2020), The Digital Sprinters: Public policies to support economic development through digital technologies. Available at: https://alphabeta.com/our-research/the-digital-sprinters-capturing-a-us34-trillion-through-innovative-public-policy/

18. GSMA Intelligence (2019), Mobile Economic Impact: Pakistan. Available at: https://www.gsma.com/betterfuture/wp-content/uploads/2019/08/Mobile-Economic-Impact-2019-Pakistan.pdf

19. Pakistan Software Houses Association for IT & ITEs (2020), "Industry Stats". Available at: https://www.pasha.org.pk/knowledge-center/industry-stats/

20. Microsoft (2018), The future computed. Available at: https://blogs.microsoft.com/wp-content/uploads/2018/02/The-Future-Computed_2.8.18.pdf

such as loans, savings and investments. Moreover, by allowing for cashless payments, Fintech has also been responsible for driving greater growth in other sectors (e.g., retail).

- **Internet of Things (IoT) and remote sensing.** IoT systems relate to the network of physical objects ("things") that are embedded with sensors, software, and other technologies to connect and exchange data with other devices and systems over the Internet. These systems can monitor and manage the performance of the connected objects and machines.[21] IoT has several applications across sectors with significant economic potential: wearable devices can help monitor and maintain health and wellbeing thereby lowering public health expenditure; energy consumption can be monitored and optimised in buildings; equipment use can be enhanced, and the health and safety performance of factories improved.

- **Advanced robotics.** The advent of advanced robotics has allowed for an expanding range of tasks that robots can perform. Compared with conventional robots, advanced robots have superior perception, integrability, adaptability, and mobility.[22] These improvements permit faster setup, reconfiguration, as well as more efficient and stable operations. For instance, in the manufacturing sector, advanced robotics can increase productivity and flexibility in both the factory and the supply chain and enable producers to rapidly adjust to changing customer needs.

- **Additive manufacturing.** This relates to technologies that build 3D objects by adding layer upon layer of material. There is a range of potential benefits, such as the ability to handle complex, low-volume components where rapid turnaround is critical.[23]

21. MGI (2019), The rise of Digital Challengers – How digitisation can become the next growth engine for central and eastern Europe.
Available at: https://digitalchallengers.mckinsey.com/files/McKinsey%20CEE%20report_The%20Rise%20of%20Digital%20Challengers.pdf
Available at: https://www.bcg.com/publications/2019/advanced-robotics-factory-future
22. Boston Consulting Group (2019), Advanced robotics in the factory of the future.
Available at: https://www.bcg.com/publications/2019/advanced-robotics-factory-future
23. Sharp (2019), "Is additive manufacturing the right choice for your electronic assembly?" JJS Manufacturing Blog.
Available at: https://blog.jjsmanufacturing.com/additive-manufacturing-electronic-assembly

EXHIBIT 2:

43 DIGITAL TECHNOLOGY APPLICATIONS ACROSS 10 SECTORS WERE IDENTIFIED TO SIZE PAKISTAN'S ECONOMIC OPPORTUNITY FROM DIGITAL TRANSFORMATION

Agriculture & food
- Precision farming technologies
- IoT-enabled supply chain management
- Food safety technologies
- Real-time market information

Consumer, retail & hospitality
- Digital retail sales and marketing channels
- IoT-enabled inventory management
- Automation & AI customer service in hotels
- Data analytics on travel patterns
- Online F&B delivery channels

Education & training
- E-career centres and digital jobs platforms
- Personalised learning
- Online retraining programmes

Financial services
- Big data analytics
- Reg tech
- Digital banking services
- Mobile money wallets

Government
- E-services
- Cloud computing
- E-procurement
- Geographic Info. System enabled tax collection
- Data analytics for government transfer payments
- Digitisation of government payments

Health
- Remote patient monitoring
- Telehealth applications
- Data-based public health Interventions
- Detection of counterfeit pharmaceutical drugs
- Smart medical devices
- Electronic medical records

Infrastructure
- Smart grids
- 5D BIM & project management technologies
- Predictive maintenance technologies
- Smart buildings

Manufacturing
- Big data analytics
- Additive manufacturing
- IoT-enabled supply chain management
- Automation & robotics

Resources
- Smart exploration and automation in mining operations
- Predictive safety technologies
- Predictive maintenance technologies

Transport services
- Smart roads
- Smart ports
- Autonomous vehicles
- Geospatial services

Key technologies:

- *Mobile Internet*
- *Fintech*
- *Advanced robotics*
- *Additive manufacturing*
- *Cloud computing*
- *Big Data*
- *AI*
- *IoT*

It is estimated that **digital technologies have the potential to create an annual economic value of PKR9.7 trillion (USD59.7 billion) in Pakistan by 2030.**[24] This is equivalent to 19 percent of Pakistan's GDP in 2020 (Exhibit 3).

The agriculture & food sector is projected to be technology's largest economic beneficiary in Pakistan. This sector is estimated to be able to gain annual economic benefits of up to PKR3 trillion (USD18.2 billion) in 2030 – amounting to about 30 percent of the country's total digital opportunity.[25] Other top sector beneficiaries include consumer, retail & hospitality (PKR1.2 trillion or USD7.2 billion); education & training (PKR1.1 trillion or USD7.0 billion); financial services (PKR1.1 trillion or USD6.8 billion); and health (PKR0.8 trillion or USD5 billion sectors).[26]

The key opportunities in these sectors are as follows:

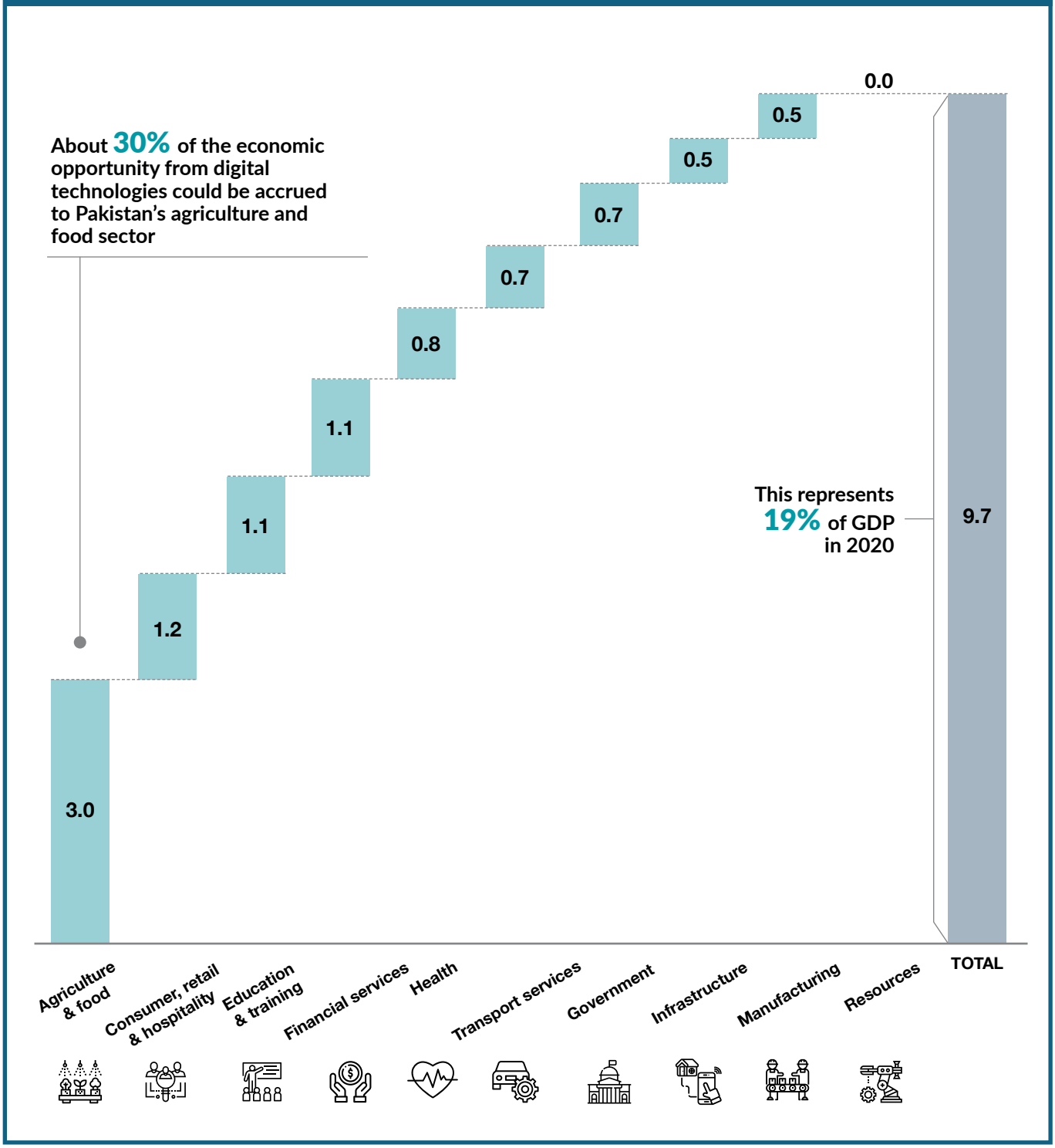
- **Agriculture & food.** There is vast potential for technology applications such as big data analytics, IoT-enabled supply chain management, and advanced robotics to boost value-add in the agriculture & food sector. For example, machine learning algorithms have shown significant promise in the sector. Aqua Agro is a Pakistani start-up that has come up with an AI-powered solution for farmers to yield more crops with reduced water resources by monitoring ecological conditions and determining whether crops need irrigation or not.[27] In addition, digital technologies are being used to fill the information gap among farmers about agricultural inputs and credit. For instance, Ricult is an online platform that empowers farmers by giving them access to credit, weather forecasts, and timely price updates, allowing farmers to overcome financial and social constraints.[28] Similarly, the Punjab Information Technology Board developed the "Agriculture Marketing Information Service" – a web platform that provides real-time market information on agricultural commodities.[29]

24. 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.
25. Based on AlphaBeta analysis. See Appendix A for details on the methodology.
26. Based on AlphaBeta analysis. See Appendix A for details on the methodology.
27. ThinkML (2019), "Pakistani startup using Artificial Intelligence to help farmers." Available at: https://thinkml.ai/pakistani-startup-using-ai-to-help-farmers/
28. MIT Technology Review (2019), "Digital farmhand." Available at: https://www.technologyreview.com/2019/06/26/134571/digital-farmhand/
29. Directorate of Agriculture (Economics and Marketing) Punjab, "AMIS". Available at: http://www.amis.pk/

EXHIBIT 3:

BY 2030, DIGITAL TECHNOLOGIES COULD SUPPORT UP TO PKR9.7 TRILLION (USD59.7 BILLION) OF ANNUAL ECONOMIC IMPACT IN PAKISTAN

POTENTIAL ANNUAL ECONOMIC VALUE FROM DIGITAL TECHNOLOGIES, BY SECTOR[1]
PKR TRILLION, 2030



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. In this analysis, 43 technology applications are considered.

Note: Numbers may not sum due to rounding.

SOURCE: AlphaBeta analysis

- **Consumer, retail and hospitality.** In the retail sector, the productivity gains experienced by businesses from marketing and selling goods through digital channels are estimated to range from six to 15 percent.[30] These arise as a result of being able to reduce labour requirements, harness inventory efficiencies, and cutting real estate costs (e.g., rental of shop space). For example, Daraz, an online e-commerce platform in Pakistan, is one of many successful retail companies that have leveraged digital technologies such as targeted advertising.[31] Such tools proved to be successful during the Black Friday sales period in 2017, where Daraz acquired 145,000 additional customers and achieved PKR3 billion (USD19 million) in sales, three times its initial target.[32] The adoption of digital sales marketing has also been witnessed in Pakistan's hospitality industry. Batoota.pk and Sasaticket.pk are examples of businesses that are facilitating online hotel bookings and ticket purchase.[33] Moreover, online platforms are helping restaurants in the F&B industry diversify their sales channels. For example, the local platform Eat Mubarak helps consumers discover restaurants and deliver food in six major cities in Pakistan.[34]

- **Education and training.** Digital technologies hold significant promise of enhancing the quality and reach of education. Despite the unique learning interests and capacities that students have, most education systems tend to take a "one-size-fits-all" approach to teaching and instruction. To address this problem, big data and analytics could be used to create personalised study plans.[35] For example, "Learn Smart Pakistan" is a digital gamified education platform that provides personalised learning plans.[36] Technology could also be used to improve access to education. For example, the Jazz Smart Schools Project uses digital and online media to educate students. The project was rolled out in 75 female public high schools in Islamabad, out of which 49 were situated in rural areas.[37] Arbisoft, set up in 2007, is a software house with over 700 employees. The company provides a suite of services (e.g., web app development, enterprise software development) and solutions (e.g., Edly, Sentimeter, VR Solutions).[38] For instance, Arbisoft (under the EdTech brand Edly), has played a key role in the development of Open edX, which is an open-source product powering learning sites (e.g., edX) for online learners, by working with organisations to develop training courses.[39] Technologies could also help administrators better monitor and evaluate the effectiveness of schools. In the province of Sindh, the "Sindh School Monitoring System" (SSMS) was established to collect, analyse and disseminate data on school performance indicators such as student enrolment and teacher presence.[40]

- **Financial services.** The financial services industry in Pakistan can tap on a range of digital technologies to enhance service delivery and cost-efficiency. For example, Habib Bank Limited is making use of IBM cloud offerings to reduce its costs and fuel innovation.[41] The adoption of electronic payments in the financial services sector could provide significant benefits to businesses, consumers and the broader economy. For example, the State Bank

30. McKinsey Global Institute (2013), Disruptive technologies: Advances that will transform life, business, and the global economy. Available at: https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/disruptive-technologies
31. Think With Google (2018), "Daraz brings Black Friday to Pakistan with comprehensive digital campaign." Available at: https://www.thinkwithgoogle.com/intl/en-apac/future-of-marketing/digital-transformation/daraz-brings-black-friday-pakistan-comprehensive-digital-campaign/
32. Think With Google (2018), "Daraz brings Black Friday to Pakistan with comprehensive digital campaign." Available at: https://www.thinkwithgoogle.com/intl/en-apac/future-of-marketing/digital-transformation/daraz-brings-black-friday-pakistan-comprehensive-digital-campaign/
33. Sources include: Pro Pakistani (2020), "Pakistan Tourism Will Change the Rules of the Game in the Next 5 Years, Says Talha Gadit of Batoota.Pk". Available at: https://propakistani.pk/2020/03/06/pakistan-tourism-will-change-the-rules-of-the-game-in-the-next-5-years-says-talha-gadit-of-batoota-pk/; Webengage, "Sastaticket, Pakistan's largest online travel agency, completes onboarding and goes live within 5 weeks." Available at: https://webengage.com/resource/case-study/sastaticket-onboarding-experience/
34. Eat Mubarak. "Discover restaurants that deliver near you." Available at: https://www.eatmubarak.pk/
35. McKinsey Global Institute (2015), A labor market that works: Connecting talent with opportunity in the digital age. Available at: https://www.mckinsey.com/featured-insights/employment-and-growth/connecting-talent-with-opportunity-in-the-digital-age
36. Website of Learn Smart Pakistan. Available at: https://www.learnsmartpakistan.org/lspv2/index
37. Digital Pakistan, Accelerate to the digital state d-education. Available at: http://digitalpakistan.pk/pdf/d-education.pdf
38. Arbisoft (2021), "About Us". Available at: https://arbisoft.com/services/open-edx/
39. Open edX (2021), "Edly". Available at: https://open.edx.org/marketplace/edly/ and Edly (2021), "Why Edly". Available at: https://edly.io/
40. Sindh Education and Literacy Department, "Sindh School Monitoring System." Available at: http://www.sindheducation.gov.pk/pages.jsp?page=sindhschoolmonitoringsystem
41. IBM, "Habib Bank Limited." Available at: https://www.ibm.com/case-studies/habib-bank-limited-gts

Photo Source: https://www.zameen.com/blog/digital-pakistan-launches-first-digital-payment-system.html

of Pakistan (SBP) and digital payments provider, Karandaaz, introduced Raast, a real-time, digital payment system, aimed at promoting financial inclusion and extending the country's existing digital infrastructure.[42] Through Raast, merchants, businesses, individuals, Fintech organisations, and government entities are able to send and receive near real-time payments via smartphones connected to the Internet. Citizens are also able to receive government payments, including salaries, pensions and payments from nationwide financial support programmes, through Raast. At the economy-wide level, according to SBP, increased adoption of electronic payments could create 4 million jobs in Pakistan and boost its GDP by USD36 billion by 2025.[43]

- **Health.** Digital technologies can unlock greater productivity in the healthcare sector and achieve better public health outcomes. Such technologies could especially be useful to access medical services remotely. For example, during the COVID-19 induced lockdown, two female Pakistani doctors, Sara Saeed Khurram and Iffat Zafar Aga, developed a telemedicine service, "Sehat Kahani", to allow fellow female doctors who had stopped practising to focus on taking care of their families treat patients remotely.[44] Similarly, "Marham" is a digital healthcare platform to find, book, and consult doctors online. It has nearly 12,000 registered doctors on the platform and witnesses more than 300,000 visits from patients each month on its website.[45] Apart from telemedicine, technologies are also being leveraged to improve operations through better records management. The Government of Pakistan launched an e-health service, which stores patients' health histories to help doctors and insurers make informed decisions.[46] Digital technologies could also be used to tackle the high prevalence of counterfeit medicines. For example, "MedznMore" is an online medicine retailer aiming to improve access to affordable and genuine medicines in Pakistan.[47]

42. Reuters (2021), "Pakistan government announces new instant digital payment system".
Available at: https://www.reuters.com/article/pakistan-economy/pakistan-government-announces-new-instant-digital-payment-system-idINL4N2JM349
43. The Express Tribune (2020), "Covid-19 boosts digital economy, e-commerce in Pakistan."
Available at: https://tribune.com.pk/story/2253806/covid-19-boosts-digital-economy-e-commerce-in-pakistan
44. Wallpaper (2020), "How two doctors designed a vital telemedicine service for Pakistan."
Available at: https://www.wallpaper.com/design/sehat-kahani-designing-telemedicine-service-pakistan-interview
45. Daily Pakistan (2018), "EXCLUSIVE: How Marham is changing Pakistan's health landscape digitally."
Available at: https://en.dailypakistan.com.pk/20-Oct-2018/exclusive-how-marham-is-changing-pakistan-s-health-landscape-digitally
46. Digital Pakistan, Accelerate to the digital state d-health. Available at: http://digitalpakistan.pk/pdf/d-health.pdf
47. Security Industry (2020), "Pakistan's MedznMore makes tackling fake meds its mission."
Available at: https://www.securingindustry.com/pharmaceuticals/pakistan-s-medznmore-makes-tackling-fake-meds-its-mission/s40/a12477/#.YDyOyWgzY2x

1.2 TECHNOLOGIES WILL BE CRUCIAL IN ADDRESSING THE LONG-TERM IMPLICATIONS OF COVID-19

COVID-19 has had a significant impact on Pakistan's economy. Due to COVID-19 containment measures to curtail the spread of the pandemic, business operations have been disrupted and households reduced consumption amid dimmer employment prospects. Moreover, reduced global trade flows have led to a contraction in the value of the country's exports by 7.5 percent in 2020.[48] As a result, the country's real GDP growth is estimated to have declined from a five-year average of 4.2 percent between 2015 and 2019 to -1.5 percent in 2020 – its first contraction in decades.[49] However, beyond the immediate impacts of the COVID-19 pandemic, there are three key potential long-term effects on Pakistan's economy:

- **Severe disruptions to the business operations of MSMEs.** MSMEs have been severely affected by the pandemic. According to a survey conducted in April 2020, over 94 percent of MSMEs indicated that their businesses have been affected by the measures implemented due to the COVID-19 pandemic.[50] The top issues faced by MSMEs include financial loss, supply chain disruptions, and reductions in demand, sales and profit, with 83 percent of participating enterprises being neither prepared nor having any plan to handle the pandemic.[51]

- **Travel restrictions threaten the survival of international tourism.** As of May 2020, the World Tourism Organization announced that 100 percent of destinations worldwide had COVID-19 related travel restrictions in place.[52] This has brought international tourism to a standstill which impacted airlines, attractions, tour operators, and travel agencies that rely on foreign tourists. Across the globe, international arrivals plunged by 74 percent in 2020 and in Pakistan, SMEs which make up around 80 percent of the tourism sector, on average, have been struggling to keep afloat.[53] The Sindh Minister for Culture, Tourism and Antiquities remarked that Sindh lost almost 50 percent of domestic tourists and 90 percent of international tourists in 2020.[54]

- **Remote work driving growth in digital freelancing.** As the pandemic forced many businesses to shift online, this led to an increase in demand for freelancers in the digital space (e.g., social media and website development professionals). In 2020, the number of digital freelancers in Pakistan surged by 69 percent year-on-year and freelance revenue increased month-on-month for the first half of the year.[55]

Technology adoption will be crucial for businesses and workers to manage the potential long-term implications of black swan events like the COVID-19 pandemic. There is a significant opportunity for digital technologies, such as virtual reality and big data analytics, to support

48. The World Bank (2021), "The World Bank in Pakistan". Available at: https://www.worldbank.org/en/country/pakistan/overview
49. Real GDP growth rate: 2015: 4.06%; 2016: 4.56%; 2017: 5.22%; 2018: 5.53%; 2019: 1.91%. The World Bank (2021), "The World Bank in Pakistan". Available at: https://www.worldbank.org/en/country/pakistan/overview
50. Shafi, Mohsin; Liu, Junrong; Ren, Wenju. "Impact of COVID-19 pandemic on micro, small, and medium-sized enterprises operating in Pakistan." Available at: https://www.sciencedirect.com/science/article/pii/S2590051X20300071
51. Shafi, Mohsin; Liu, Junrong; Ren, Wenju. "Impact of COVID-19 pandemic on micro, small, and medium-sized enterprises operating in Pakistan." Available at: https://www.sciencedirect.com/science/article/pii/S2590051X20300071
52. World Bank Group (2020), COVID-19 and tourism in South Asia. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/34050/COVID-19-and-Tourism-in-South-Asia-Opportunities-for-Sustainable-Regional-Outcomes.pdf?sequence=6&isAllowed=y
53. Sources include: World Bank Group (2020), COVID-19 and tourism in South Asia. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/34050/COVID-19-and-Tourism-in-South-Asia-Opportunities-for-Sustainable-Regional-Outcomes.pdf?sequence=6&isAllowed=y; e-UNWTO (2021), "UNWTO World Tourism Barometer and Statistical Annex, January 2021". Available at: https://www.e-unwto.org/doi/epdf/10.18111/wtobarometereng.2021.19.1.1
54. Tribune (2020), "Covid-hit tourism sector may recover in late 2021". Available at: https://tribune.com.pk/story/2278043/covid-hit-tourism-sector-may-recover-in-late-2021
55. Payoneer (2020), Freelancing in 2020: An abundance of opportunities. Available at: https://pubs.payoneer.com/docs/2020-gig-economy-index.pdf

MSMEs, freelancers and tourism businesses in maintaining business continuity during unprecedented changes in the business environment and address the three outlined long-term implications mentioned in the earlier section:

- **Create alternative tech-enabled revenue streams.** During the pandemic, many businesses turned to online platforms, such as e-commerce marketplaces and mobile applications, to digitise their offerings and reach customers through digital mediums to weather the crisis. In the long term, these technology applications are key to building resilience and adaptability, especially for MSMEs, during an economic downturn. Other examples of relevant technology applications include e-commerce platforms, online food and beverage (F&B) delivery services and big data analytics. E-commerce platforms can provide MSMEs access to diverse global markets and mitigate risk within supply chains in a cost-effective manner. Online F&B delivery services support restaurants in maintaining business continuity even though consumers are unable to leave their homes due to pandemic-related social restrictions. Big data analytics can support alternative data-driven lending options beyond traditional processing methods by leveraging invoice data, e-commerce transactions to support credit scoring.[56]

- **Drive long-term sustainability in Pakistan's tourism industry.** Given the long-term impact of the pandemic for Pakistan's tourism industry, there are opportunities for businesses, especially for MSMEs, to accelerate digital transformation and create sustainable business models. Box 2 highlights how digital technologies can enable the safe reopening of borders to international tourists while broadening the reach and appeal of Pakistan to tourists worldwide and facilitate the recovery of the tourism industry when travel resumes.

- **Facilitate the growth of Pakistan's digital freelance sector.** Without having to physically move across borders, digital technologies can create job opportunities for people to work remotely in different countries. Examples of relevant technology applications include mobile wallets and e-career centres and job matching platforms. Digital payment services, such as mobile wallets, empower freelancers across Pakistan to receive digital payments from different countries. For example, "PaySend", an international money transfer start-up, partnered with Pakistan's local bank, "JS Bank", to launch the "Freelance Wallet", which allows freelancers to receive international remittances with just a mobile number.[57] E-career centres and job matching platforms, such as "Upwork" and "Fiverr", facilitate the matching of freelancers to job opportunities, such as writing, editing, graphic design, and virtual assistance.

56. G20 Insights (2020), "Digital Innovation Can Improve Financial Access for SMEs".
Available at: https://www.g20-insights.org/policy_briefs/digital-innovation-can-improve-financial-access-for-smes/
57. Fintech Futures (2020), "PaySend and JS Bank create freelancer-focused wallet in Pakistan".
Available at: https://www.fintechfutures.com/2020/02/paysend-and-js-bank-create-freelancer-focused-wallet-in-pakistan/

BOX 2.
ACCELERATE DIGITAL TRANSFORMATION TO BOOST RESILIENCE IN THE TOURISM INDUSTRY

Digital technologies have enabled tourism operators to gain valuable insights into the customer journey and create a seamless and improved customer experience. Examples of relevant technology applications include e-commerce platforms, big data analytics, and virtual and augmented reality technologies.

- **E-commerce platforms.** In the Hunza valley area of Gilgit-Baltistan, about 70 percent of the businesses are dependent on sales to foreign tourists.[58] As international travel resumption remains uncertain as borders stay closed and vaccination programmes have yet to become widely available, many small businesses were deprived of a significant share of customers. In response, the Karakoram Area Development Organization created an online e-commerce platform to promote local crafts in the area and enabled small business owners to sell their handicrafts online to earn a sustainable income.

- **Big data analytics.** Big data provides a range of benefits in the tourism industry, including being able to use predictive analytics on occupancy and greater insights on customer segments. The international hotel chain, Dorchester Collection, for instance, has used big data and AI technologies to sort through customer feedback from surveys, reviews, and online polls, to build a clearer picture of current customer opinion in real-time.[59]

- **Virtual and augmented reality.** Virtual and augmented reality technologies could allow for "remote tourism", an emerging mode of travel amid border closures enabling travellers from across the globe to explore Pakistan . Virtual reality allows for sensory experiences that are typically physical in nature to be engaged virtually. This could be used by tourism operators to share experiences and better market to end-consumers. For example, local IT company Haider-Solutions-360° created 360-degree virtual tours of tourist attractions, including the Pakistan Monument, a national monument and heritage museum located in Islamabad aimed to symbolise national unity.[60] Through immersive virtual reality experiences, tourism operators can continue to engage and pique the interest of "travellers" from the confines of their homes, and keep these destinations top of mind to inspire future travel when borders reopen.

58. DW (2021), "COVID offers Pakistan chance to focus on ecotourism". Available at: https://www.dw.com/en/covid-pakistan-tourism-ecology/a-56717727
59. Revfine (2018), How Artificial Intelligence is Changing the Travel Industry. Available at: https://www.revfine.com/artificial-intelligence-travel-industry/
60. Hd360 (2021), "Pakistan Monument Virtual Tour". Available at: https://hd360.pk/VT_Portfolio/PMVT/index.html

CAPTURING THE PRIZE — THREE PILLARS OF ACTION

To fully capture the digital opportunity, three pillars of action are required: 1) Developing infrastructure to support the local tech ecosystem; 2) Creating a conducive environment for IT exports, and 3) Promoting innovation and digital skills. Businesses and the government in Pakistan have benefitted from efforts made across the three pillars to advance the country's digital transformation. To support the local tech ecosystem, Pakistan has placed a strong emphasis on developing the country's infrastructure that enables the delivery of innovative digital services, applications and content. The government has approved the "Right of Way" policy to expedite the expansion of telecom infrastructure and unveiled the "Digital Pakistan Policy" to build software technology parks, a national technology incubation centre and telecentres to support businesses in accessing ICT facilities and services. To create a conducive environment for IT exports, Pakistan has been providing incentives to support digital freelancers, such as waiving income taxes for IT and IT-enabled services (ITeS) export remittances, and promoting the country's exports via digital platforms under the "Brand Pakistan" campaign. The government has also unveiled multiple digital skilling programmes to promote innovation and digital skills, such as "e-Rozgaar" centres to provide training in online freelancing tools and its flagship "DigiSkills" initiative to build digital talent in partnership with the industry. In addition, to promote innovation and entrepreneurship, government agencies such as Punjab Information Technology Board (PITB) and Khyber Pakhtunkhwa Information Technology Board (KPITB) have introduced technology incubators and platforms such as the "Digital Youth Summit".

"CAPTURING THE PRIZE"
THREE PILLARS OF ACTION

Three pillars of action are required to fully unlock the digital opportunity

1. Develop infrastructure to support the local tech ecosystem
2. Create a conducive environment for Information Technology (IT) exports
3. Promote innovation and digital skills

Significant effort has already been made in the following areas

- Promoting financial inclusion through digital payments
- Developing e-governance tools
- Encouraging movement to the cloud
- Facilitating digital connectivity, access and infrastructure

- Establishing "Special Technology Zones" to promote exports
- Providing incentives to support digital freelancers
- Promoting Pakistan's exports via online campaigns

Innovation

- Promoting investment in start-ups, innovation and entrepreneurship

Digital Skills

- Facilitating digital skills development
- Providing skills training to MSMEs workers
- Promoting equitable access to digital skilling opportunities
- Incorporating digital tech into education

However, there are areas in which Pakistan can further strengthen its approach

- Increase Internet availability through infrastructure investments
- Promote the adoption of public cloud

- Create an accommodative tax framework and ease restrictive data policies
- Participate in multilateral digital trade agreements to promote digital trade

Innovation

- Tailor relevant and rigorous support services to entrepreneurs
- Provide strong government financial support for start-ups
- Bridge the gender gaps in the ecosystem

Digital Skills

- Forge close public-private partnerships to improve relevance of skills training
- Address gender gap in digital skilling efforts
- Cultivate digital talent in gaming
- Create sector-specific digital skills training

To fully realise the economic benefits of digital technologies, Pakistan would benefit from improving the country's digital infrastructure and promoting Internet adoption. Policymakers can consider permitting more Internet service providers and increasing bandwidth to lower prices and increase affordability. To encourage greater participation in digital trade, the government could create an accommodative tax framework and ease restrictive data policies. At the same time, the country can consider participating in international digital trade agreements such as the "Digital Economy Partnership Agreement" to enhance digital trade opportunities domestically and in the region. There is also scope for the Pakistani Government to collaborate with industry partners to improve relevance of skills training and broaden access to digital skilling opportunities to bridge the gender gap. Furthermore, the government could consider various risk-sharing approaches to expand the funding options for start-ups.

2.1 OVERVIEW OF THREE PILLARS OF ACTION FOR PAKISTAN

In 2018, Pakistan introduced the "Digital Pakistan Policy" policy with a vision of enhancing connectivity, improving digital infrastructure, increasing investment in digital skills, and promoting innovation and technology-based entrepreneurship.[61]

Aligning with the focus areas in the "Digital Pakistan Policy", the report has identified three pillars of actions required for the country to fully unlock the PKR9.7 trillion (USD59.7 billion) digital opportunity (see Exhibit 4).

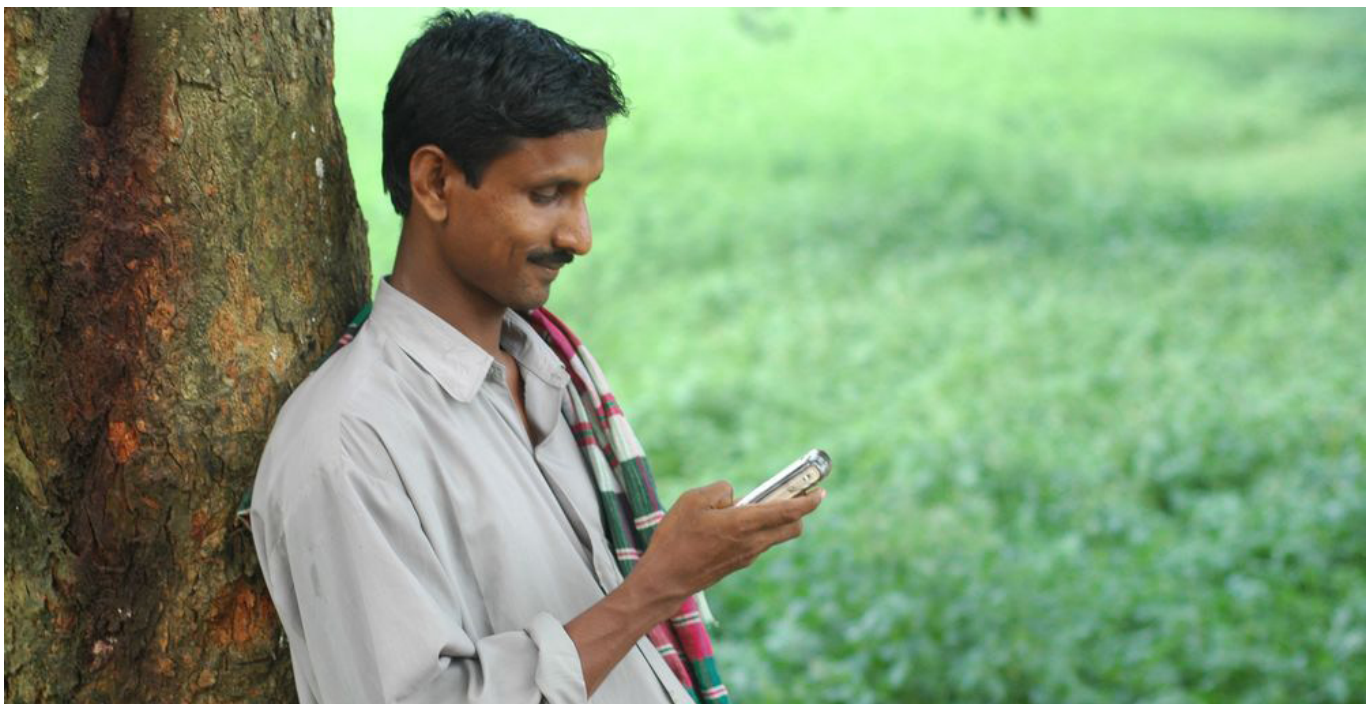


Photo Source: https://propakistani.pk/2021/10/15/govt-launches-kisan-portal-for-small-farmers/?__cf_chl_jschl_tk__=pmd_xRvXtgFTzkHdCBxBBKqt5a6_8RSRPoRV21L.EHRxm7Y-1635256903-0-gqNtZGzNAlCjcnBszQil

61. Digital Pakistan (2021), "The Digital Pakistan policy: vision and execution". Available at: https://digitalpakistan.pk/blog/the-digital-pakistan-policy-vision-and-execution/#:~:text=Pakistan%20introduced%20its%20first%20'Digital%20Pakistan%20policy'%20back%20in%202018.&text=Taking%20a%20step%20forward%20PM,%2C%20promoting%20innovation%2C%20and%20tech.

EXHIBIT 4:

THE THREE PILLARS OF ACTION ARE MAPPED TO KEY FOCUS AREAS OUTLINED IN THE "DIGITAL PAKISTAN POLICY"

	1 Develop infrastructure to support the local tech ecosystem	2 Create a conducive environment for Information Technology (IT) exports	3 Promote innovation and digital skills
Points under each pillar of action	• Promoting financial inclusion through digital payments • Developing e-governance tools • Encouraging movement to the cloud • Facilitating digital connectivity, access and infrastructure	• Supporting digital freelancers • Promoting Pakistan's exports • Creating an accommodative tax framework and ease restrictive data policies • Participating in multilateral digital trade agreements	• Providing technical skills training to MSMEs • Facilitating digital skills development • Promoting equitable access to digital skilling opportunities • Incorporating digital tech into education • Promoting innovation and entrepreneurship
Key focus areas outlined in the "Digital Pakistan Policy"[1]	• [Digital infrastructure] Payment solutions • [Access & connectivity] Internet access • [Access & connectivity] Affordability of data • [E-govt] Paperless procurement • [E-govt] Easy data sharing	• [Digital infrastructure] Regulations and mechanisms for the digital economy • [Access & connectivity] Taxation of broadband Internet	• [Digital skills & training] Technical skills • [Digital skills & training] Digital literacy • [Innovation & entrepreneurship] Enable the start-up ecosystem

Digital Pakistan
All Things Digital in Pakistan

1. Note that the list of focus areas for the "Digital Pakistan Policy" cited is not exhaustive. Digital Pakistan (2020), "The Digital Pakistan Policy: Vision and Execution". Available at: https://digitalpakistan.pk/blog/the-digital-pakistan-policy-vision-and-execution/#:~:text=Pakistan%20introduced%20its%20first%20'Digital%20Pakistan%20policy'%20back%20in%202018.&text=Taking%20a%20step%20forward%20PM,%2C%20promoting%20innovation%2C%20and%20tech

2.2 PILLAR 1: DEVELOPING INFRASTRUCTURE TO SUPPORT THE LOCAL TECH ECOSYSTEM

To harness the productivity benefits of digital transformation and build economic resilience in the post-pandemic era, it is crucial that Pakistan develop the necessary enablers for businesses to leverage technology applications in their day-to-day operations, including significant focus on the following areas:

- **Promoting financial inclusion through digital payments.** The "Global Findex Database 2014" revealed that the country's financial inclusion was the lowest in South Asia – individuals with access to a bank account only constituted 13 percent of the adult population, as compared to 31 percent in Bangladesh and 53 percent in India.[62] In response, the government consulted various stakeholders, including regulators, banks and associations, to develop the "National Financial Inclusion Strategy".[63] Launched in 2015, the "National Financial Inclusion Strategy" aims to improve access to financial services and identified financial, payments and ICT infrastructure as one of the key enablers in its implementation framework.[64] The strategy outlines financial infrastructure that includes building a fully automated and easily accessible collateral registry, strengthening payment platforms by integrating branchless banking, expanding the scope of credit bureaus to include alternative financial information, and improving the accessibility and reliability of land registries. By 2023, the country envisages having 65 million active digital transaction accounts, extending finance to 700,000 SMEs, and serving six million farmers through Fintech solutions.[65] These targets are estimated to create three million new jobs and boost the value of Pakistan's IT exports by an additional USD5.5 billion through enhanced access to finance to SMEs by 2023.[66] To support the country's "National Financial Inclusion Strategy", a Pakistani mobile network and Internet services provider, Jazz, introduced "JazzCash". "JazzCash" is a mobile wallet targeted at creating digital transaction accounts for the unbanked population to receive and make payments.[67] Another mobile payment service provider is Telenor Microfinance Bank, jointly owned by telecommunications company Telenor Group and Ant Group, operator of payment and lifestyle platform Alipay. Its banking platform, "Easypaisa", offers over-the-counter (OTC) mobile money services, where customers can transfer money without opening a mobile wallet account.[68] In a similar vein, the State Bank of Pakistan and digital payments provider, Karandaaz, introduced Raast, a new instant payment system, aimed at promoting financial inclusion and enhancing the country's existing digital infrastructure.[69] Through Raast, merchants, businesses, individuals, Fintech organisations, and government entities are able to send and receive near real-time payments via smartphones connected to the Internet. Citizens are also able to receive government payments, including salaries, pensions and payments from nationwide financial support programmes through Raast.

62. The News (2015), "Banked population lowest in Pakistan". Available at: https://www.thenews.com.pk/print/55117-banked-population-lowest-in-pakistan
63. State Bank of Pakistan (2015), National Financial Inclusion Strategy: Pakistan. Available at: https://www.sbp.org.pk/ACMFD/National-Financial-Inclusion-Strategy-Pakistan.pdf
64. National Financial Inclusion Strategy (2018), Available at: http://finance.gov.pk/NFIS.pdf
65. National Financial Inclusion Strategy (2018), Available at: http://finance.gov.pk/NFIS.pdf
66. National Financial Inclusion Strategy (2018), Available at: http://finance.gov.pk/NFIS.pdf
67. JazzCash (2021), Available at: https://www.jazzcash.com.pk/mobile-account/
68. Consultative Group to Assist the Poor (2013), "The 'EasyPaisa' Journey from OTC to Wallets in Pakistan". Available at: https://www.cgap.org/blog/easypaisa-journey-otc-wallets-pakistan
69. Reuters (2021), "Pakistan government announces new instant digital payment system". Available at: https://www.reuters.com/article/pakistan-economy/pakistan-government-announces-new-instant-digital-payment-system-idINL4N2JM349

- **Developing e-governance tools to promote citizen-centric participatory governance.** One of the key priorities of the "Digital Pakistan Policy" is to create an e-government where intra-government processes move towards a paperless environment and interactions between businesses, citizens and the government are digitised. To this end, the Punjab IT Board (PTIB) developed 21 online mobile and digital applications to digitise its government services.[70] One of the applications include the "Pakistan Citizen Portal" which can be downloaded from app stores or accessed on the web. The "Pakistan Citizen Portal" is an online portal connecting citizens to both federal and provincial government organisations that allows citizens, with Internet access, to submit complaints and requests.[71] With a case resolution rate of over 90 percent, the portal has proven to be an effective, complementary tool in administration.[72] Civil servants are allotted a specific amount of time to review and address a complaint lodged on the platform before unresolved cases are automatically escalated up to the next supervising authority. To ensure citizens are able to utilise government e-services, the government has committed to improving the country's telecommunication infrastructure.[73]

- **Encouraging movement to the cloud.** As part of the "Digital Pakistan Policy", the National Telecommunications Corporation partnered with VMware Inc, an enterprise software provider, to modernise the public sector's IT infrastructure by building the country's first government cloud-based storage. The government cloud-based storage enables the public sector to achieve cost savings and innovation in public service delivery, while offering the flexibility and agility to scale its services rapidly. Moreover, the cloud infrastructure provides further savings by improving

the availability and reliability of services with minimal downtime and adequate backup in the event of server crashes.[74] With an aim to promote the country as the fourth industrial revolution (4IR) technology hub, the President of Pakistan launched the "Presidential Initiative for Artificial Intelligence and Computing" to train up to 100,000 individuals in cutting-edge technologies including AI, cloud-native computing, blockchain and IoT.[75]

- **Facilitating digital connectivity, access and infrastructure.** The country is removing barriers in the laying of fibre cables and investing in digital infrastructure to support the deployment of technology applications. To support the installation and maintenance of telecommunication equipment and expansion, the federal cabinet has approved the "Right of Way" policy that expedites the installation of critical telecom infrastructure in land and buildings.[76] The country has also made inroads

70. The News (2020), "Pakistan Citizen Portal proves to be most effective tool".
Available at: https://www.thenews.com.pk/print/597251-pakistan-citizen-portal-proves-to-be-most-effective-tool
71. Prime Minister's Performance Delivery Unit (2019), Pakistan Citizen's Portal. Available at: http://pmdu.pmo.gov.pk/manuals/Pakistan-Citizen-Portal-Manual-2.0.pdf
72. The News Pakistan (2020), "Pakistan Citizen Portal proves to be most effective tool".
Available at: https://www.thenews.com.pk/print/597251-pakistan-citizen-portal-proves-to-be-most-effective-tool
73. GSMA (2020), Pakistan: progressing towards a fully fledged digital economy.
Available at: https://www.gsma.com/asia-pacific/wp-content/uploads/2020/06/24253-Pakistan-report-updates-LR.pdf
74. Pakistan Today (2018), "NTC to build Pakistan's first 'G-Cloud'". Available at: https://profit.pakistantoday.com.pk/2018/04/25/ntc-to-build-pakistans-first-g-cloud/
75. Medium (2020), "Presidential Initiative for Artificial Intelligence And Computing (PIAIC) Offers Online Admissions Of New Trending Skills For All Pakistanis Worldwide At FREE-OF-COST.". Available at: https://medium.com/@hamzaadil/presidential-initiative-for-artificial-intelligence-and-computing-piaic-offers-online-admissions-d5abced23db2
76. Dawn (2021), "Right of Way policy for telecom sector approved". Available at: https://www.dawn.com/news/1602693

into expanding its digital infrastructure. Known as the "Pakistan Stack", the digital infrastructure enables the delivery of innovative digital services, applications and content for the government, businesses and start-ups.[77] At the end of 2020, the Pakistan Software Export Board established 14 state-of-the-art software technology parks, and is planning to open another 40 across the country.[78] These parks provide world-class data and network facilities for MSMEs and multinational corporations to conduct research and innovation, including an "Accelerator" and "Incubation Centre" with funds to help entrepreneurs and tech-based start-ups gain access to the resources they require to scale and grow. Under the "Digital Pakistan Policy", the Ministry of Information Technology and Telecommunication partnered with private entities, such as the "Ignite National Technology Fund", to establish the country's largest technology incubation centre, "National Technology Incubation Centre". By March 2020, the incubation centre had supported ten batches of start-ups and nurtured more than 200 Pakistani tech start-ups.[79] In addition, to bridge the rural-urban digital divide, Pakistan established telecentres in unserved and underserved areas to provide the public with easy access to ICT services.

Despite rapid deployment of digital infrastructure over the past decade, Internet connectivity remains a barrier to economic development, and the COVID-19 pandemic has further laid bare gaps in digital infrastructure in much of the country. When more than 300,000 schools and universities closed temporarily during the COVID-19 outbreak, many Pakistani students did not have access to the Internet to continue learning remotely. Due to financial constraints and the lack of Internet infrastructure, such as fibre optics transmission lines, only 54 percent of the population has broadband connection.[80] In addition, Internet shutdowns in federally administered tribal areas (FATA) due to national security concerns meant that people living in the area were unaware of the ongoing pandemic.[81] The Economist Intelligence Unit's "Inclusive Internet Index 2020", which benchmarks 100 countries on the extent to which the Internet is accessible, affordable and relevant, ranked Pakistan 24th out of 26 Asian countries.[82] The study cited low levels of

77. CrowdFund Insider (2019), "Former Google Executive Tania Aidrus Chosen by Prime Minister Imran Khan to Lead 'Digital Pakistan' Initiative". Available at: https://www.crowdfundinsider.com/2019/12/155016-former-google-executive-tania-aidrus-chosen-by-prime-minister-imran-khan-to-lead-digital-pakistan-initiative/
78. The Nation (2020), "PSEB to set up 40 technology parks across country". Available at: https://nation.com.pk/07-Dec-2020/pseb-to-set-up-40-technology-parks-across-country
79. Phone World (2021), "The National Incubation Center Invites Startup Applications for its 10th Cohort of Incubation". Available at: https://www.phoneworld.com.pk/the-national-incubation-center-invites-startup-applications-for-its-10th-cohort-of-incubation/
80. Datareportal (2020), "DIGITAL 2020: PAKISTAN". Available at: https://datareportal.com/reports/digital-2020-pakistan and YouTube (2021), " Pakistan's Journey to Digital". Available at: https://www.youtube.com/watch?v=7mlSvA7MyWo
81. Slate (2020), "An Internet Shutdown Is Keeping Coronavirus Information From Millions in Pakistan". Available at: https://slate.com/technology/2020/04/coronavirus-covid19-pakistan-internet-shutdown-fata.html
82. Economist Intelligence Unit (2020), "The Inclusive Internet Index". Available at: https://theinclusiveinternet.eiu.com/explore/countries/PK/

digital literacy and relatively poor network quality as major impediments to Internet inclusion. To increase the availability and adoption rates of the Internet, the country can consider broadening Internet access through the following actions:

- **Increase Internet availability through infrastructure investments, especially in rural areas.** Even though approximately 70 percent of Pakistan's population live in rural areas, nearly 90 percent of the country's ICT-related infrastructure is installed in urban areas.[83] As a result, a large portion of the country's populace do not have access to the Internet. While the country has recently approved the "Right of Way" policy to facilitate the laying of more fibre cables, the government could consider further intervention to build the necessary infrastructure and bridge the urban-rural digital divide, particularly in areas with little commercial viability. Pakistan's Minister for Information Technology has attributed the urban-rural digital divide to the lack of private companies investing in rural and far-flung areas which were deemed less profitable.[84] To address the lack of Internet service providers in rural areas, Thailand's government has launched the "Net Pracharat" ("Village Broadband Internet") programme to expand Thailand's national broadband network coverage to remote areas. Under the "Net Pracharat" program, the Ministry of Digital Economy and Society (MDES) collaborated with the National Broadcasting Telecommunications Commissions (NBTC) fibre cable network and free public Wi-Fi hotspots were installed in over 74,000 villages.[85] As of May 2019, 1,671 schools and hospitals were connected to the "Net Pracharat" network and over six million users were connected to the "Net Pracharat" Wi-Fi network. MDES also provided training to 1,033 officers who in turn helped raise awareness of the "Net Pracharat" programme in their communities, and trained villagers on Internet fundamentals and how to start an online business.

- **Promote the adoption of public cloud, including in the public sector.** Governments typically rank amongst the largest users of IT infrastructure and as cloud computing has the potential to significantly reduce costs, many government agencies have launched public cloud computing initiatives. One successful approach to cloud adoption pursued by several governments has been a "Cloud First" policy, which mandates government agencies to evaluate cloud computing service options prior to making any new large investment in IT. The policy specifically holds that public cloud services take precedence over solely on-premise and private cloud solutions – provided that the necessary security requirements and international standards are met by the Cloud Service Provider (CSP). Singapore, for example, has adopted a Cloud First programme in an effort to leverage the potential of the public cloud and to digitise government processes and services.[86] Singapore is deploying a commercial cloud programme that permits government agencies to individually select public cloud services, and provide pre-approved procurement and security assurance. Since 2018, when the government of Singapore announced a five-year plan to migrate most of its information technology systems from on-premise to the cloud, it has moved more than 150 systems to the commercial cloud. And in 2020 alone over USD870 million of contracts have been earmarked to double the number of systems already on the commercial cloud.[87] Similarly, the Philippines government is building on cloud-based productivity services such as Google Workspace as part of its GovMail programme to allow employees to work remotely, securely, and collaboratively.

83. International Development Research Centre (2021), "Measuring and Bridging the Gender Digital Divide in Rural Pakistan". Available at: https://www.idrc.ca/en/project/measuring-and-bridging-gender-digital-divide-rural-pakistan
84. The Diplomat (2020), "Pakistan's Great Digital Divide". Available at: https://thediplomat.com/2020/07/pakistans-great-digital-divide/
85. United Nations Economic and Social Commission for Asia and the Pacific (2019), Village Broadband Internet Project (Net Pracharat). Available at: https://www.unescap.org/sites/default/files/Village%20Broadband%20Internet%20Project%20%28Net%20Pracharat%29%2C%20MDES%20Thailand.pdf
86. GovTech Singapore (2019), "Soaring high with commercial cloud". Available at: https://www.tech.gov.sg/media/technews/soaring-high-with-commercial-cloud
87. GovTech Singapore (2020), "Doubling down on cloud to deliver better government services". Available at: https://www.tech.gov.sg/media/technews/doubling-down-on-cloud-to-deliver-better-government-services?utm_medium=recommender_1&utm_source=aHR0cHM6Ly93d3cudGVjaC5nb3Yuc2cvbWVkaWEvdGVjaG5ld3Mvc29hcmluZy1oaWdoLXdp dGgtY29tbWVyY2lhbC1jbG91ZA==&utm_content=aHR0cHM6Ly93d3cudGVjaC5nb 3Yuc2cvbWVkaWEvdGVjaG5ld3MvZG91YmxpbmctZG93bi1vbi1j bG91ZC10by1kZWxpdmVyLWJldHRlci1nb3Zlcm5tZW50LXNlcnZpY2Vz

2.3 PILLAR 2: CREATE A CONDUCIVE ENVIRONMENT FOR IT EXPORTS

In Pakistan, export of digital services represents a rapidly increasing share of overall services exports. From 2005 to 2018, the country's share of ICT services within total services exports increased by around 80 percent.[88] Exports of digital services exceeded USD2.1 billion in 2021, an increase of 47 percent from the previous year.[89] The export yield per worker of the ICT industry is also significant compared to other industries. On average, each worker in the ICT industry contributes up to USD20,000 of exports, about 50 times and 33 times more than workers in the agriculture and textile industries respectively.[90] ICT exports will continue to become an important contributor to Pakistan's economy, and this is mainly driven by two components.

First, digital freelancers providing IT services to overseas customers contribute to the growing ICT services exports and IT exports prove to be a key revenue stream for the industry. Industry experts estimated that in 2019, digital freelancers contributed to USD0.5 billion worth of ICT services exports.[91] The second component comprises official ICT services exports from established Pakistani technology firms to the rest of the world. This includes software consulting services, digital IT support services and niche services such as web scraping. Recognising the importance of creating a conducive environment for these two drivers of the country's IT exports, Pakistan has implemented the following actions to support these businesses:

88. World Bank (2020), Pakistan: Economic Policy for Export Competitiveness. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/33880/Digital-Pakistan-Economic-Policy-for-Export-Competitiveness-A-Business-and-Trade-Assessment.pdf?sequence=1&isAllowed=y
89. Pro Pakistani (2021), "Pakistan's IT Exports Cross $2 Billion Mark For The First Time". Available at: https://propakistani.pk/2021/07/19/pakistans-it-exports-cross-2-billion-mark-for-the-first-time/?__cf_chl_jschl_tk__=pmd_SeoE4W8QJwnBj0tAyOsGPC9EjRlf1N2ZSKVVql9QMHE-1629269849-0-gqNtZGzNAiWjcnBszQa9
90. P@SHA (2021), Removal of Tax Exemption from the IT and ITeS Industry in Pakistan. Available at: https://www.pasha.org.pk/pashapk/Report-on-Impact-of-Removal-of-Income-Tax-Exemptions-by-PASHA.pdf
91. Given the informal nature of digital freelancing, this figure was not captured in official statistics. World Bank (2020), Pakistan: Economic Policy for Export Competitiveness. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/33880/Digital-Pakistan-Economic-Policy-for-Export-Competitiveness-A-Business-and-Trade-Assessment.pdf?sequence=1&isAllowed=y

- **Establishing "Special Technology Zones" to promote IT exports.** The government established the "Special Technology Zones Authority" to facilitate the development of "Special Technology Zones" (STZs) which will help increase high-tech exports from Pakistan.[92] These STZs will feature partnerships between global tech companies and local tech companies to facilitate technology transfer from major global innovation hubs, research institutes, technology-based start-ups, and collaborative spaces for innovation and entrepreneurship.

- **Providing incentives to support digital freelancers.** According to the "Online Labour Index" published in 2017, which measures the supply and demand of online freelance labour across countries and occupations, Pakistan accounts for the third-largest share (13 percent) of online gig workers.[93] In the fourth fastest-growing freelance market in the world, individual freelance developers established small software companies, known as "software houses", to provide international services.[94] To ensure the sustainable growth of the IT export sector and increase the sector's exports to USD10 billion, over 4,000 businesses registered with the Pakistan Software Export Board were given tax incentives to export their IT products and services.[95] For example, income taxes on IT and ITeS export remittances are waived till June 2025, registered IT start-ups are given tax breaks for up to three years, and foreign IT and ITeS investors are allowed full repatriation of profits, among other incentives.

- **Promoting Pakistan's exports via online campaigns.** Pakistan has been holding multiple digital campaigns under the "Brand Pakistan" initiative to create a unified national brand and raise awareness of Pakistani products and culture. In 2017, the Trade Development Authority of Pakistan (TDAP) launched the "Brand Pakistan" campaign to promote the country's exports from sectors such as manufacturing, tourism, textiles, and improve its international reputation.[96] One of the key agendas was to promote the competitiveness of Pakistani goods and services by creating effective web portals, e-marketing and targeted advertising initiatives. In 2021, the Pakistan Tourism Development Corporation (PTDC) launched a similar campaign to showcase and promote tourist attractions in the country through social media channels, such as YouTube, and online advertising campaigns. To provide an immersive experience for home-bound local and foreign tourists to explore the country's attractions digitally during the COVID-19 pandemic, PTDC developed an interactive e-portal which features virtual galleries, videos and documentaries.[97]

However, the country faces several obstacles to maximising its digital trade opportunity, and could consider the following actions:

- **Create an accommodative tax framework and ease restrictive data policies.** Pakistan has extensive data policies and taxes that substantially restrict cross-border data flows, which are necessary for digital trade. In the 2019 Digital Trade Restrictiveness Index developed by European Centre for International Political Economy (ECIPE), Pakistan was ranked 17th in a list of 65 countries under the indicator "restrictions on data", and 13th under the indicator "trading restrictions".[98] The country's high ranking in both categories was attributed

92. Dawn (2021), "Special Technology Zones Authority to boost IT sector: officials". Available at: https://www.dawn.com/news/1600880
93. Transpay (2019), "Index: India, Bangladesh and Pakistan Supply Most of the World's Online Labor". Available at: https://www.transpay.com/blog/sending-payouts/index-india-bangladesh-and-pakistan-supply-most-of-the-worlds-online-labor
94. Forbes (2019), "The Top 10 Fastest Growing Freelance Markets in The World". Available at: https://www.forbes.com/sites/elainepofeldt/2019/08/18/the-top-10-fastest-growing-freelance-markets-in-the-world/?sh=4bcf0fc7733b
95. Ministry of Information Technology & Telecommunication (2020), "IT, ITeS export remittances grow 20.75pc in 11 months". Available at: https://moitt.gov.pk/NewsDetail/ZGNkZjdhYjAtMmMyZi00NDRiLWFhOTItYjhiMjIzZDZlOGFm
96. Daily Times Pakistan (2017). "Brand Pakistan initiative to be unveiled at Expo Pakistan-2017." Available at: https://dailytimes.com.pk/120238/brand-pakistan-initiative-to-be-unveiled-at-expo-pakistan-2017/
97. The Nation (2021), "Brand Pakistan to be unveiled soon for effective tourism promotion: PTDC." Available at: https://nation.com.pk/01-Feb-2021/brand-pakistan-to-be-unveiled-soon-for-effective-tourism-promotion-ptdc
98. European Centre for International Political Economy (2019), "Digital Trade Restrictiveness Index". Available at: https://globalgovernanceprogramme.eui.eu/wp-content/uploads/2019/09/Digital-Trade-Restrictiveness-Index.pdf

to its high tariffs in digital trade and trade defence measures targeting digital goods. The country imposes an average most-favoured nation (MFN) tariff rate[99] of 10.2 percent, the second-highest across 65 countries, on ICT goods and their inputs.[100] Data usage in Pakistan is also subject to a provincial sales tax and federal excise duty at a rate of 19.5 percent and 18.5 percent, respectively.[101] Usage of mobile services is further charged an additional 14 percent ad valorem tax, bringing the total burden from ad valorem taxes up to 33.5 percent. Taxation on data usage is particularly problematic for digital trade especially when data underpins the digital economy. Emerging technologies, such as cloud computing and big data analytics, thrive on the use of and cross-border flow of data. These additional costs can be cost-prohibitive, especially for MSMEs, and hinder businesses from capturing productivity gains from leveraging digital trade opportunities. Instead of imposing blanket tariffs that could unnecessarily restrict digital trade, Pakistan could consider creating an accommodative tax framework by adopting the Organisation for Economic Co-operation and Development's (OECD) proposed cross-border taxation framework (see Box 3). Barriers to cross-border data exchanges should also be minimised, while data privacy and security concerns may be addressed through regulations on data sharing. These regulations should be clear on the type of data that can be shared, the boundaries of sharing, and the type of consumer consent that is required. A useful first step would be for Pakistan to adopt the "APEC Privacy Framework" and join the "APEC Cross Border Data Privacy Rules System" as well as adopt ISO Standards such as ISO27018 that specify controls to protect personal data.

- **Participate in multilateral digital trade agreements to promote digital trade and ease cross-border data flows.** With an OECD report highlighting that a 10 percent rise in "bilateral digital connectivity" could improve trade in goods and services by about two and three percent respectively, cross-border data flows are critical for enabling digital exports.[102] To enhance digital connectivity with its international partners, Pakistan could consider participating in multilateral agreements to create a conducive environment for businesses to better tap on the opportunities in the digital economy. An example of such a recently signed agreement is the "Digital Economy Partnership Agreement" (DEPA) signed between Singapore, New Zealand and Chile, which seeks to promote digital trade and help MSMEs overcome the challenges of scale and distance.[103] The DEPA includes provisions that streamline trading procedures through digitising trading documentation, and promoting open cross-border data flows with the necessary data safeguards. Through the DEPA, businesses operating in the three signatory countries can transfer information seamlessly across borders, with the assurance that the data is protected by the relevant security mechanisms and requisite regulations.[104] This provides a conducive environment for data-driven business models such as software-as-a-service and with businesses increasingly reliant on electronic transactions and digital solutions to serve customers regardless of where they are located. In addition, MSMEs looking to better understand foreign markets can now access and use open government data to discover new business opportunities and innovate new products and services.[105]

99. The "Most Favoured Nation" (MFN) rates are the tariffs that countries promise to impose on imports from other members of the World Trade Organization, unless the country is part of a preferential trade agreement. In effect, MFN rates are the highest (most restrictive) rates that members charge one another.
100. European Centre for International Political Economy (2019), "Digital Trade Restrictiveness Index".
Available at: https://globalgovernanceprogramme.eui.eu/wp-content/uploads/2019/09/Digital-Trade-Restrictiveness-Index.pdf
101. European Centre for International Political Economy (2019), "Digital Trade Restrictiveness Index".
Available at: https://globalgovernanceprogramme.eui.eu/wp-content/uploads/2019/09/Digital-Trade-Restrictiveness-Index.pdf
102. OECD (2019), Trade in the digital era. Available at: https://www.oecd.org/going-digital/trade-in-the-digital-era.pdf
103. Beehive.gov.nz (2020), "NZ concludes digital economy trade talks with Singapore and Chile."
Available at: https://www.beehive.govt.nz/release/nz-concludes-digital-economy-trade-talks-singapore-and-chile
104. Ministry of Trade and Industry Singapore (2020), Singapore substantially concludes negotiations for Digital Economy Partnership Agreement with Chile and New Zealand.
Available at: https://www.mti.gov.sg/-/media/MTI/Newsroom/Press-Releases/2020/01/Joint-press-release---Conclusion-of-Digital-Economy-Partnership-Agreement---21-Jan.pdf
105. Ministry of Trade and Industry Singapore (2020), Singapore substantially concludes negotiations for Digital Economy Partnership Agreement with Chile and New Zealand.
Available at: https://www.mti.gov.sg/-/media/MTI/Newsroom/Press-Releases/2020/01/Joint-press-release---Conclusion-of-Digital-Economy-Partnership-Agreement---21-Jan.pdf

BOX 3.
OECD'S CROSS-BORDER TAXATION FRAMEWORK ENSURES LEVEL PLAYING FIELD BETWEEN LOCAL AND FOREIGN DIGITAL SERVICE PROVIDERS

As companies increasingly do business with customers in a jurisdiction without having a physical presence, profits generated through the use of the underlying data asset will not necessarily be taxable in the country where the final sales occurred (or from where the data originated). OECD's "nexus rule" aims to address this issue by imposing taxes on businesses which have sustained and significant involvement in the economy of a market jurisdiction, such as through consumer interaction and engagement, irrespective of its level of physical presence in that jurisdiction.

The "nexus rule" determines the jurisdiction to tax a non-resident enterprise based on a revenue threshold, which serves as a primary indicator of whether a company has a sustained and significant involvement in the economy of a jurisdiction.[106] Once it has been established that a particular country should be allowed to tax the profits of an enterprise, the profit allocation rules determine the relevant share of the profits that will be subjected to taxation. The internationally accepted principle underlying profit allocation is the "Arm's Length Principle". The application of this principle involves an analysis of three factors that are deemed to materially contribute to business profits, namely the functions performed, assets used and risks assumed by each business entity.

Similarly, Singapore and Malaysia have imposed digital services taxes on imported services to ensure a level playing field between local and foreign suppliers or service providers. In Singapore, foreign digital service providers are required to pay Goods and Services Tax (GST) if their global turnover was more than SGD1 million (USD738,000) and they have sold more than SGD100,000 (USD73,800) worth of digital services to Singaporean customers, in the past 12 months.[107] In Malaysia, the Service Tax (Amended) Act 2020 imposes a digital service tax on registered foreign service providers which provide MYR500,000 (USD121,000) and above worth of value in digital service to consumers in the country.[108]

106. OECD (2018), Tax Challenges Arising from Digitalisation – Interim Report 2018. Available at: https://www.oecd-ilibrary.org/docserver/9789264293083-en.pdf?expires=1616307890&id=id&accname=guest&checksum=3E9D9607992D85EDC74F01FCB66025C4
107. ASEAN Briefing (2020), "Goods and Services Tax in Singapore: New Obligations for Digital Service Providers". Available at: https://www.aseanbriefing.com/news/goods-services-tax-singapore-new-obligations-digital-service-providers/
108. Royal Malaysian Customs Department (2020), Service Tax (Digital Services) Regulation 2019. Available at: https://mysst.customs.gov.my/SSTRegulations

2.4 PILLAR 3: PROMOTE INNOVATION AND DIGITAL SKILLS

To unlock the full benefits of digital transformation, Pakistan must continue to promote an environment that is conducive to innovation and pursue policies that facilitate the deployment of cutting-edge technologies such as AI and cloud computing. The country already has a thriving tech ecosystem, cultivated by efforts from the government, industry and investors.[109] The government has been supporting the growing start-up ecosystem in Pakistan and the country has over 1,000 start-ups, 24 incubators and accelerators, and 80 co-working spaces as of the end of 2019.[110] Reflecting the confidence in Pakistani start-ups, there has been a surge in venture capital funding from USD48 million in 2019 to USD85 million in the first six months of 2021.[111] The Pakistani start-up ecosystem is also on track to raise more than USD230 million in 2021.[112] Box 4 highlights several prominent Pakistani technology companies across industries. On the digital skilling front, it is also critical to ensure that Pakistanis are able to use digital technologies to access job opportunities, run businesses and enhance productivity in their work. Opportunities to access digital skills training should be made available to all segments of society, including underserved communities. At the same time, the seeds for a future generation of adaptable and digitally skilled workforce must be planted early to ensure a healthy digital talent pipeline.

Pakistan is already advancing the goals of promoting innovation and building digital talent through the following action areas:

- **Promoting investment in start-ups, innovation and entrepreneurship.** The Punjab Information Technology Board (PITB) established physical "e-Rozgaar" centres in 36 districts of Punjab to provide training in online freelancing tools for budding digital freelancers and enhance their professional skills. These centres have since trained over 20,000 people in Internet freelancing and enabled participants to earn a living while working from home, thereby gaining financial independence.[113] Participants can access three months of training across different types of digital competencies at no cost, including content marketing and advertising, creative design, and technical coding.[114] Furthermore, government agencies such as PITB and Khyber Pakhtunkhwa Information Technology Board (KPITB) have introduced technology incubators and platforms such as the "Digital Youth Summit" to encourage entrepreneurship.[115] In addition, the industry has also supported the government to develop the local start-up ecosystem. Pakistan Association for Software Houses for IT & ITeS (P@SHA) is the licensed trade-body association for the IT and ITeS industry in Pakistan. For the past three decades, P@SHA has been on the mission to capture the potential of the IT and ITeS industry in Pakistan.[116] In 2015, P@SHA launched Pakistan's leading innovation centre "Nest I/O" with the support from "Google for Start-ups".

- **Facilitating digital skills development through national programmes.** As reflected in the Ministry of IT and Telecom's "Digital Pakistan Policy" set out in 2018, there is a strong impetus by the government to promote human resource

109. TechCrunch (2021), "Pakistan's growing tech ecosystem is finally taking off". Available at: https://techcrunch.com/2021/07/07/pakistans-growing-tech-ecosystem-is-finally-taking-off/
110. Invest2Innovate (2019), "i2i's New Study: Pakistan Startup Ecosystem Report 2019". Available at: https://invest2innovate.com/i2is-new-study-pakistan-startup-ecosystem-report-2019/
111. The Express Tribune (2021), "The startup boom in Pakistan". Available at: https://tribune.com.pk/story/2308970/the-startup-boom-in-pakistan
112. YouTube (2021), " Pakistan's Journey to Digital". Available at: https://www.youtube.com/watch?v=7mlSvA7MyWo
113. E-Rozgaar (2021), Available at: https://www.erozgaar.pitb.gov.pk/
114. E-Rozgaar (2021), Available at: https://www.erozgaar.pitb.gov.pk/
115. Invest2Innovate (2019), "i2i's New Study: Pakistan Startup Ecosystem Report 2019". Available at: https://invest2innovate.com/i2is-new-study-pakistan-startup-ecosystem-report-2019/
116. P@SHA (2021), "Who We Are?". Available at: https://www.pasha.org.pk/about-us/who-we-are/

BOX 4.
EXAMPLES OF PROMINENT TECHNOLOGY COMPANIES IN PAKISTAN

COMPUTING SOLUTIONS PRIVATE LIMITED

Computing Solutions Private Limited (CSP) has been an official "Retail Pro International" (a world-leading retail management and point-of-sale software solution) business partner in Pakistan since 2017.[117] The company offers advanced retail solutions such as virtual fitting rooms, real-time analytics and inventory management to retail chains. CSP has obtained multiple awards for its innovative retail IT solutions such as the "Jonathan Scutt Memorial Technical Excellence Award 2020" and "Service Excellence Award – Middle East & Africa 2020".[118]

INFOTECH

Infotech, established in 1995, is a provider of integrated systems with expertise in key industries (e.g., financial services and government) and emerging markets.[119] From offices across the world, InfoTech's products and services offer clients technological tools, domain expertise and consulting experience to implement these systems. One of its products is "Capizar", which is a capital markets product suite including automated trading platforms, electronic depository systems, regulatory compliance portals and market surveillance systems. "Capizar" has been implemented in 13 markets and processes more than a billion dollars' worth of equities and bonds trades daily; examples of implementations include the Ghana Stock Exchange, Zimbabwe Stock Exchange and East African Community's Capital Markets Infrastructure (Tanzania, Rwanda, Burundi and Uganda).[120] Another product, "GeReg", an e-government service platform, helps to simplify government services and improve the workflows within ministries. Governments in Ghana and Tanzania have been using the platform for various services such as citizen registrations and business filings.[121]

TPS PAKISTAN PRIVATE LIMITED

Founded in 1996, TPS is a provider of cards and payment solutions, serving various commercial and central banks, telecommunications operators and financial institutions globally.[122] Through its products and services (e.g., "IRIS Payment Platform", "Biometric Identity"), TPS helps clients to digitise their offerings, minimise time-to-market operations, unlock new revenue streams and reduce risks. One of its clients is Bank Nizwa which is Oman's first dedicated Islamic Bank. Bank Nizwa has utilised TPS' "IRIS Money Platform" to offer digital wallets and payment services to its customers.[123]

117. CSP (2021), "About Us". Available at: https://cs.com.pk/#
118. Dawn (2020), "This Pakistan-based software company is the first to win the prestigious Tech Excellence Award in the country". Available at: https://www.dawn.com/news/1588772/ and YouTube (2020), "How is the retail market growing in Pakistan?". Available at: https://www.youtube.com/watch?v=NrSLJYEgms8
119. InfoTech (2021), "About Us". Available at: https://www.infotechgroup.com/about/
120. Pro Pakistani (2015), "InfoTech Helps Ghana Automate Its Stock Exchange". Available at: https://propakistani.pk/2015/11/10/infotech-helps-ghana-automate-its-stock-exchange/?__cf_chl_jschl_tk__=pmd_6WRsbcsedyiuPl29E1zbgPmEC5Hdih7Sl005pRXzQ9w-1629426914-0-gqNtZGzNAiWjcnBszQml; Technology TImes (2017), "Info-Tech Pakistan To Digitize Malawi Stock Exchange". Available at: https://www.technologytimes.pk/2017/12/04/info-tech-pakistan-to-digitize-malawi-stock-exchange/; The Nation (2014), "InfoTech signs deal with Zimbabwe Stock Exchange". Available at: https://nation.com.pk/03-Jun-2014/infotech-signs-deal-with-zimbabwe-stock-exchange and EAC, "Capital Markets Infrastructure adding value to East Africans". Available at: https://www.eac.int/financial/68-sector/financial
121. The Express Tribune (2011), "Ghana registrar: Pakistani firm to automate department". Available at: https://tribune.com.pk/story/140674/ghana-registrar-pakistani-firm-to-automate-department and Modern Ghana (2010), "Registrar General's Department and Infotech sign agreement". Available at: https://www.modernghana.com/news/288509/registrar-generals-department-and-infotech-sign.html
122. TPS (2021), "About Us". Available at: https://www.tpsworldwide.com/about-us/about-us/
123. TPS, "Bank Nizwa successfully goes live with IRIS Money to launch Digital Wallets". Available at: https://www.tpsworldwide.com/press_releases/bank-nizwa-successfully-goes-live-iris-money-launch-digital-wallets/

development in the digital economy, particularly in the areas of digital entrepreneurship, research and freelancing.[124] This agenda has been reflected in a series of recent programmes led by government-industry partnerships. For example, the government worked with industry leaders to introduce its flagship "DigiSkills" initiative in 2018. With the aim to train up to one million freelancers, "DigiSkills" provides free massive open online courses (MOOCs) covering a broad range of digital tools and skills such as e-commerce management, graphic design and search engine optimisation.[125] These courses are designed by local industry leaders, and delivered in collaboration with online learning experts from the Virtual University of Pakistan, the country's first distance learning-based university.[126] Since its launch in 2018, over 750,000 people have benefited from the courses provided by "DigiSkills".[127] Under the "Digital Pakistan Policy", internship programmes targeting young IT graduates have also been developed in partnership with the industry.[128] These programmes were curated to ensure graduates are "market ready for cutting edge technologies", such as IoT, AI, robotics, Fintech, cybersecurity and big data.[129]

- **Providing skills training to MSME workers.** Support has also been provided for the development of digital skills for MSME owners and their employees through government-industry collaboration. An important initiative in this regard is the Trade Development Authority of Pakistan's (TDAP) Memorandum of Understanding (MoU) with Alibaba, a global giant in e-commerce, to provide online and offline training programmes to MSMEs.[130] Under this partnership, the TDAP will select MSMEs to participate in the training programmes, while Alibaba will provide the training programmes in a bid to facilitate the onboarding of these MSMEs onto Alibaba's e-commerce platform.[131]

- **Promoting equitable access to digital skilling opportunities, especially for females.** In Pakistan, the level of digital literacy for segments of the population, such as women and rural communities, is relatively low.[132] A study by the United Nations University found that only 3 percent of women in Pakistan were able to copy or move a file or folder on a computer.[133] Furthermore, Pakistan has one of the largest mobile phone ownership gender gaps globally; 68 percent of men own a mobile phone, as compared to only 43 percent of women.[134] This suggests that women have fewer opportunities to access digital services, and could potentially also be less digitally savvy. Recognising digital inclusion as a significant priority, the government has announced a flagship programme, "ICT for Girls", to provide state-of-the-art computer labs across the country's 114 Women Empowerment Centres. These facilities provide free digital skills training to widows, unemployed women, orphans, and girls from low-income backgrounds across the country.[135] It is envisioned that the digital skills learned in the centres, such as database management and coding, would provide beneficiaries with greater access to job opportunities and allow them to become financially independent. To date, around 10,000 individuals have benefited from the

124. Ministry of IT and Telecom, Pakistan (2018), Digital Pakistan Policy. Available at: http://moib.gov.pk/Downloads/Policy/DIGITAL_PAKISTAN_POLICY(22-05-2018).pdf
125. Ministry of IT and Telecom (2020), "DigiSkills training program". Available at: https://digiskills.pk/#Home
126. The News (2018), "60,331 trained in first batch under 'Digiskills Programme'. Available at: https://www.thenews.com.pk/print/359874-60-331-trained-in-first-batch-under-digiskills-programme
127. Ministry of IT and Telecom (2020), "DigiSkills training program". Available at: https://digiskills.pk/#Home
128. Ministry of IT and Telecom, Pakistan (2018), Digital Pakistan Policy. Available at: http://moib.gov.pk/Downloads/Policy/DIGITAL_PAKISTAN_POLICY(22-05-2018).pdf
129. Ministry of IT and Telecom, Pakistan (2018), Digital Pakistan Policy. Available at: http://moib.gov.pk/Downloads/Policy/DIGITAL_PAKISTAN_POLICY(22-05-2018).pdf
130. Alibaba Group (2017), "Alibaba signs MoU with Trade development Authority of Pakistan to support e-commerce development of SMEs and financial services". Available at: https://www.alibabagroup.com/en/news/press_pdf/p170516.pdf
131. Alibaba Group (2017), "Alibaba signs MoU with Trade development Authority of Pakistan to support e-commerce development of SMEs and financial services". Available at: https://www.alibabagroup.com/en/news/press_pdf/p170516.pdf
132. United Nations University (2019), Taking Stock: Data and Evidence on Gender Digital Equality. Available at: https://i.unu.edu/media/cs.unu.edu/attachment/4040/EQUALS-Research-Report-2019.pdf
133. United Nations University (2019), Taking Stock: Data and Evidence on Gender Digital Equality. Available at: https://i.unu.edu/media/cs.unu.edu/attachment/4040/EQUALS-Research-Report-2019.pdf
134. United Nations University (2019), Taking Stock: Data and Evidence on Gender Digital Equality. Available at: https://i.unu.edu/media/cs.unu.edu/attachment/4040/EQUALS-Research-Report-2019.pdf
135. Universal Service Fund (2018), "ICT for Girls." Available at: https://usf.org.pk/projects/detail/special-project/ICTforGirls

program.[136] To promote female entrepreneurship, the government introduced a special minimum quota for women entrepreneurs in Pakistan's National Incubation Centres (NICs) which were created to provide additional resources for start-ups to grow in Pakistan.[137] Under this programme, up to 30 percent of spaces across the country's five NICs have been reserved for women entrepreneurs.[138]

- **Incorporating digital technology into educational curriculums.** As part of a partnership between the Federal Directorate of Education and the Jazz Foundation that aims to improve the country's quality of education for public schools, the government also established the "Jazz Smart Schools" programme. The programme adopts a blended learning approach that combines traditional classroom teaching with the use of curated online teaching tools, such as mobile tablets, to educate girls from public schools in Islamabad.[139] Since its inception in 2017, over 28,000 school children across 75 schools have participated in the programme.[140] The results from the programme have been positive, with students in participating schools recording better learning outcomes and higher levels of digital literacy than children from other public schools.[141]

Although the start-up ecosystem in Pakistan has been growing significantly, there are still several challenges hindering its full potential. A report by Invest2Innovate, an accelerator programme in Pakistan, revealed that entrepreneurs faced difficulties in obtaining rigorous and customised guidance (e.g., business skills development, mentorship, access to investors, tax compliance) from support programmes such as incubators and accelerators.[142] For instance, half of the start-ups interviewed mentioned that they received limited or no support on dealing with regulatory or legal processes, leading to unavoidable costs when they had to fix these issues later. There was also consensus that the advice and mentorship received in incubators were similar for start-ups in the same cohort, which did not provide as much value as customised feedback. Another challenge faced by start-ups is financing - while there has been a surge in venture capital funding, there is still a lack of access to early stage and growth stage capital.[143] Based on the analysis by Invest2Innovate, 64 percent of start-ups perceived the investment raising process as difficult in Pakistan.[144] There are also gender gaps in the start-up ecosystem. Studies have shown that

136. *ICT for Girls (2020), "Women Empowerment Centres". Available at: https://www.ictforgirls.org.pk/wec.html*
137. *ITU (2018), "How Pakistan is promoting women and girls in ICT". Available at: https://news.itu.int/how-pakistan-is-promoting-women-and-girls-in-ict/*
138. *ITU (2018), "How Pakistan is promoting women and girls in ICT". Available at: https://news.itu.int/how-pakistan-is-promoting-women-and-girls-in-ict/*
139. *Jazz Foundation (2020), "Jazz Smart School Programme". Available at: http://www.jazzfoundation.com.pk/our-program/education/*
140. *Digital Pakistan (2019), "Jazz Celebrates the Success of its Smart Schools Programme". Available at: https://digitalpakistan.pk/blog/jazz-celebrates-the-success-of-its-smart-schools-programme/*
141. *Digital Pakistan (2019), "Jazz Celebrates the Success of its Smart Schools Programme". Available at: https://digitalpakistan.pk/blog/jazz-celebrates-the-success-of-its-smart-schools-programme/*
142. *Invest2Innovate (2019), "i2i's New Study: Pakistan Startup Ecosystem Report 2019". Available at: https://invest2innovate.com/i2is-new-study-pakistan-startup-ecosystem-report-2019/*
143. *The News (2021), "Pakistan launches growth funds for start-ups". Available at: https://www.thenews.com.pk/print/787541-pakistan-launches-growth-funds-for-startups and McKinsey & Company (2019), Starting up: Unlocking entrepreneurship in Pakistan. Available at: https://www.mckinsey.com/~/media/mckinsey/featured%20insights/middle%20east%20and%20africa/pakistans%20start%20up%20landscape%20three%20ways%20to%20energize%20entrepreneurship/starting-up-unlocking-entrepreneurship-in-pakistan.ashx*
144. *Invest2Innovate (2019), "i2i's New Study: Pakistan Startup Ecosystem Report 2019". Available at: https://invest2innovate.com/i2is-new-study-pakistan-startup-ecosystem-report-2019/*

Pakistani start-ups led by men raised investment more often than start-ups led by women.[145] Furthemore, Pakistan has one of the world's lowest rates of female entrepreneurs. For example, less than five percent of women in Pakistan are engaged in entrepreneurial activities as compared to over 20 percent of men.[146] Although the Pakistani Government has started to implement policies to tackle these challenges, more could be done to accelerate the start-up ecosystem including actions such as:

- **Tailor relevant and rigorous support services to entrepreneurs.** Government agencies could conduct a review of public and private incubators to ensure that their curricula are helpful for start-ups across industries and growth stages. For instance, there could be more focus on industry-specific mentor matching. The Australian Government has introduced the "Entrepreneur's Programme" that aims to provide practical and tailored support for local start-ups.[147] To provide customised approaches, the initiative has business experts across relevant industry sectors to help businesses innovate and commercialise new products.

- **Provide strong government financial support for start-ups.** The Ministry of Information Technology and Telecommunications launched the country's first investment platform "PakImpactInvest" to bridge the gap between entrepreneurs and investors.[148] In addition to this initiative, the government could consider the risk-sharing approaches taken by Hong Kong and South Korea to expand the funding options for start-ups. In 2017, the Hong Kong Government has set up a HKD2 billion (USD258 million) "Innovation and Technology Venture Fund (ITVF)" to attract more venture capital funds to co-invest in local innovation and technology (I&T) start-ups in Hong Kong.[149] While there were a significant number of angel investors providing seed to pre-Series A funding during that period, the funding sources available to I&T start-ups were relatively inadequate, particularly from Series A to B stages.[150] The ITVF thus aimed to match up to HKD400 million (USD52 million) of investments with a co-investment partner in order to further stimulate investment from the private sector.[151] In South Korea, under the "Innovative Startup Package", every start-up funded by the government is only required to pay back ten percent of the funding received upon success.[152]

- **Bridge the gender gaps in the ecosystem.** In Pakistan, the government has implemented initiatives to close these gaps. The Small and Medium Enterprises Development Authority (SMEDA) have introduced women entrepreneurship initiatives such as Women Business Development Centres (WBDCs) and training programmes to help women set up successful businesses.[153] To further facilitate female participation in

145. IFC, "Sarmayacar".
Available at: https://www.ifc.org/wps/wcm/connect/64dae82b-dcbc-480f-b9fd-6fb5756b0875/IFC+We-Fi+Project+Brief+-+Sarmayacar.pdf?MOD=AJPERES&CVID=npeoNMf
146. World Bank (2018), "WomenX: Multiplying the Power of Women Entrepreneurs in Pakistan". Available at: https://www.worldbank.org/en/news/feature/2018/11/01/womenx-multiplying-the-power-of-women-entrepreneurs-in-pakistan and The News (2017), "World Bank says Pakistan ranks lowest among countries with women entrepreneurs".
Available at: https://www.thenews.com.pk/print/243346-World-Bank-says-Pakistan-ranks-lowest-among-countries-with-women-entrepreneurs
147. Australian Government (2021), "How the Entrepreneurs' Programme works".
Available at: https://business.gov.au/grants-and-programs/entrepreneurs-programme/how-the-entrepreneurs-programme-works
148. The News (2021), "Pakistan launches growth funds for start-ups". Available at: https://www.thenews.com.pk/print/787541-pakistan-launches-growth-funds-for-startups
149. Innovation and Technology Fund (2017), "Innovation and Technology Venture Fund (ITVF)".
Available at: https://www.itf.gov.hk/en/funding-programmes/supporting-start-ups/itvf/index.html
150. Innovation and Technology Fund (2016), Item for Finance Committee. Available at: https://www.itf.gov.hk/filemanager/en/content_43/FCR-2016-17-67.pdf
151. Innovation and Technology Fund (2017), "Innovation and Technology Venture Fund (ITVF)".
Available at: https://www.itf.gov.hk/en/funding-programmes/supporting-start-ups/itvf/index.html
152. Tech Incubator Programme for Startup (2020), Available at: http://www.jointips.or.kr/about_en.php
153. SMEDA, "Women Entrepreneurship Initiatives". Available at: https://smeda.org/index.php?option=com_content&view=article&id=236&Itemid=574#

the start-up ecosystem, gender-specific laws and strategies regarding small businesses could be considered. In the Philippines, where women-owned SMEs account for a quarter of all SMEs, the government has enacted a range of gender-specific regulations to support women's entrepreneurship.[154] This includes the "Women's Empowerment, Development and Gender Equality Plan (2013-2016)" and "Republic Act 7882: Provision of Assistance to Women Engaging in Micro and Cottage Business Enterprises, and for other purposes" which offer loans and free training to existing and aspiring women entrepreneurs.[155]

While the current training initiatives are important steps towards enabling greater access to digital skills training for Pakistan's working population and future workforce, there is still much scope for improvement to the digital skills base and education system. A study by the World Economic Forum found that stakeholders from the private sector have expressed dissatisfaction with competencies of undergraduates – especially those from technology institutes – as the skills they possess do not reflect the evolving needs of the digital sector.[156] In addition, the World Economic Forum's "Global Competitiveness Index 2019" ranked Pakistan as 73rd out of 141 countries on the ability of the active working population to possess and use digital skills.[157] The country has also performed poorly on the "2020 Global Talent Competitiveness Index" developed by INSEAD, the Adecco Group and Google, which ranked the country 106th out of 132 countries.[158] At the same time, the benefits of these programmes appear to be largely focused on the freelancer segment of the workforce, which account for less than one percent of the country's working population.[159] Beyond digital tools for online freelance work, there is scope for the Pakistani Government to expand digital skills training opportunities to the following areas:

- **Forge close public-private partnerships to improve relevance of skills training.** Besides encouraging apprenticeships and on-the-job training, the government could explore collaborations with industry partners to jointly develop skills-based training programmes that create a healthy pipeline of graduates who can fill growing, in-demand jobs. It could explore similar models like those in the Philippines – where the government consulted employers and employees to collect job market data and understand how employee competencies could fulfil evolving industry needs. Partnering human resource consulting firm, SFI Career Centre, the Philippine Department of Labour and Employment (DOLE) undertook a country-wide mapping exercise of "21st-century skills", known as the "Philippines Talent Mapping Initiative".[160] This involved assessing about 100,000 Filipinos on their competency levels across 15 defined

154. Sydney Southeast Asia Centre (2017), Women and entrepreneurship. Available at: https://investinginwomen.asia/wp-content/uploads/2018/01/FS_WSMEs-Philippines.pdf
155. ADB (2018), Emerging Lessons on Women's Entrepreneurship in Asia and the Pacific: Case Studies from the Asian Development Bank and The Asia Foundation. Available at: https://www.adb.org/sites/default/files/publication/459551/women-entrepreneurship-lessons-asia-pacific.pdf; Philippine Commission on Women (2014), Women's Empowerment, Development and Gender Equality Plan, 2013-2016. Available at: https://pcw.gov.ph/assets/files/2019/04/Womens-Edge-Plan.pdf?x25110 and Philippine Commission on Women (2021), "Republic Act 7882: Provision of Assistance to Women Engaging in Micro and Cottage Business Enterprises, and for other purposes". Available at: https://pcw.gov.ph/republic-act-7882-provision-of-assistance-to-women-engaging-in-micro-and-cottage-business-enterprises-and-for-other-purposes/
156. State Bank of Pakistan (2018), Annual report 2017/2018. Available at : http://www.sbp.org.pk/reports/annual/arFY18/Chapter-07.pdf
157. World Economic Forum, (2019) "The Global Competitiveness Report 2019". Available at: http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf
158. 2020 Global Talent Competitiveness Index. Available at: https://gtcistudy.com/the-gtci-index/
159. Based on AlphaBeta analysis of the number of freelance workers in Pakistan and the total working population in Pakistan. For data sources, see: The Nation (2020), "1.15m Pakistanis contribute to global freelance economy". Available at: https://nation.com.pk/19-Sep-2018/1-15m-pakistanis-contribute-to-global-freelance-economy; International Labor Organization (2020). Available at: https://ilostat.ilo.org/topics/
160. "Philippine Talent Map". Available at: https://talentmap.ph/

skills categorised into three groups: behavioural, social-emotional, and higher-order thinking. As part of this, DOLE undertook a series of industry consultations with employers in a range of industries to understand how their findings correlated with emerging trends including Industry 4.0 (I4.0).[161] Both public and private sectors could also consider standardising job postings in order for government agencies to easily obtain a complete measurement of the current job market conditions as new occupations emerge with the advancement of technology.

- **Address the gender gap in digital skilling efforts.** While Pakistan has launched several programmes that were instrumental in facilitating access to digital skills training for underserved communities, there is room for further efforts to support more of such individuals, as well as bridge the skills that they learn through these programmes to income-earning opportunities. The programme offered by Indonesia's Ministry of Tourism and Creative Economy not only trains females in digital skills, but also connects them with job opportunities, providing some useful insights for Pakistan. In Indonesia, the Ministry of Tourism and Creative Economy launched "Coding Mom" in 2016, a two-month coding course to improve workforce participation rates of women.[162] This scheme aims to attract mothers and female migrant workers returning from overseas back to the workforce by teaching them digital marketing and how to write basic programming codes that could allow them to set up their businesses digitally. Within three years of its launch, "Coding Mom" has trained over 600 graduates and given moms the knowledge in helping them gain confidence when communicating with their husbands about technology-related topics.[163]

- **Cultivate digital talent to nurture the local gaming industry.** According to the International Game Developers Association in Pakistan, the gaming industry earns about USD25 million in revenue from domestic markets annually and more than 8,000 professionals participate in game development.[164] While some game developers have gained recognition on the international stage (such as Hazel Mobile Group, GeniTeam and Game District) , the industry faces a shortage of game developers, artists, and graphic designers due to the absence of professional education in game design.[165] On the other hand, Vietnam is seen as a hub for regional tech talent and game developers. With an estimated developer population of around 350,000 to 400,000, the country has a large tech talent pool and its gaming revenue for both PC and mobile games reached USD477 million in 2019.[166] Box 5 provides further details on how the country has nurtured a huge pool of digital talent and created a vibrant local esports scene.

- **Create sector-specific digital skills training programmes, particularly in non-tech sectors.** The country could consider structured interventions that train non-technology companies in the range of digital technologies that could be adopted, and the requisite skills to do so. As illustrated in Chapter 1, non-tech, traditional sectors are some of the largest beneficiaries of digital adoption. To fully unlock the economic benefits of technologies in these sectors, digital upskilling will be crucial and have to be curated based on the nature of the specific technology applications. Pakistan can consider international best practices in both Vietnam's state-owned sector training institutions and how the Singapore government has partnered with the industry to create traineeships under its "SGUnited Jobs and Skills Package" (see Box 6).

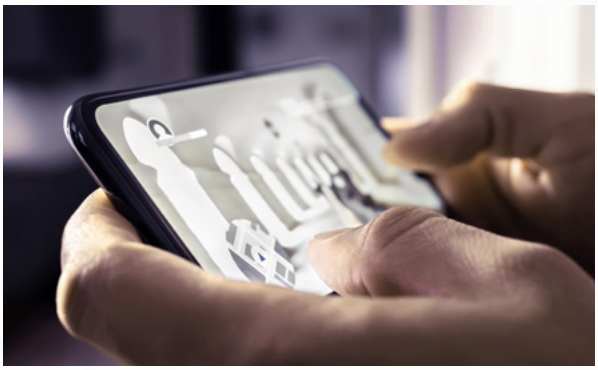
161. "Philippine Talent Map". Available at: https://talentmap.ph/
162. Aim2Flourish (2021), "The True Definition of Wonder Woman". Available at: https://aim2flourish.com/innovations/the-true-definition-of-wonder-woman
163. Aim2Flourish (2021), "The True Definition of Wonder Woman". Available at: https://aim2flourish.com/innovations/the-true-definition-of-wonder-woman
164. Dawn (2019), "State of play: Is video game development on the rise in Pakistan?". Available at: https://www.dawn.com/news/1475376
165. MIT Technology Review (2020), "Game on for Pakistan's esport industry". Available at: http://www.technologyreview.pk/game-on-for-pakistans-esport-industry/
166. Sources include: e27 (2021), "How young and women developers are nurturing the tech ecosystem for a stronger post-COVID-19 world". Available at: https://e27.co/how-young-and-women-developers-are-nurturing-the-tech-ecosystem-for-a-stronger-post-covid-world-20210108/; Niko Partners (2020), Asia Country Spotlight: Vietnam. Available at: https://s3.hatchbuck.com/MediaFiles/443e913ed76db5e9f411d72a517329aa066bd17ed43e6c064495df07aa0f8624.pdf

BOX 5.
VIETNAM EQUIPS STUDENTS WITH PROGRAMMING SKILLS AND PROMOTES ESPORTS AS A PROFESSIONAL CAREER

In 2020, the mobile data and analytics company, App Annie, ranked four Vietnamese game publishers among the top 10 largest number of app downloads.[167] Besides nurturing successful game publishers, the country's technology talent, at the national level, was also well-recognised in Coursera's Global Skills Index 2020, which ranked the country second among 60 countries in technology skills mastery.[168] In particular, technology skills in software engineering (i.e., software development and algorithms), operating systems (i.e., Android and iOS operating system) and human-computer interaction (i.e., user interface and machine translation) are essential in game development.

This box identifies steps taken by the country to develop a healthy pipeline of digital talent that propelled the country to its current status as a developer talent hub. Vietnam has inculcated a **strong focus on programming** in educational curriculums. Students in Vietnam begin basic programming lessons in second grade and by grade four, students start programming Logo, aneducational programming language allowing users to draw shapes using a graphical turtle.[169] By grade five, students in Vietnam are writing procedures containing loops, on par with grade 11 students in the United States, and were once deemed likely to succeed in Google's interview process.[170] The country also has undergraduate courses tailored to groom budding game developers, such as Bachelor of Science (Honours) in Computer Games Design and Programming offered by the British University Vietnam.[171]

In addition, the government has been **promoting esports as a professional career**. The Vietnam Recreational and Electronic Sport Association has organised multiple esports tournaments and recruited Vietnamese representatives to compete in international arenas. Moreover, the association has named esports as one of the 40 disciplines at the 31st Southeast Asian Games to be held in 2021.[172]



167. PRNewswirre (2020), "App Annie Announces Global and Asian Top Publishers of 2020".
Available at: https://www.prnewswire.com/in/news-releases/app-annie-announces-global-and-asian-top-publishers-of-2020-840222512.html
168. Coursera (2020), "Global Skills Index". Available at: https://www.coursera.org/gsi#form
169. Letolle Consulting (2020), "Can Vietnam Rise to Become A Global Technology Hub?".
Available at: https://www.letolleconsulting.com/post/can-vietnam-rise-to-become-a-global-technology-hub
170. Good (2013), "Google Engineer Says Vietnamese 11th Graders Know Enough Computer Science to Pass Their Interview Process".
Available at: https://www.good.is/articles/google-engineer-says-vietnamese-11th-graders-know-enough-computer-science-to-pass-their-interview-process
171. British University Vietnam (2021), "BSc (Honours) in Computer Games Design and Programming".
Available at: https://www.buv.edu.vn/academics/courses-programmes/bsc-hons-game-design/
172. Viet Nam News (2021), "Professional e-sport players can earn high incomes".
Available at: https://vietnamnews.vn/sports/873144/professional-e-sport-players-can-earn-high-incomes.html

BOX 6.
VIETNAM AND SINGAPORE PROVIDE SECTOR-SPECIFIC DIGITAL SKILLS TRAINING AND APPRENTICESHIPS

VIETNAM'S STATE-OWNED SECTOR TRAINING INSTITUTIONS

In Vietnam's centrally managed economy, several state-owned sectors had their training institutions in their corporate field.[173] In the shipbuilding industry, VINASHIN trains between 6,000 and 7,000 technical workers annually. In the petroleum industry, the Petroleum Vocational College has trained more than 70,000 people including 15,000 technical workers in 27 different professional skills areas. These enterprises organise vocational training for employees under three main forms: coaching at work, focused training, and training in business outside the enterprise focus.

SINGAPORE'S TRAINEESHIPS UNDER "SGUNITED JOBS AND SKILLS PACKAGE"

Amid the economic slowdown during the pandemic, the Singapore government launched a SGD2-billion "SGUnited Jobs and Skills Package" which placed nearly 76,000 individuals into jobs, traineeships, company attachments, and skills training.[174] The Ministry of Manpower and Workforce Singapore, a statutory board under the Ministry of Manpower, created 21,000 traineeship positions in the Research and Development (R&D) industry, including universities, A*STAR (Agency for Science, Technology and Research) research institutes, AI Singapore, and local deep tech startups.[175] This provides new graduates with opportunities to gain industry-relevant experience and boost their employability when the economy recovers. At the end of 2020, the sectors with the highest number of placements include healthcare, information and communications, manufacturing, professional services and financial services.[176] Host companies under this programme also received co-funding of up to 80 percent of training allowance from Workforce Singapore.

Photo Source: https://www.rp.edu.sg/education-and-career-guidance/sgunited-jobs-and-skills-package

173. Asian Development Bank (2020), Viet Nam Secondary Education Sector Assessment, Strategy, and Road Map.
Available at: https://www.adb.org/sites/default/files/institutional-document/561121/viet-nam-secondary-education-assessment.pdf
174. Ministry of Finance (2021), Annex C-2: SGUnited Jobs and Skills Package.
Available at: https://www.mof.gov.sg/docs/librariesprovider3/budget2021/download/pdf/annexc2.pdf
175. Workforce Singapore (2020), SGUnited Traineeships Programme factsheet for trainees.
Available at: https://www.wsg.gov.sg/content/dam/ssg-wsg/wsg/sgunited-hostcompanies/SGUT_Factsheet_HostOrganisations_Dec2020_Online.pdf
176. The Straits Times (2020), "Majority of SGUnited job placements in healthcare".
Available at: https://www.straitstimes.com/singapore/jobs/majority-of-sgunited-job-placements-in-healthcare

ADVANCING THE PRIZE — GOOGLE'S CONTRIBUTION TO ADVANCING THE DIGITAL OPPORTUNITY IN PAKISTAN

An important player spearheading digital transformation in Pakistan, Google has made significant contributions in each of the three pillars for digital transformation outlined in Chapter 2. By introducing a lightweight operating system, Android (Go Edition), people from lower socio-economic backgrounds can participate in the digital economy and access the Internet. Through YouTube, local content creators such as Village Food Secrets can share their content with international audiences and amass huge popularity. Google is building strong partnerships with government agencies and industry associations to promote innovation through the "Nest I/O" technology incubator and supporting Pakistani start-ups. Through programmes such as "Grow with Google", which trained over 5,500 SMEs on how to leverage digital tools, and "CS First", Google is supporting the development of a digitally skilled workforce.

In addition, Google's products create various economic benefits for businesses, consumers and the wider society in Pakistan. Google's products and services are estimated to bring about total annual business and consumer benefits worth PKR1 trillion (USD6.3 billion) and PKR210.2 billion (USD1.3 billion), respectively, in Pakistan. These products include Google Search, Google Ads, AdSense, YouTube, Google Play, Google Maps, Google Drive, and Google Docs, Sheets and Photos. For businesses, economic benefits come in the form of increased revenue through increased customer outreach and access to new markets, as well as improved productivity through time savings. In addition, consumers experience greater convenience, access to information, and more avenues for learning and skills development. Beyond its economic

"ADVANCING THE PRIZE"
GOOGLE'S CONTRIBUTION TO PAKISTAN'S DIGITAL TRANSFORMATION JOURNEY

1. Develop infrastructure to support the local tech ecosystem
2. Create a conducive environment for Information Technology (IT) exports
3. Promote innovation and digital skills

EXAMPLES OF INITIATIVES BY GOOGLE

- **ANDROID (GO EDITION)** provides a lighter Android operating system to power affordable smartphones
- **YOUTUBE** enables Pakistani creators to export local content and reach international audiences
- Google trained **OVER 40,000** Pakistanis in application and software development through its programmes

GOOGLE ALSO DELIVERS WIDER BENEFITS TO BUSINESSES, CONSUMERS AND SOCIETY IN PAKISTAN

BUSINESSES

Through significant boosts to productivity and customer outreach, Google is estimated to have supported **PKR1 trillion (USD6.3 billion)** worth of annual benefits for businesses in Pakistan[1]

CONSUMERS

By helping consumers save time and generating value through their free products, Google is estimated to have supported **PKR210.2 billion (USD1.3 billion)** worth of annual benefits for consumers in Pakistan[2]

SOCIETY

By enabling businesses to unlock new revenue streams and expand their businesses, Google indirectly supports **over 410,000 jobs** in Pakistan. Its other initiatives, such as extending digital skilling opportunities to underrepresented communities, also provide intangible benefits to the wider society

1. Business benefits refer to the estimated economic impact from the following products: Google Search; Google Ads; AdSense; YouTube; Google Play; and Google Maps.
2. Consumer benefits refer to the estimated economic impact from the following products: Google Search; Google Maps; YouTube; Google Drive; Docs, Sheets and Photos; Google Play.

Note: All data is based on AlphaBeta analysis using a range of original and third-party sources. See Appendix in report for detailed methodology. Figures are estimated based on the latest available annual data as at time of research in 2020

contributions to businesses and individuals, Google also supports benefits to the broader society in Pakistan. By enabling businesses to unlock new revenue streams and expand their businesses through the use of Google Ads, AdSense, and YouTube, Google indirectly supports over 410,000 jobs in Pakistan. Furthermore, Google delivers intangible benefits through its programmes, such as extending digital skilling opportunities to underrepresented communities, promoting safe Internet use, supporting arts and culture, and providing in-kind advertising credits to non-profit organisations in Pakistan.

3.1 GOOGLE CONTRIBUTES TO EACH OF THE THREE PILLARS OF DIGITAL TRANSFORMATION IN PAKISTAN

Across the three pillars of action, Google has made significant contributions in Pakistan through its programmes, products and services.

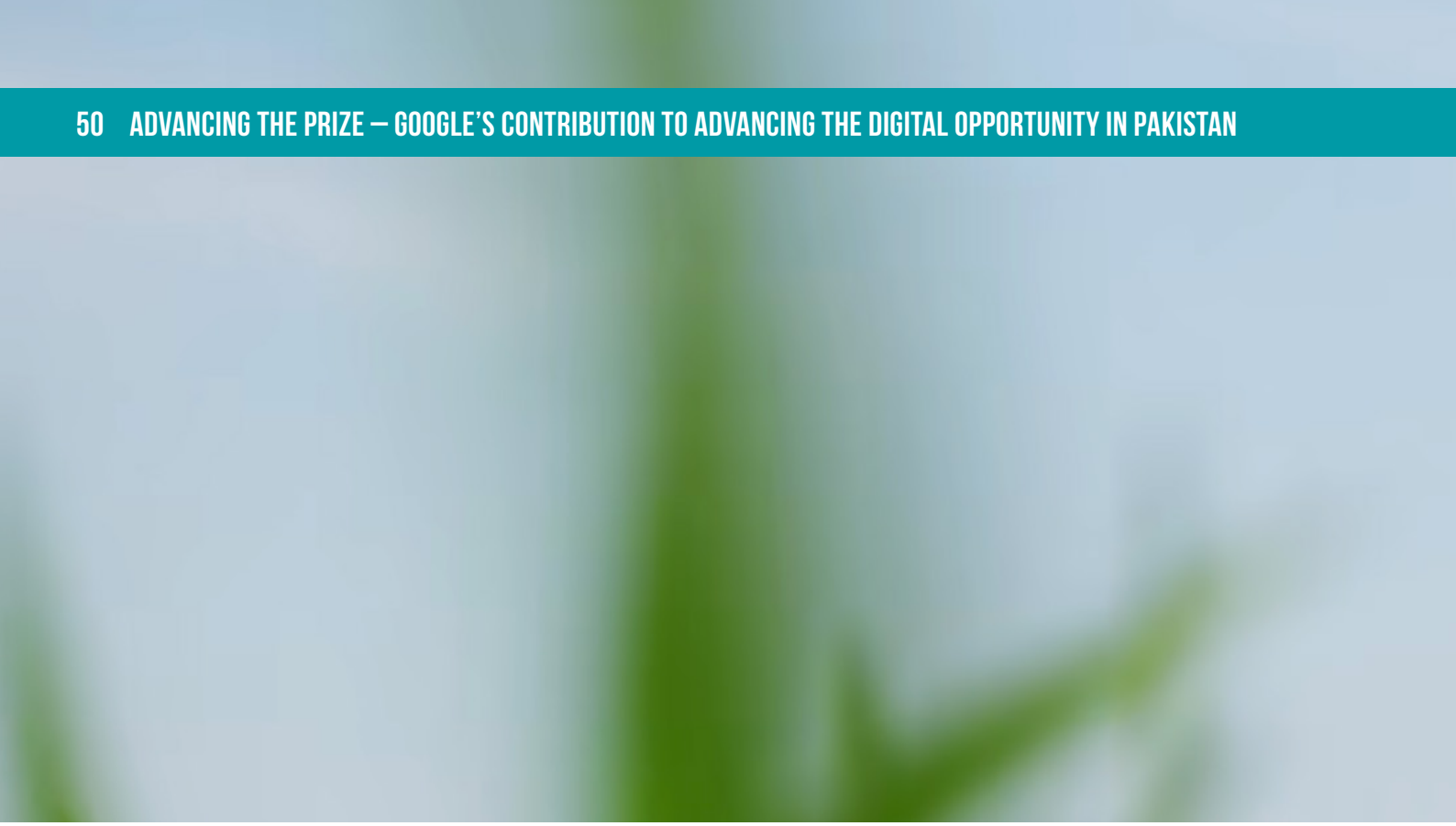
To **develop infrastructure to support the local tech ecosystem (Pillar 1)**, Google is involved in the following:

- **Launching a lightweight operating system to support digital inclusion.** Recognizing that device affordability is a key factor that ensures individuals can connect to the Internet, Google has introduced a lighter, yet powerful Android operating system – Android (Go Edition) – to power affordable, entry-level smartphones. Built to run on phones with less than 1.5 gigabyte of random-access memory (i.e., computing power), the modified Android operating system ensures people from lower socio-economic backgrounds can participate in the digital economy and access the Internet.[177]

To **create a conducive environment for IT exports (Pillar 2)** to promote demand for Pakistani IT goods and services, including digital content, Google has launched the following efforts in Pakistan:

- **Enabling local content creators to gain an international audience.** YouTube played a role in the sports industry when it carried a first-ever live-stream of the Pakistan Super League (PSL), Pakistan's nationally celebrated cricket tournament, in 2019. The livestream managed to draw over six million unique viewers from across the globe. In fact, Pakistani cricket player Shoaib Akhtar also hosts his own YouTube channel, with a fast-growing following. Shoaib regularly produces content to discuss and share his views on the latest cricket developments and also produces vlogs of his personal life. His channel was ranked in the top ten fastest-growing channels among new creators.[178] Additionally, YouTube played a life-changing role for popular content creator, Village Food Secrets, run by Mubashir Saddique.[179] Hailing from a small village in Punjab, Mubashir started a YouTube channel focused on traditional style cooking. Recently featured on YouTube's global blog, Mubashir's channel has amassed huge popularity, with over three million subscribers.[180]

177. Android Authority (2019), "Google launches Android Go based on Android 10 for entry-level phones". Available at: https://www.androidauthority.com/android-go-android-10-1033412/
178. YouTube (2021), "Shoaib Akhtar". Available at: https://www.youtube.com/channel/UCeWqACGRU5gT0BXeFhrixWA
179. YouTube (2021), "Village Food Secrets". Available at: https://www.youtube.com/channel/UCQexaAjPn3-1MCE4DmBK3Tg
180. YouTube Official Blog (2021), " From homemade tripod to 2.8 million subscribers: 'Village Food Secrets' is one of Pakistan's leading creators". Available at: https://blog.youtube/creator-and-artist-stories/homemade-tripod-28-million-subscribers-village-food-secrets-one-pakistanis-leading-creators/



- **Promoting protection and privacy of data and information.** Robust privacy safeguards and user controls encourage individuals and businesses to engage in digital trade. As a strong advocate for smart, interoperable and adaptable data protection regulations, Google is supporting Pakistan's efforts to develop personal data protection legislation by preparing a set of high-level principles on data protection. Governments and businesses can consider adopting Google's "Framework for Responsible Data Protection Regulation" to protect individuals and communities from harm and misuse of data, while enabling businesses and consumers to benefit from the benefits of innovative services.[181] One of the provisions places a strong emphasis on giving individuals the ability to manage their personal information that they have provided to an organisation, including making the data available for export in a machine-readable format. The framework also encourages global interoperability by encouraging countries to adopt an integrated framework of privacy regulations and cross-border data transfer mechanisms that ensure protections follow the data, not national boundaries.

Google also launches programmes that **promote innovation and digital skills (Pillar 3)** and has trained over 40,000 Pakistanis through the following initiatives:

- **Promoting entrepreneurship and accelerating growth of tech start-ups.** To nurture the growth of local technology start-ups, Google launched the "Google for Startups Accelerator: Southeast Asia" programme. The programme is a three-month online accelerator bootcamp for high-potential tech-based start-ups that are solving the region's challenges in the post-pandemic era.[182] Through the programme, start-ups receive tech and business mentorships, opportunities to connect with relevant teams from Google and its network of industry partners and workshops focused on product design, customer acquisition, and leadership development for founders. Thus far, the programme supported four Pakistani start-ups, "Walee", "DeafTawk", "Sehat Kahani", and "WonderTree", and provided them the help they needed to be better equipped to find solutions for pressing challenges in the region.[183] One of the four start-ups, "Sehat Kahani", is working on providing access to affordable, technology-enabled healthcare via a network of

181. Google (2018), Framework for Responsible Data Protection Regulation.
Available at: https://services.google.com/fh/files/blogs/google_framework_responsible_data_protection_regulation.pdf
182. Google for Start-ups (2020), "Google for Start-ups Accelerator: Southeast Asia". Available at: https://sites.google.com/view/gfs-accelerator-sea/home
183. Google The Keyword (2020), "Support for Southeast Asian startups tackling big challenges".
Available at: https://blog.google/around-the-globe/google-asia/support-southeast-asian-startups/

qualified home-based female doctors. During the COVID-19 pandemic, telemedicine clinics providing medical advice to those living in rural areas had to close due to lockdown restrictions. In response, two female doctors created a telemedicine app, "Sehat Kahani", to democratise access to quality and affordable healthcare using cost-effective, tech-enabled solutions. Female doctors can consult patients from their homes without ignoring the responsibilities to their families, while bridging the healthcare gap. Thus far, "Sehat Kahani" has a network of 5,000 female doctors, and has offered over 350,000 consultations since its launch.[184] Moreover, the start-up has recently raised USD1 million in a Pre-Series A round with investors from the Islamic Development Bank and Impact investment Exchange.

- **Fostering partnerships with the government and industry to support tech hubs.** Google has been building strong partnerships with government agencies and industry associations to support local tech hubs. One key partnership forged was with the Punjab IT Board (PITB) to train over 1,000 developers in basic web development skills at physical "e-Rozgaar" centres. In addition, Google also reached out to 65 developers and start-up founders through the "Nest I/O" to train them in machine learning applications, allowing them to gain industry-relevant skills for their businesses (see Box 7).

- **Building community groups to cultivate developer talent.** Google is also a strong supporter of the tech community by supporting and nurturing community groups across the country where developers learn, connect and innovate using Google's technologies. This includes "Developer Student Clubs" (DSC) which are university-based community groups for students to learn technology. These clubs nurture budding developers through workshops, events, and career-readiness sessions that equip them with the relevant skills for a career in the tech industry. Box 8 shows how one of the leaders of the DSC programme, Krinza Momin, participated in the "DSC Solution Challenge" and was selected as one of the top global ten winners.[185] In 2020, DSCs were present across 43 universities in 14 cities, and hosted over 340 training sessions that impacted the lives of more than 32,000 student

184. Menabytes (2021), "Pakistan's Sehat Kahani raises $1 million Pre-Series A to grow its telemedicine network". Available at: https://www.menabytes.com/sehat-kahani-pre-series-a/
185. Google Developers (2020), "Meet the global students solving local problems with code". Available at: https://developers.googleblog.com/2020/07/dsc-global-students-solutions-with-code.html

BOX 7.
PARTNERING WITH LOCAL TECH HUB TO TRAIN NEW WEB DEVELOPERS

"E-ROZGAAR" CENTRES

Collaborating with Punjab IT Board (PITB), Google led training sessions to train hundreds of developers in "e-Rozgaar" centres across the Punjab province.[186] These sessions were aimed to provide web development skills to freelancers, allowing them to take advantage of web development opportunities for income.

The collaboration proved to be a success, providing multiple benefits for the Punjab community. The programme recorded a participation size of 1,070 attendees, with 827 participants and 63 "e-Rozgaar" trainers passing the relevant tests and attaining "Mobile Web Specialist" certification.[187] This figure exceeded expectations, being 78 percent higher than the original goal set by the organisers, proving how collaboration between industry and public services is key to creating new employment opportunities and helping workers to attain the most relevant set of skills.[188] Programmes such as these also promote employment opportunities for female developers, with females constituting 471 out of the 827 participants (or 52 percent) who passed and attained the "Mobile Web Specialist" certification. Finally, the programme also empowers the local community by training 63 "e-Rozgaar" instructors how to conduct web development training for their community "e-Rozgaar" centres. This would then allow more participants to benefit indirectly from the training centre in the long run.

Photo Source: https://twitter.com/erozgaar/status/974148777824129024

186. Daily Pakistan (2019), ""e-Rozgaar" X Google - Developers Celebration Event held at Arfa Software Park."
Available at: https://en.dailypakistan.com.pk/22-Oct-2019/"e-Rozgaar"-x-google-developers-celebration-event-held-at-arfa-software-park
187. The Mobile Web Developer Certification is a performance-based exam that challenges mobile web developers to write code in response to real-world tasks. Based on extensive job task analysis, candidates earning this certification have shown that they have the skills expected of an advanced-level mobile web developer, and are capable of writing performant and responsive applications for the mobile web.
188. Daily Pakistan (2019), ""e-Rozgaar" X Google - Developers Celebration Event held at Arfa Software Park."
Available at: https://en.dailypakistan.com.pk/22-Oct-2019/"e-Rozgaar"-x-google-developers-celebration-event-held-at-arfa-software-park

Photo Source: https://jehanara.wordpress.com/tag/the-nest-io/

"NEST I/O" TECHNOLOGY INCUBATOR AND COMMUNITY HUB

"Google for Start-ups" is a programme which involves over 50 co-working spaces and accelerators in 125 countries, offering access to Google's products and hands-on lessons for aspiring entrepreneurs. In Pakistan, "Google for Start-ups" partnered with the country's key IT industry association, P@SHA as well as a global technology company, Samsung, to launch "Nest I/O", a technology incubator and community hub for local entrepreneurs. "Nest I/O" provides budding entrepreneurs with working space, infrastructure, facilities, knowledge sessions, as well as access to a network of mentors and potential investors.

Within a span of three years since it was first launched in 2015, "Nest I/O" had successfully completed six incubation cycles, created 370 new jobs, and hosted hundreds of training sessions, workshops, and events for entrepreneurs across the country.[189] In 2019, Google held a "Google Machine Learning Bootcamp" in collaboration with "Nest I/O" in Karachi.[190] The bootcamp was designed for IT practitioners to learn about Google's latest machine learning offerings and for those who are keen in applying such technologies in their everyday work and projects. These programmes not only raise awareness of emerging technologies, but also deepen machine learning expertise and provide industry-level guidance to start-ups or professionals. Industry professionals from around the world have now become a part of "Nest I/O" network, including representatives from Google, an international accelerator programme, 500 Startups, and customer relationship management software provider, HubSpot. By 2020, the "Nest I/O" has hosted around 200 start-ups across 11 cohorts.[191]

189. Tech Juice (2018), "Nest I/O has incubated over 100 startups which have created 370 new jobs in 3 years". Available at: https://www.techjuice.pk/nest-i-o-has-incubated-over-100-startups-created-370-jobs-3-years/
190. Facebook (2019), "Google Developers Machine Learning Bootcamp". Available at: https://www.facebook.com/events/the-nest-io/google-developers-machine-learning-bootcamp/963064297374580/
191. The Nest I/O (2021), Available at: https://thenestio.com/

BOX 8.
GOOGLE DSCS EMPOWER STUDENT DEVELOPERS TO DRIVE SOCIAL CHANGES WHILE DEEPENING THEIR EXPERTISE

Google's "Developer Student Clubs" (DSCs) empower budding developers, like Krinza Momin, who are deeply passionate about creating digital solutions to solve community problems using Google's technologies. Despite being only one of two females in her computer science course, Krinza mustered the courage to apply as a student lead in her university's DSC.[192] To her surprise, Krinza was selected as the student lead and this has opened multiple opportunities for her to connect with Googlers, industry experts, as well as student leads globally. As a community leader, she hopes for a cultural shift towards encouraging more young girls in her community to take up leadership positions and "encourage other girls to say 'yes' to opportunities". Through the DSC, Krinza also picked up important skill sets such as how to pitch ideas at hackathons, including the "DSC Signature Competition" and the "DSC Solutions Challenge". Krinza's story has been covered in a recent case study featured on YouTube by the Google team, to showcase opportunities for students through DSC.[193]

In the "DSC Solutions Challenge", Krinza and her team built an Android app, "Worthy Walk" to tackle obesity, while helping local businesses in reaching out to potential customers.[194] By tracking the individual's fitness goals with its in-built currency called "Knubs", the mobile app allows users to redeem discounts using "Knubs" from local businesses, shops and startups.[195]

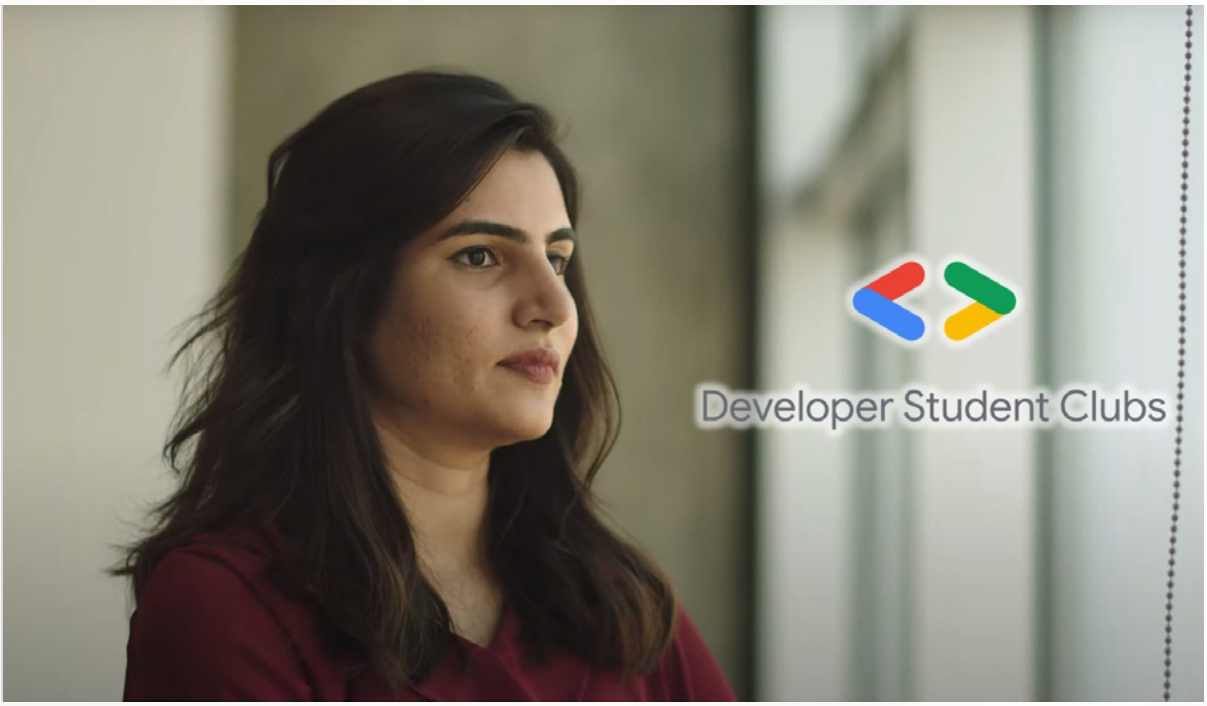


Photo Source: https://www.techjuice.pk/proud-moment-for-pakistan-as-google-shares-former-dsc-lead-krinza-momins-story/

192. YouTube (2020), "Krinza's Story - Google Developer Student Clubs." Available at: https://www.youtube.com/watch?v=hckNNPD9GZY
193. YouTube (2020), "Krinza's Story - Google Developer Student Clubs." Available at: https://www.youtube.com/watch?v=hckNNPD9GZY
194. Google Developers (2020), "Meet the global students solving local problems with code". Available at: https://developers.googleblog.com/2020/07/dsc-global-students-solutions-with-code.html
195. Google Developers (2020), "Meet the global students solving local problems with code". Available at: https://developers.googleblog.com/2020/07/dsc-global-students-solutions-with-code.html

developers through these sessions. Besides building communities in schools, Google also creates networks for developers in the country through "Google Developer Groups" (GDGs). GDGs regularly hold community events and partner with local tech and tech-enabled companies to deepen their technical capabilities. With four GDG chapters and one GDG-cloud (online) chapters, Google reached out to over 10,000 developers through its community programmes. Another Google programme, the "Grow with Google Digital Skills Community", formerly known as "Google Business Groups", is present in nearly 300 chapter groups across 31 countries globally. The independent, not-for-profit industry community holds workshops and networking events to share the latest product, tech or software developments and features with participants. One event held by the Lahore chapter was "Bizfest 2018" which allowed students, entrepreneurs, and business developers to attend training, workshops and talks held by experts.[196] Google has also made efforts to support Pakistan's game development industry through programmes like "Game Launcher," a 2019 partnership with Telenor Pakistan to advise the eight most promising gaming startups in Pakistan and help them transform their creative ideas into successful and sustainable app businesses.

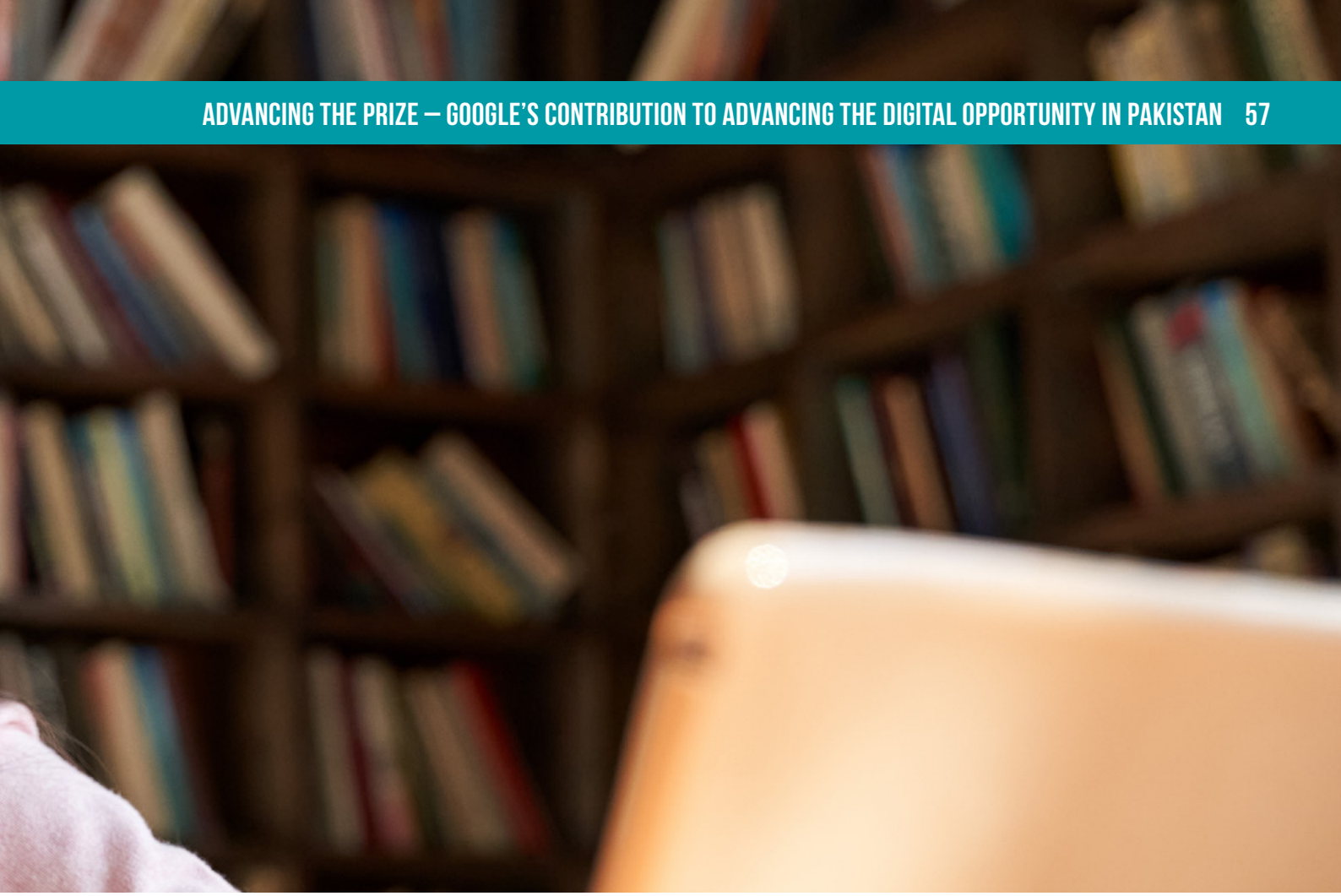
- **Developing tools and skills programmes for businesses to become digital-ready post-pandemic.** As a response to the ongoing COVID-19 crisis, Google unveiled several initiatives to support businesses with the tools and technologies to remain resilient and maintain business continuity. As one of Google's cornerstone community initiatives, Google launched the "Grow with Google" programme in Pakistan to equip local business owners and job seekers with digital skills and support the adoption of free digital tools such as Business Profile (previously known

196. StartUp PK (2019), "Google Business Group Comes to Lahore." Available at: https://www.startup.pk/google-business-group-comes-to-lahore/

as Google My Business.[197] Through a series of online digital skilling courses, resources and articles, businesses learn how to create an online presence, promote their offerings via online channels, and engage with customers digitally. In collaboration with the Ministry of Commerce, Trade Development Authority of Pakistan (TDAP), and SME Development Authority, Google organised a series of webinars called "Going Online with Google" under the "Grow with Google" programme for over 5,500 SMEs on how to leverage digital tools.[198] Launched during the peak of the COVID-19 lockdown, the programme was designed to help businesses to go online in challenging times. Additionally, businesses and adult learners are able to access "Google Primer", a free mobile application that provides quick, bite-sized lessons on business, marketing, management, and other topics that allows them to start adopting digital solutions and technologies.[199] The application also showcases successful businesses that adopted the lessons learnt from "Google Primer" to highlight the different ways viewers can upgrade their own line of work.[200] For example, lessons on money management are co-designed by Google and industry partners to teach business owners on key topics such as basic accounting, using microloans, or developing fundraising strategies.

- **Introducing computer programming curriculum in schools.** Google's initiatives also aim to prepare the future workforce to cope with the evolving demands of the digital economy. Under its "Computer Science (CS) First Curriculum" initiative, Google collaborated with the Ministry of IT and Telecom, the Telecom Foundation, and the Virtual Universities, to introduce students to computer science.[201] The free computer science curriculum

197. *Sources include: Grow with Google (2021), Available at: https://grow.google/intl/en_pk/; Google My Business (2021), Available at: https://www.google.com/intl/en_pk/business/*
198. *YouTube (2021), "Going Online With Google Webinars". Available at: https://www.youtube.com/playlist?list=PLyqSvXX_AF84cW3uWOGtWjAQKm2WibEDG*
199. *Primer (2021), Available at: https://www.yourprimer.com/?force_layout=True*
200. *Your Primer (2021), Available at: https://www.yourprimer.com/*
201. *Samaa (2020), "Google launches CS First programme in Pakistan". Available at: https://www.samaa.tv/news/2020/10/google-launches-cs-first-programme-in-pakistan/*



aims to inculcate fundamental coding skills and enable students to make use of "Scratch", a free, block-based programming tool, to design their own projects.[202] At the same time, the initiative provides free tools and resources for teachers to teach computers science. The programme has since trained over 100 teachers and students in 13 schools across Karachi, Lahore, and Islamabad, in basic computer science skills through games and self-directed projects.[203]

- **Supporting remote learning through Google Workspace for Education.** To support digital education and remote learning during the pandemic, Google partnered with the Ministry of Federal Education and Professional Training and Tech Valley Pakistan (a social enterprise) to roll out its free Google Workspace for Education tools across more than 400 schools in the Islamabad Capital Territory. Over 100 teachers were trained on how to use Google tools to carry out distance and digital learning at their schools. Google is also supporting a similar pilot project in Khyber Pakhtunkhwa province.[204]

- **Imparting digital skills in cloud computing.** To encourage students and professionals alike to learn about cloud computing and develop their own cloud-based solutions, Google launched the "Cloud Seekho" programme.[205] Through a series of self-study online labs, the programme allows students to learn job-ready skills in cloud computing at their own pace while experimenting in online labs provided by Google's "QwikLabs". In the two batches of the "CloudSeekho" programme, over 5,500 students have participated. Of which, 1,300 have successfully graduated from the programme.[206]

202. Google for Education (2021), "CS First". Available at: https://csfirst.withgoogle.com/s/en/home
203. Samaa (2020), "Google launches CS First programme in Pakistan". Available at: https://www.samaa.tv/news/2020/10/google-launches-cs-first-programme-in-pakistan/
204. The News (2020), "Google's digital technologies to help upgrade education system in KP".
Available at: https://www.thenews.com.pk/print/747262-google-s-digital-technologies-to-help-upgrade-education-system-in-kp
205. Pak Scoop (2020), "Google's 'Cloud Seekho' Program Celebrates First Batch of 350 Graduates."
Available at: https://pakscoop.com/googles-cloud-seekho-program-celebrates-first-batch-of-350-graduates/
206. Pak Scoop (2020), "Google's 'Cloud Seekho' Program Celebrates First Batch of 350 Graduates."
Available at: https://pakscoop.com/googles-cloud-seekho-program-celebrates-first-batch-of-350-graduates/

GOOGLE'S ECONOMIC IMPACT IN PAKISTAN

BUSINESS BENEFITS

Google supports about
PKR1 TRILLION (USD6.3 BILLION)
in annual benefits to businesses in Pakistan[1]

Google Search saves the average Pakistani employee about
6.1 DAYS PER YEAR
through almost instantaneous access to information online

CONSUMER BENEFITS

Google supports about
PKR210.2 BILLION (USD1.3 BILLION)
in annual benefits to consumers in Pakistan[2]

The average Pakistani **Google Search** user saves
4.3 DAYS A YEAR
looking for answers, as compared to traditional offline methods

According to AlphaBeta research,
OVER 30%
of **YouTube** users in Pakistan say they use online video services to learn advanced digital skills

SOCIETAL BENEFITS

By enabling businesses to unlock new revenue streams and expand their businesses, Google indirectly supports **over 410,000** jobs in Pakistan

Google launched the **"Women Techmakers"** programme which seeks to foster a community for women in the digital industry through peer-learning and sharing

1. Business benefits refer to the estimated economic impact from the following products: Google Search; Google Ads; AdSense; and Google Play.
2. Consumer benefits refer to the estimated economic impact from the following products: Google Search; Google Maps; Google Drive; Docs, Sheets and Photos; Google Play.
Note: All data is based on AlphaBeta analysis using a range of original and third-party sources. See Appendix in report for detailed methodology. Figures are estimated based on the latest available annual data as at time of research in 2020

3.2 BENEFITS OF GOOGLE SEARCH AND OTHER TECHNOLOGIES TO BUSINESSES, CONSUMERS AND SOCIETY

Google's services, such as Google Search, Google Ads, and Google Maps bring about substantial economic benefits in Pakistan. This study finds that the annual economic value presented by Google's applications and platforms is worth PKR1 trillion (USD6.3 billion) for businesses, and PKR210.2 billion (USD1.3 billion) for consumers.[207] An overview of the assessed economic benefits of Google services to Pakistani businesses and consumers is provided in Exhibit 5. It is important to note that these benefits relate to direct economic benefits received, and do not include the flow-on economic effects generated (see Box 9 for further details). In addition, Google also supports benefits to the wider society in Pakistan. These include indirectly supporting over 410,000 jobs in its economy,[208] as well as other intangible benefits through its programmes, such as extending digital skilling opportunities to underrepresented communities, promoting safe Internet use, supporting arts and culture, and providing in-kind advertising credits to non-profit organisations in Pakistan.

BENEFITS TO BUSINESSES

GOOGLE HELPS BUSINESSES BOOST THEIR REVENUES

Google applications broaden the reach of businesses in Pakistan to new customers and markets. Online advertising platforms such as **Google Search** and **YouTube** allow businesses to conduct targeted advertising, bringing their products and services to the right audiences and growing their customer base.

Google Ads is estimated to generate PKR984.9 billion (USD6.1 billion) annually in the form of net returns to Pakistani businesses from advertising on Google Search results of relevant keywords.[209] Beyond search advertising, Pakistani businesses also benefit from displaying advertisements on Google's network of publisher sites such as websites, blogs, and forums through **AdSense**. These net returns to local Pakistani creators and businesses are estimated at PKR2.3 billion (USD14.3 million) annually. Meanwhile, by leveraging the various formats of advertisements enabled by **YouTube**, businesses are estimated to achieve PKR9.8 billion (USD61 million) in net advertising returns annually.[210]

Box 10 illustrates how a financial institution in Pakistan, the Telenor Microfinance Bank, was able to launch an effective rebranding campaign through **Google Ads**, while Box 11 shows the wider contributions made by Google to support organisations during the COVID-19 pandemic.

207. The products included in these estimations include Google Search, Google Ads, AdSense, Google Play, Google Maps, YouTube, Google Drive, and Google Docs, Sheets and Photos.
208. Jobs supported refer to new jobs that may have been created through a business' use of Google's platforms, as well as ongoing employment of jobs that previously existed.
209. This refers to the increase in revenues and sales that can be directly attributed to advertising minus the related advertising expenditure.
210. This refers to the increase in revenues and sales that can be directly attributed to advertising minus the related advertising expenditure.

EXHIBIT 5:
OVERVIEW OF BENEFITS ANNUALLY SUPPORTED BY GOOGLE IN PAKISTAN

TYPE OF BENEFIT	EASE OF ACCESS TO INFORMATION	ENTERTAINMENT AND ENRICHMENT
RELEVANT PRODUCT/S	**Google Search**	**YouTube, Google Play & Android**
BUSINESS BENEFITS	• By allowing almost instantaneous access to online information, Google Search helps businesses save **6.1 days** a year per worker in Pakistan	• App developers in Pakistan earn about **PKR8.4 billion (USD52.4 million)** in revenue from both domestic and international markets through the Google Play platform per year • Android enables app developers to save up to **25%** of development time and target more than **1 billion** users worldwide[1]
CONSUMER BENEFITS	• By providing almost instantaneous access to information, the average Google Search user in Pakistan saves about **4.3 days** looking for answers online each year • The total annual consumer benefits derived from Google Search are estimated at **PKR48.5 billion (USD302 million)**	• Consumers can choose from over **3.5 million** apps available on the Android ecosystem[1] • By gaining access to a range of digital entertainment options through Google Play and YouTube, the consumer surplus benefits to consumers in Pakistan are estimated at **PKR85.9 billion (USD535 million)** annually

1. App Annie (2017), "Top Predictions for the App Economy in 2018". Available at: https://www.appannie.com/en/insights/market-data/predictions-app-economy-2018/
2. Net advertising benefits refer to additional revenue earned from advertising less the advertising cost.
Note: Figures are estimated based on the latest available annual data as at time of research in 2020.
SOURCE: AlphaBeta analysis

	INCREASED PRODUCTIVITY AND CONVENIENCE	ADVERTISING BENEFITS	TOTAL BENEFITS:
	Google Maps, Drive, Photos, Docs & Sheets	**YouTube, Google Ads & AdSense**	
	• The Business Profile, previously known as Google My Business, function in Google Maps allows customers to discover local businesses. Globally, the additional revenue earned by small and medium-sized businesses as a result of Business Profile has been estimated to be between **USD212-250** per year	• Google Search and Ads bring about **PKR984.9 billion (USD6.1 billion)** in net advertising benefits to businesses in Pakistan annually[2] • Web publishers and content creators in Pakistan earn about **PKR11.1 billion (USD68.9 million)** in revenue from AdSense and YouTube annually • Advertisers in Pakistan gain **PKR12.1 billion (USD75.3 million)** in net advertising benefits annually from displaying advertisements on websites and videos using AdSense and YouTube[2]	**PKR1 TRILLION (USD6.3 BILLION)**
	• The total annual consumer benefits derived from productivity-enhancing tools of Google Maps, Drive, Photos, Docs, and Sheets are estimated at **PKR75.8 billion (USD472 million)**	Nil	**PKR210.2 BILLION (USD1.3 BILLION)**

BOX 9.
MEASURING THE BENEFITS OF GOOGLE'S PRODUCTS TO BUSINESSES AND CONSUMERS

The benefits of Google's products to businesses and consumers estimated in this research focus on the direct economic impact received by them. Because of the different nature of the benefits experienced from the products, different approaches were utilised for businesses and consumers. The business benefits supported by Google include the gross revenue, income or savings generated by businesses using Google products. It is important to note that these benefits do not include the flow-on economic effects generated, such as further purchases from their suppliers, or the economic activity generated by the employees of these businesses who spend their wages in the broader economy (indirect or induced spend). This is because of the intention to gauge the direct impacts that business users of Google's products receive. For consumers, it is important to note that these benefits are challenging to measure and calculate because individuals typically do not pay for the services. In the absence of price indicators, the economic "willingness to pay" principle was used to estimate the value of consumer benefits by asking individuals how much they value specific products. Time savings accrued to consumers from their use of Google Maps (which optimises their driving and public transport journeys) and Google Search (which increases the efficiency of information gathering) were also measured to derive a measure of the convenience these products bring to them. Appendix B shows a detailed methodological explanation of how the benefit of each product was sized.

BOX 10.
GOOGLE ADS HELPED FINANCIAL INSTITUTION IN PAKISTAN EXPAND ITS CUSTOMER BASE

Telenor Microfinance Bank is a Pakistani financial institution jointly owned by telecommunications company Telenor Group and Ant Group, operator of payment and lifestyle platform Alipay. Its mobile payment service platform "Easypaisa" was launched to help the bank shift towards a branchless banking system to reach customers via their mobile phones. In 2019, the mobile app had over 6.4 million mobile wallet users.[211] To drive the company's next phase of growth, "Easypaisa" was hoping to reposition its existing brand perception and target a new customer base that is both tech-savvy and more digitally connected. In order to pull off a successful rebranding campaign, "Easypaisa" was looking for a cost-effective and efficient method and decided to leverage Google Ads.[212] By launching the rebranding campaign with Google Ads under its integrated marketing communications (IMC) strategy, the company became the first Pakistani company to launch a digital campaign with advertisements that took over Google Search, Display, and YouTube. Within 72 hours of the launch, the campaign achieved top-of-mind awareness for its viewers, reaching around 88 percent of its target audience and resulting in the "Easypaisa" app ranking third on Google Play Store.[213] About 45 days into the campaign, Easypaisa's cost-per-install, calculated by dividing the advertising spend by the number of new installs, fell by 30 percent due to the large volume of users downloading the mobile application.

Photo Source: https://technode.com/2018/03/14/ant-financial-enters-pakistan-with-185m-mobile-finance-platform-deal/

211. Huawei (2020), "Pakistan's No. 1 Payments App Easypaisa Now Comes to HUAWEI AppGallery". Available at: https://consumer.huawei.com/pk/press/news/2020/easypaisa-now-comes-to-huawei-appgallery/
212. YouTube (2020), "EasyPaisa's Journey To Rebranding With Google Ads." Available at: https://www.youtube.com/watch?v=wmTX696ER1k
213. YouTube (2020), "EasyPaisa's Journey To Rebranding With Google Ads." Available at: https://www.youtube.com/watch?v=wmTX696ER1k

BOX 11.
GOOGLE'S CONTRIBUTIONS TO GOVERNMENT, BUSINESSES AND STUDENTS, DURING THE COVID-19 PANDEMIC

SAFEGUARDING PUBLIC HEALTH AND ENABLING EFFICIENT INFORMATION DELIVERY

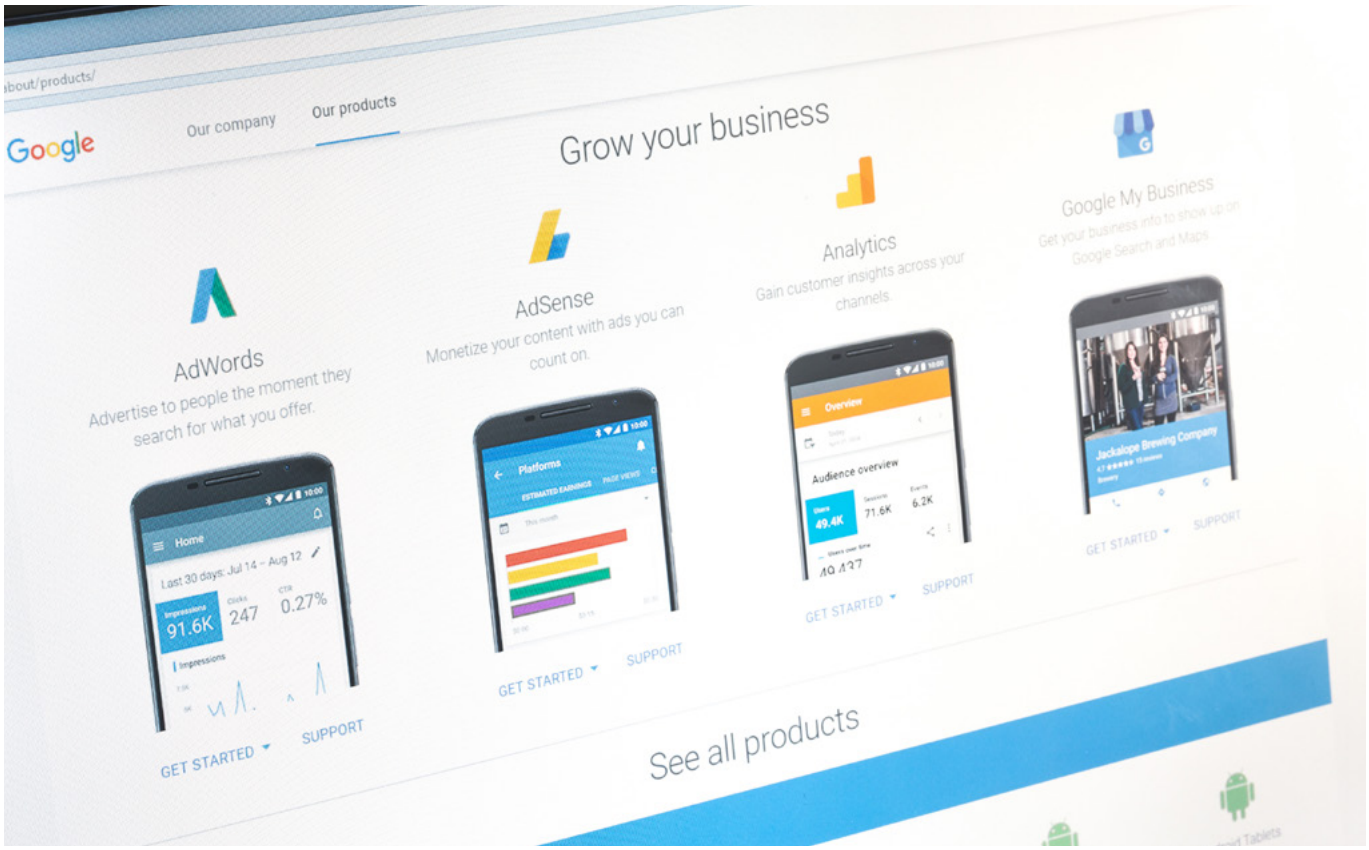
Google's advertising tools have proven to be particularly helpful during the COVID-19 pandemic not only to businesses, but also the government. In response to the public health crisis, Google donated USD5 million in Ad Grants to help the Government of Pakistan provide critical information on how to prevent the spread of COVID-19 and other measures to help local communities. Google assisted the ministry of national Health Services, Regulations and Coordination (NHSRC) with launching ad campaigns on Google Search that direct users to authoritative information published by the Ministry. In addition, Google launched a website consolidating COVID-19 related resources and education on potential symptoms, prevention and treatments, with links to authoritative information from the Government of Pakistan.[214]

HELPING STUDENTS LEARN AT HOME

Concerns over the transmission of COVID-19 led to school closures in Pakistan. In response, Google for Education supported distance learning by helping teachers and students stay connected remotely. In a pilot programme with Khyber Pakhtunkhwa Elementary and Secondary Education Department in Pakistan, Google deployed Google for Education in classrooms and trained teachers in integrating digital tools in teaching pedagogies.[215] The Google Meet video-conferencing software's advanced capabilities (i.e., allowed larger meetings of up to 250 participants per call) was made available free of charge to enable an entire class or group of classes to join a lesson simultaneously. Google Classroom enables teachers to create virtual classrooms and manage coursework, organise assignments, boost collaboration, and foster better communication by providing students timely feedback on their work.

To increase accessibility to remote learning opportunities for students affected by school closures, Google's philanthropic arm, Google.org, launched a USD-10 million Distance Learning Fund. As part of the Distance Learning Fund, Google .org provided PKR10 crores (USD637,000) in funding to support teachers in accessing the resources they need to provide high quality learning opportunities for children, particularly those from underserved communities. In addition, Google created a central hub of information, tips, training and tools from across Google for Education to help teachers keep teaching, known as "Teach from Home".[216] Besides digital tools delivered through Google for Education, "YouTube Learning Hub" provides learning videos designed for families.

214. Google (2020), "COVID-19 Information & Resources". Available at: https://www.google.com/intl/ALL_pk/covid19/
215. The News (2020), "Google's digital technologies to help upgrade education system in KP". Available at: https://www.thenews.com.pk/print/747262-google-s-digital-technologies-to-help-upgrade-education-system-in-kp
216. Google (2020), "Teach from Anywhere". Available at: https://teachfromanywhere.google/intl/ALL_pk/



In addition, Google provides new sources of income for content creators in Pakistan. By allowing content creators such as online journalists, media sites, bloggers and writers to earn income by hosting advertisements on their sites, **AdSense** is estimated to have helped content creators in Pakistan monetise space on their websites and generate a total annual income of PKR7.1 billion (USD44.1 million). **YouTube** also benefits video content creators in Pakistan who earn revenue through placing advertisements on their videos. This is estimated to bring YouTube content creators in Pakistan a total of PKR4 billion (USD24.9 million) in advertising revenue per year. In 2020, YouTube had more than 650 Pakistan-based channels with more than 100,000 subscribers, up from just eight channels in 2016.[217] Moreover, more than a hundred video creators have amassed a following of over one million YouTube subscribers. Box 12 illustrates examples of how YouTube videos enable enterprising content creators to capitalise on this platform to build a ground-up business with a community of followers.

Google's digital product distribution system, **Google Play**, as well as its mobile operating system, **Android**, have resulted in a variety of benefits to Pakistani app developers. Based on AlphaBeta research, app developers are estimated to earn an annual income of about PKR8.4 billion (USD52.4 million) from Google Play in both the domestic and global markets.[218] Further, through the Android operating system, app developers in Pakistan can readily reach more than one billion users globally.[219] The system was also estimated to save them up to 25 percent in development time from not having to port their apps across different operating systems.[220] For instance, Vizteck Solutions is a Pakistani company specialising

217. Think with Google, "YouTube: Pakistan's most popular online video platform".
Available at: https://www.thinkwithgoogle.com/_qs/documents/6956/TwG_APAC_Infographic_Pakistan_WEB_C1_5X913nr.pdf
218. Google Play is a digital distribution service operated and developed by Google. It serves as the official app store for the Android operating system, which refers to the mobile operating system developed by Google for touchscreen mobile devices such as smartphones and tablets. Google Play users are able to browse and download applications developed with the Android software development kit. Figures are estimated based on the latest available annual data as at time of research in 2020.
219. AlphaBeta (2018), "AlphaBeta research brief: The estimated economic impact from Android across five Asian markets".
Available at: https://www.alphabeta.com/wp-content/uploads/2017/08/180820-Android-Economic-Impact.pdf
220. AlphaBeta (2018), "AlphaBeta research brief: The estimated economic impact from Android across five Asian markets".
Available at: https://www.alphabeta.com/wp-content/uploads/2017/08/180820-Android-Economic-Impact.pdf

BOX 12.
YOUTUBE CONNECTS LOCAL CONTENT CREATORS TO AUDIENCES IN BOTH DOMESTIC AND INTERNATIONAL MARKETS

VILLAGE FOOD SECRETS

Village Food Secrets is one of the many successful YouTube channels that has managed to reach out to a wide, global audience, especially during the COVID-19 pandemic. The channel shares and teaches viewers about rural cooking and is hosted by Mubashir Saddique, a Pakistani with a passion for food.[221]

Mubashir's videos earn at least a few hundred thousand views, with multiple new content every week. Before being a content creator, he previously worked as a factory worker and was only able to come home once a week. Starting out the channel proved to be a feat, with him resorting to using basic equipment such as a tripod built out of sticks and a second-hand smartphone as a video recorder. However, his effort proved to be successful ever since, providing an example of how online video production can be a sustainable source of income for aspiring creators.

Through his channel, Mubashir has managed to put his village of Shahpur on the world map and the imaginations of many viewers across the globe. His relative success had also inspired his siblings to take up content creating, with his brothers opening up their own YouTube channels which have since become popular. YouTube has covered Village Food Secrets in an exclusive creator case study, to showcase his work to the entire world, and to showcase that YouTube is here for all Pakistanis.

KITCHEN WITH AMNA

Founded by Amna Riaz, "Kitchen with Amna" was the first women-led channel to reach 1 million subscribers in Pakistan.[222] Amna started with humble beginnings as a shy and timid girl who often struggled to speak in front of other people, including her relatives. It was in 2015 when she first had the idea of making a video about how to make Pakistan's traditional fruit salad, fruit chaat, during Ramadan. With the help of her brother, Amna subsequently created a YouTube channel sharing videos that teach beginners complex Pakistani dishes such as reshmi kabab or saag in a short and simple way.

"Kitchen with Amna" has since grown into one of the most popular channels in Pakistan, attracting over 4 million subscribers. Amna proudly shared her experience as a content creator on YouTube and the confidence she gained in the process, "Now everyone approaches me; they are amazed by my new-found confidence, how talkative I have become, and the credit for this transformation goes to YouTube."[223] YouTube has covered Amna's story in an exclusive creator case study, which accumulated over 800,000 views.[224]

221. YouTube (2021), "Village Food Secrets". Available at: https://www.youtube.com/c/VillageFoodSecrets/featured
222. YouTube (2019), "The Story Behind Kitchen with Amna". Available at: https://www.google.com/url?q=https://www.youtube.com/watch?v%3Dadypbt4LDRc&sa=D&source=editors&ust=1623166403165000&usg=AOvVaw3lg4XQ2dxnhqEtRdO7IO7s
223. The News (2019), "Kitchen with Amna: The awe-inspiring story of Pakistan's most popular female YouTuber". Available at: https://www.thenews.com.pk/latest/421796-kitchen-with-amna-the-awe-inspiring-story-of-pakistans-most-popular-female-youtuber
224. The News (2019), "Kitchen with Amna: The awe-inspiring story of Pakistan's most popular female YouTuber". Available at: https://www.thenews.com.pk/latest/421796-kitchen-with-amna-the-awe-inspiring-story-of-pakistans-most-popular-female-youtuber

in creating mobile applications like platforms for ridesharing services, food delivery and grocery delivery. Its MyGroser app, available through Google Play, is used in Malaysia. The grocery delivery app has more than 100,000 users and experienced over 1,000 percent growth in deliveries since the Movement Control Order (MCO) was introduced in Malaysia.[225]

Exhibit 6 summarises the estimated business benefits in the form of revenue gains experienced by Pakistani businesses from Google Search and Ads, YouTube, AdSense and Google Play.[226]

GOOGLE HELPS BUSINESSES INCREASE PRODUCTIVITY AND SAVE TIME

Google helps businesses save time by enhancing employees' productivity by improving the speed and ease of access to information and research. In particular, **Google Search** minimises the time for businesses to acquire information by arranging and simplifying the vast array of content on the Internet. The ability to rapidly find relevant data and information provides tremendous productivity benefits for employees, with each employee saving on average about 6.1 days annually.

EXHIBIT 6:

GOOGLE IS ESTIMATED TO BRING ABOUT PKR1 TRILLION (USD6.3 BILLION) WORTH OF ANNUAL BENEFITS TO BUSINESSES IN PAKISTAN

PRODUCT	DESCRIPTION OF BENEFITS	ESTIMATED ANNUAL BENEFITS
Google Search & Ads	Net advertising benefits for businesses[1]	PKR984.9 billion (USD6.1 billion)
AdSense	Net advertising benefits for businesses[1]	PKR2.3 billion (USD14.3 million)
	Income generated by website publishers through AdSense	PKR7.1 billion (USD44.1 million)
YouTube	Net advertising benefits for businesses[1]	PKR9.8 billion (USD61 million)
	Advertising revenue earned by YouTube video creators	PKR4 billion (USD24.9 million)
Google Play	Income generated by app developers in Pakistan from both the domestic and international markets through Google Play	PKR8.4 billion (USD52.4 million)
TOTAL ANNUAL BUSINESS BENEFITS IN PAKISTAN:		**PKR1,016 BILLION (USD6.3 BILLION)**

1. Net advertising benefits refer to additional revenue earned from advertising less the advertising cost.
Note: Figures are estimated based on the latest available annual data as at time of research in 2020.
SOURCE: AlphaBeta analysis

225. The Malaysian Reserve (2020), "MyGroser sees deliveries rise by 1,000%, eyes expansion".
Available at: https://themalaysianreserve.com/2020/08/04/mygroser-sees-deliveries-rise-by-1000-eyes-expansion/
226. While the benefits to Ad Grants are in the form of free advertising provided to non-profits (not returns on advertising), they are also included in this section as this amount of free advertising will also lead to increased donor interest and funding for nonprofits.

BENEFITS TO CONSUMERS

CONSUMERS IN PAKISTAN EXPERIENCE TOTAL ANNUAL BENEFITS WORTH PKR210.2 BILLION (USD1.3 BILLION) FROM GOOGLE'S SERVICES

The consumer benefits supported by Google are challenging to measure and calculate because most of Google's consumer applications are available for free. In the absence of price indicators, the economic "willingness to pay" principle was adopted to estimate the value of consumer benefits by asking individuals how much they value specific products (see Box 9). Taken together, Google Search, Google Maps, YouTube, Google Play, Drive, Photos, Docs and Sheets are estimated to bring about total annual consumer benefits worth PKR210.2 billion (USD1.3 billion). This value includes three main categories of benefits provided by Google applications: ease of access to information (Google Search), entertainment and enrichment (Google Play and YouTube), and enhanced productivity and convenience (Google Maps, Drive, Photos, Docs and Sheets). Exhibit 7 shows the breakdown of consumer surplus by category.

GOOGLE ENABLES CONSUMERS TO GAIN ACCESS TO INFORMATION

Google provides benefits to Pakistani consumers by allowing them to instantly access a vast array of information online. The total annual consumer surplus brought about by **Google Search** is estimated at

EXHIBIT 7:

GOOGLE IS ESTIMATED TO SUPPORT A TOTAL PKR210.2 BILLION (USD1.3 BILLION) WORTH OF ANNUAL CONSUMER SURPLUS IN PAKISTAN

ESTIMATED ANNUAL CONSUMER SURPLUS OF GOOGLE PRODUCTS IN PAKISTAN
CONSUMER SURPLUS (PKR)

TYPE OF BENEFIT	PRODUCT	ANNUAL CONSUMER SURPLUS
Ease of access to information	Google Search	PKR48.5 billion (USD302 million)
Entertainment and enrichment	Google Play	PKR85.9 billion (USD535 million)
	YouTube	
Enhanced productivity and convenience	Google Maps	PKR75.8 billion (USD472 million)
	Google Drive, Photos, Docs and Sheets	
	TOTAL ANNUAL CONSUMER SURPLUS:	**PKR210.2 BILLION (USD1.3 BILLION)**

Note: Figures are estimated based on the latest available annual data as at time of research in 2020.
SOURCE: AlphaBeta analysis

PKR48.5 billion (USD302 million) (Exhibit 7). Based on an international study showing that a search for a piece of information that takes 21 minutes in the library takes only seven minutes online, it is estimated that Google Search saves Pakistani consumers an average of 4.3 days per year.[227]

By providing free access to information and learning resources, Google Search also helps Pakistanis acquire new knowledge and skills. For instance, Pakistanis are turning towards Google Search to learn about healthy living and sustainability practices such as the use of electric vehicles.[228]

GOOGLE'S SERVICES IMPROVE PRODUCTIVITY AND CONVENIENCE FOR PAKISTANIS

Google Maps brings about productivity in the public transport and driving journeys of Pakistani citizens through the service's wayfinding and navigation feature, which optimises these trips using real-time data such as public transport arrival times and road traffic conditions.

In addition, by allowing digital data to be stored and accessed through multiple devices including laptops, tablets and smartphones, Google's cloud-based services such as **Google Drive, Photos, Docs, and Sheets** provide great convenience to Pakistani consumers. These services enable them to manage files, folders, music and photos on the fly – without having to retrieve the information from a piece of hardware.

The total annual consumer benefits derived from productivity-enhancing tools of Google Maps, Drive, Photos, Docs, and Sheets are estimated at PKR75.8 billion (USD472 million).

GOOGLE PROVIDES VARIOUS OPTIONS FOR ENTERTAINMENT AND ENRICHMENT

YouTube has presented substantial benefits to consumers as a source of free entertainment as well as a channel for consumers to learn new skills (e.g., online "how-to" videos) or gain new knowledge (e.g., online documentaries). According to AlphaBeta research, over 30 percent of YouTube users in Pakistan say they use online video services to learn advanced digital skills such as coding, software programming, and mobile application and website development.[229]

Google Play and **Android** have also brought a variety of benefits to Pakistani consumers. In fact, Pakistan has over 30 million users of Android phones who have been estimated to download over 120 million applications from the **Google Play Store** every month. Android enables consumers to choose from over 3.5 million apps available on the Android ecosystem.[230] Meanwhile, **Google Play** is a convenient platform for consumers to access a range of smartphone applications, as well as digital books, music and films. For example, the Pakistan Online E-services is a mobile application created by the Government of Pakistan and Private Organisations of Pakistan which allows citizens to access government services from their smartphones.[231] Similarly, the Punjab IT Board (PITB) has published 21 applications for public services, including the Lahore High Court's online application which allows lawyers and advocates to readily access timings and notifications of case proceedings and court hearings through their smartphones.

In total, YouTube and Google Play bring an estimated PKR85.9 billion (USD535 million) in annual consumer surplus for consumers in Pakistan.[232]

227. Yan Chen, Grace Young Joo Jeon and Yong-Mi Kim (2014), A day without a search engine: an experimental study of online and offline search. Experimental Economics. Available at: https://link.springer.com/article/10.1007/s10683-013-9381-9
228. Think with Google (2020), "What is Pakistan searching for? Insights for brands". Available at: https://www.thinkwithgoogle.com/intl/en-apac/consumer-insights/consumer-trends/what-pakistan-searching-insights-brands/
229. Google/AlphaBeta Economic Impact Report survey, n = 500. Percent represents use of online video services to learn advanced digital skills amongst Pakistani for whom YouTube is their most frequently used online video service.
230. App Annie (2017), "Top Predictions for the App Economy in 2018". Available at: https://www.appannie.com/en/insights/market-data/predictions-app-economy-2018/
231. Google Play (2021), "Pakistan Online E-services". Available at: https://play.google.com/store/apps/details?id=com.appscourt.eservices.pakistan.registration.simcheck.bills&hl=en&gl=US
232. Google/AlphaBeta Economic Impact Report survey, n = 500. The total consumer surplus represents the economic benefits to consumers in Pakistan from using Google Play. See more details in Appendix B for the methodology.

JOB CREATION AND OTHER BENEFITS TO BROADER SOCIETY

Google's products also support benefits to the broader society in Pakistan. These include the creation of new jobs in its economy (brought about by business expansions enabled by Google's products), as well as other intangible benefits through its programmes.

GOOGLE INDIRECTLY SUPPORTS OVER 410,000 JOBS IN PAKISTAN

At a broader level, Google has facilitated job creation in the economy through its products. Through Google Search and Ads, AdSense, and YouTube, Google indirectly supports the creation of over 410,000 jobs in Pakistan.[233] These jobs are created through the use of Google products that lead to businesses expanding their customer bases and increasing revenue.[234] For instance, businesses that expand their reach to new markets through advertising via Google Ads, AdSense and YouTube would require increased labour to meet this additional demand.

GOOGLE EXTENDS DIGITAL SKILLING OPPORTUNITIES TO UNDERREPRESENTED COMMUNITIES AND TECH HUBS

These benefits are a result of the use of Google products or direct initiatives and strategic partnerships Google has engaged in Pakistan. Beyond the digital skills programmes discussed in Chapter 3.1, the company's products and programmes provide a range of societal benefits through supporting broader human capital development, raising awareness on online safety and providing grants to non-profit organisations. To address gender inequality in Pakistan, Google launched the "Women Techmakers" programme which aims to increase the visibility of women in the tech industry, provide resources for self-development, and create a community of like-minded developers. In 2019, the programme has attracted more than 5,000 female participants in Pakistan.

233. Refers to jobs supported by Google Search and Ads, AdSense, and YouTube. The job estimate excludes revenue gained by website publishers who use AdSense and YouTube video creators as it may comprise freelancers and individuals who publish websites and videos recreationally, and thus do not fall under any formal industry sector.
234. Jobs supported refer to new jobs that may have been created through a business' use of Google's platforms, as well as ongoing employment of jobs that previously existed.

GOOGLE SUPPORTS NON-PROFIT ORGANISATIONS THROUGH IN-KIND ADVERTISING

Through the Google for Nonprofits initiative, Google supports organisations in the non-profit sector through "Ad Grants", a programme that provides in-kind advertising to Pakistani charities and non-profit organisations. "Ad Grants" recipients can leverage Google's advertising tools to promote their organisation, recruit volunteers, and attract donors from across the globe. In addition, non-profit organisations can access productivity and collaboration tools in Google Workspace (formerly known as G Suite) to organise their campaign activities and raise awareness of their cause.

GOOGLE PROMOTES ARTS AND CULTURE IN PAKISTAN

Google is committed to preserving the rich cultural heritage of Pakistan and has worked with several local partners to bring the country's historical artifacts to an international audience and boost tourism. During the COVID-19 outbreak when travel restrictions were imposed, Google Arts and Culture platform allowed museums to digitise their artifacts and artworks and feature them as online exhibits. This has been instrumental in sustaining a steady stream of engagement to promote Pakistani culture and heritage and boost awareness internationally. "Wonders of Pakistan", for example, is an online exhibition that provides panoramic views of famous sites on the "Google Arts and Culture" platform.[235] Google partnered with Lahore Museum for the online exhibition to showcase the country's cultural treasures, ancient monuments, and contemporary art. Initiatives such as this help to digitise Pakistani content and draw online visitors from across the globe. Through "Google Doodles", a temporary decoration of Google's logo on its homepages to celebrate notable events, Google honours and raises awareness of key cultural icons in the country. For instance, in June 2020, "Google Doodles" celebrated acclaimed Pakistani artist and educator, Anna Molka Ahmed, the country's first art teacher to bring her students out of the classroom to paint outdoors.[236]

235. Google Arts & Culture (2021), "Wonders of Pakistan". Available at: https://artsandculture.google.com/project/wonders-of-pakistan
236. Google (2020), "Celebrating Anna Molka Ahmed". Available at: https://www.google.com/doodles/celebrating-anna-molka-ahmed

APPENDIX: METHODOLOGY

A: SIZING THE ECONOMIC VALUE OF DIGITAL TECHNOLOGIES

This document provides the detailed methodology, assumptions and sources of information to quantify the potential economic impact of digital technologies for Pakistan in 2030.

APPENDIX A1: OVERALL APPROACH

A four-step methodology was used to understand the potential economic impact created by digital technologies in 2030 (Exhibit A1).

STEP 1: IDENTIFY DIGITAL TECHNOLOGIES

Several existing research reports on current and emerging digital technologies were reviewed to identify the most relevant technologies to focus on for this analysis in terms of their potential economic impact. There was a large body of research by academics, development practitioners, non-for-profits as well as the private and public sector on the interaction between technologies and economic development. In 2013, McKinsey Global Institute identified 12 disruptive trends that would transform life, business and the global economy.[237] Of these trends, seven were considered digital in nature: mobile Internet; automation of knowledge; IoT which was often combined with geospatial and satellite technology (e.g., remote sensing); cloud technology; advanced robotics; autonomous and near autonomous vehicles; and additive manufacturing (more commonly known as 3D printing).

Since 2013, several technologies have been added to this list due to potentially transformational economic and social impact. For example, the UK-based international development network, Bond, noted rapid changes in the technologies shaping international development between 2016 and 2019. Emerging technologies included big data, financial technology (Fintech), machine learning and even blockchain. These technologies were in no way mutually exclusive and the line between what constituted a different technology versus an application of a technology could be blurred. For example, AI utilised big data which often relied on cloud computing technology to provide the storage and computational horsepower to run machine learning algorithms and other analytics. Similarly, autonomous vehicles contained a multitude of sensors, many of which were Internet-enabled i.e., IoT. Exhibit 1 in Chapter 1 provides an overview of eight key digital technologies with significant implications for economic development.

STEP 2: ALIGN ON FOCUS SECTORS

To understand the current and potential economic output of these digital technologies, a set of focus sectors have been identified. These sectors were selected based on two steps:

- Clustering industries, at the ISIC 1 digit level, into broader sectors for convenient analysis.[238] This was guided by the individual industry's relevance

237. McKinsey Global Institute (2013), Disruptive technologies: Advances that will transform life, business, and the global economy. Available at: https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/disruptive-technologies

238. These sectors uniquely match to the relevant International Standard Industrial Classification of All Economic Activities (ISIC) with the exception of "Consumer, retail & hospitality", 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.

for digital technologies (based on past research quantifying the potential industry benefits of these digital technologies).[239]

- Prioritizing the sectors based on their importance for Gross Domestic Product (GDP), proxied by the sector's share of national GDP. Each selected sector must represent more than 1.5 percent of the national GDP.

The Information and Communication Technology (ICT) industry classification was excluded due to its value-added to the economy being almost entirely driven by technology and most of the value from digital technologies in this sector would have been captured in other sectors as an input to production.

Based on these steps, ten sectors were selected.[240] These sectors consisted of Agriculture and food; Consumer, retail and hospitality services; Education and training; Financial services; Government; Health; Infrastructure (including utilities such as energy and water); Manufacturing; and Transport services.

STEP 3: IDENTIFY RELEVANT TECHNOLOGY APPLICATIONS IN FOCUS SECTORS

Relevant technology applications in the focus sectors and their sources of value (e.g., reduced wastage in production, enhanced consumer offerings) were identified based on a detailed review of the academic literature for each of the eight focus technologies. These technology applications included tangible drivers

EXHIBIT A1:

A FOUR-STEP METHODOLOGY WAS USED TO UNDERSTAND HOW DIGITAL TECHNOLOGIES COULD TRANSFORM ECONOMIC DEVELOPMENT

	STEP 1 Identify digital technologies	STEP 2 Align on focus sectors	STEP 3 Identify relevant technology applications in focus sectors	STEP 4 Size the value in 2030
Activities	Identify key digital technologies that academic literature has shown to be important for driving business and consumer value	Identify key sectors of the economy, based on relevance of those technologies and their importance for overall jobs and GDP	Understand relevant technology applications in focus sectors, including sources of value	Estimate the value (in local currency terms) of these technology applications in each sector in 2030 based on full adoption scenario
Methodology	Industry reports – e.g., McKinsey Global Institute, World Economic Forum	Technology reports to identify sector-impact of technologies; local country data for importance of sectors to GDP, jobs	Review of sector-level technology reports	Case studies, with top-down "sanity check" based on comparison to other research reports on overall value of technologies

239. This was based on a range of reports. See for example, McKinsey Global Institute (2014), Southeast Asia at the crossroads: Three paths to prosperity (Available at: https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Asia%20Pacific/Three%20paths%20to%20sustained%20economic%20growth%20in%20Southeast%20Asia/McKinsey Global Institute%20SE%20Asia_Executive%20summary_November%202014.ashx); and McKinsey Global Institute (2014), India's tech opportunity: Transforming work, empowering people (Available at: https://www.mckinsey.com/industries/high-tech/our-insights/indias-tech-opportunity-transforming-work-empowering-people).
240. In Pakistan, all ten sectors have fulfilled the criterion in Step 2.

of business value, such as the use of remote patient monitoring to enable hospital-level care in homes using advanced sensors, smart medical devices, and robotics. A list of these technology applications, categorized by sector and key digital technology, is shown in Exhibit 2 in Chapter 1. Several emerging digital technologies such as blockchain were considered but not analysed as they were still in the nascent stages and economic impact estimates were difficult to obtain.

STEP 4: SIZE THE VALUE IN 2030

The value (in local currency terms) of these technology applications in each sector was then quantified in 2030 (based on assessed potential linked to benchmarks).

The **"Full adoption" scenario** was analysed. In this scenario, the country was assumed to achieve full digital adoption (100 percent) in the 43 digital technology applications across ten sectors. This scenario was modelled to frame the maximum achievable opportunity.

A series of international and country-specific case studies were used for each technology application in the sizing. A "sanity check" of the results was then done by comparing the overall sector and economy-wide estimates with other research reports. **These estimates do not represent GDP or market size (revenue), but rather economic impact such as productivity gains, increased revenues and cost savings.**[241]

APPENDIX A2: SPECIFIC APPROACHES, ASSUMPTIONS AND SOURCES

Table 1 summarises the key metrics and sources used commonly across the sizing of the economic opportunities of digital technology applications.

The specific assumptions and sources of information used to size each digital technology application in each sector are shown below. These assumptions were used to estimate the "Full adoption" scenario in 2030.

TABLE 1: KEY METRICS AND SOURCES FOR SIZING ECONOMIC OPPORTUNITIES

METRICS	SOURCE
GDP / GDP per capita	• World Bank GDP statistics • International Monetary Fund (IMF) Real GDP growth estimates • Pakistan Bureau of Statistics
Population	• United Nations Department of Economic and Social Affairs Population datasets
Labour Force	• International Labour Organisation (ILO) • World Bank Labour Force statistics • Pakistan Bureau of Statistics
Wage	• Pakistan Bureau of Statistics
Exchange rates	• OFX

241. The report considers the feasibility of the 43 technology applications in Pakistan and finds existing examples of adoption for most applications.

AGRICULTURE AND FOOD

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. PRECISION FARMING		**PRODUCTIVITY GAINS/COST SAVINGS**
Data-driven optimisation of crop and meat production	Sized based on the productivity gains from increased yield, as well as cost savings from the use of fewer resources in farming. The Pakistan Agricultural Research Council (2016) estimated that precision land levelling has increased crop yield up to 26 percent. A country-level estimate was derived based on the effectiveness of the technology within the context of the country's agricultural landscape and its agricultural sector GDP.	• Pakistan Agricultural Research Council (2016)[242]
2. IOT-ENABLED SUPPLY CHAIN MANAGEMENT		**INCREASED REVENUES**
IoT technology to help reduce food waste in supply chain	Sized based on the additional revenues from reduced food losses that occur in the supply chain. McKinsey Global Institute (2014) estimated that 10 percent to 15 percent of all food waste throughout the supply chain were recoverable from technology-enabled supply chain management. A country-level estimate was derived based on annual food waste from the supply chain which was assumed to grow at constant rates.	• McKinsey Global Institute (2014)[243] • The Nation (2020)[244]
3. REAL-TIME MARKET INFORMATION		**INCREASED REVENUES**
Provision of real-time market information on prices	Sized based on increased farmers' revenues from access to real-time information. McKinsey Global Institute (2014) estimated this positive impact to be equivalent to 10 percent to 15 percent of agricultural GDP. A country-level estimate was derived based on the country's agriculture sector GDP.	• McKinsey Global Institute (2014)[245]
4. FOOD SAFETY		**COST SAVINGS**
Using sensors, data monitoring and analysis techniques to ensure the biosecurity of food products and predict when concerns may arise	Sized based on cost savings from reduced food contamination losses. Fast Company (2017) reported that improving food traceability via sensing, tracking and data monitoring technologies could improve the percentage of food arriving at the retailers' premises with target freshness, from 30 percent to 90 percent. PricewaterhouseCoopers (2015) estimated the global cost of food fraud, proxied by lost sales due to adverse health consequences, to be between USD30 billion to USD40 billion a year. Growth in cost of food fraud was derived based on FAO's estimate of global food demand growth. A country-level estimate of food contamination losses was derived based on the relative share of global GDP.	• Fast Company (2017)[246] • Pricewaterhouse Coopers (2015)[247] • Food and Agriculture Organization of the United Nations[248]

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CONSUMER, RETAIL AND HOSPITALITY

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. DIGITAL RETAIL SALES AND MARKETING CHANNELS		**PRODUCTIVITY GAINS**
Productivity gains from delivering retail goods through digital channel reducing labour, inventory, and real estate costs	Sized based on productivity gains from delivering goods digitally. Institute for International Economic Policy (2016) estimated that productivity gains from selling goods through digital channels ranged from 6 percent to 15 percent, based on reduced labour requirements, inventory efficiencies and lower real estate costs. A country-level estimate was derived based on domestic e-commerce retail sales and operating costs (assuming constant growth rates).	• Institute for International Economic Policy (2016)[249]
2. IOT-ENABLED INVENTORY MANAGEMENT		**INCREASED REVENUES**
Use of IoT to reduce stock outs	Sized based on increase in revenues from capturing sales potentially lost due to stock outs. Institute for International Economic Policy (2016) estimated that 4 percent of retail sales were lost due to stock outs, and that 35 percent to 40 percent of this value may be recaptured using IoT. A country-level estimate was derived based on domestic retail sales.	• Institute for International Economic Policy (2016)[250]
3. AUTOMATION AND AI CUSTOMER SERVICE IN HOTELS		**INCREASED REVENUES**
Use of AI and automated services for remote check-ins at hotels	Sized based on increased revenues from higher efficiency in hotel verification procedures. Colliers International (2019) estimates that hotel revenues could increase by 10 percent through AI. The Vulcan Post reported that each hotel verification procedure typically took 10 minutes. The Singapore Tourism Board estimated that the E-visitor Authentication system could eliminate manual processes and reduce check-in time by up to 70 percent. A country-level estimate was derived based on hotel revenue.	• Colliers International (2018)[251] • The Vulcan Post (2018)[252] • Singapore Tourism Board (2019)[253]
4. DATA ANALYTICS ON TRAVEL PATTERNS		**INCREASED REVENUES**
Use of big data analytics in predicting consumer behaviour	Sized based on increased revenues from better targeted promotions to tourists. Boston Consulting Group (2020) estimated that brands experienced a revenue uplift of 6 to 10 percent from integrating proprietary data to create personalized experiences. A country-level estimate was derived based on tourism revenue.	• Boston Consulting Group (2020)[254]

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CONSUMER, RETAIL AND HOSPITALITY (CONT'D)

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
5. ONLINE F&B DELIVERY SERVICES		**INCREASED REVENUES**
Use of online delivery service	Sized based on increase in revenues from capturing F&B orders placed online. The Straits Times (2017) reported that restaurants have seen revenues rise by 15 percent after partnering food delivery firms. A country-level estimate was derived based on domestic F&B revenue.	• The Straits Times (2017)[255]

EDUCATION AND TRAINING

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. E-CAREER CENTRES AND DIGITAL JOBS PLATFORM		**GDP INCREMENTS**
Use of online job listing platforms and matching of candidate profiles to available jobs based on algorithms	Sized based on GDP contributions from higher employment rate. McKinsey Global Institute (2015) estimated the impact on employment rates on different countries, stating that these were different for each country, depending on its labour market characteristics, education and income levels and demographic trends. A country-level estimate was derived based on national employment rate, labour force and GDP per capita.	• McKinsey Global Institute (2015)[256]
2. PERSONALISED LEARNING		**GDP INCREMENTS**
Use of digital technologies to provide personalised and remote learning opportunities for students	Sized based on increase in GDP from higher employment rate. McKinsey Global Institute (2018) estimated that personalised learning would increase the employment rate by 0.5 percent in high-income countries, and 0.9 percent in other countries. Classification of the country's income level was based on the World Bank's definition. A country-level estimate was derived based on national employment rate, labour force and GDP per capita.	• McKinsey Global Institute (2018)[257] • World Bank[258]
3. ONLINE RETRAINING PROGRAMMES		**GDP INCREMENTS**
Lifelong learning opportunities delivered in digital format helped individuals gain new skills	Sized based on increase in GDP from higher employment rate. McKinsey Global Institute (2018) estimated that online retraining programmes would increase employment rate by 0.1 percent in "high income" countries, and 0.3 percent in "middle-income" countries. A country-level estimate was derived based on national employment rate, labour force and GDP per capita.	• McKinsey Global Institute (2018)[259] • World Bank[260]

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FINANCIAL SERVICES

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. BIG DATA ANALYTICS		**INCREASED REVENUES**
Increased lending to small and medium-sized enterprises (SMEs) at higher margins due to big data	Sized based on additional revenue generated from increased lending to SMEs at higher margins. McKinsey Global Institute (2014) estimated that lending to SMEs would increase by 16 percent to 33 percent due to big data analytics, with increased margins between 1.4 percent to 1.8 percent. A country-level estimate was derived based on annual total lending to SMEs.	• McKinsey Global Institute (2014)[261]
2. DIGITAL BANKING SERVICES		**COST SAVINGS**
Use of Internet and mobile technologies to reduce operational and risk costs, and improve service delivery	Sized based on the cost savings from digitisation such as the electronic onboarding of clients, leveraging machine learning and robotics to create operational improvements and the use of public cloud infrastructure to reduce processing capacity. McKinsey Global Institute (2019) estimated that the cost-efficiency in South Korea from digital banking services is 1.5 percent. A country-level cost saving was derived based on domestic banking sector operating costs.	• McKinsey Global Institute (2017)[262]
3. MOBILE MONEY WALLETS		**INCREASED WAGES**
Use of Mobile Internet to support digital financial inclusion	Sized based on the number of persons who became financially included due to mobile money as of 2030 based on projections from 2014 and 2017 estimates (at historical growth rates). McKinsey Global Institute (2014) estimated that individuals would experience a 15 percent increase in wages due to financial inclusion, with this wage being gauged at the country's minimum wage rate as such individuals typically come from lower-income backgrounds. A country-level estimate was derived based on the proportion of the country's population (ages 15+) who were financially included, the proportion of them who became financially included due to mobile money, and annual minimum wage. Classification of the country's income level was based on the World Bank's definition.	• World Bank Global Findex Database[263] • McKinsey Global Institute (2014)[264]
4. REG TECH		**COST SAVINGS**
Use of AI and machine learning to automate document review, risk analysis and other repetitive compliance tasks	Sized based on the cost savings in compliance expenditure due to improvement in efficiency brought about by these technologies. Juniper Research (2017) estimated that up to 50 percent of compliance expenditure could be eliminated from adopting these technologies. A country-level estimate of efficiency savings was derived based on domestic banking sector costs.	• Juniper Research (2017)[265]

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GOVERNMENT

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. CLOUD COMPUTING		**COST SAVINGS**
Use of cloud-based software to reduce costs	Sized based on the estimated savings from cloud computing, specifically in the reduction in hardware costs. InfoWorld (2019) reported that companies experienced between 25 percent to 55 percent cost savings after migrating to the cloud. A country-level estimate was derived based on government ICT expenditure and hardware costs.	• InfoWorld (2019)[266]
2. E-SERVICES		**COST SAVINGS**
Reduction in operating expenditure from using e-services	Sized based on the reduction in operating expenditure from moving services online, pre-filing of tax forms, data availability and performance dashboards. The European Commission (2018) estimated that 20 percent of operating expenditure was eliminated in Spain after moving to e-services. A country-level estimate was derived based on government operating expenditure.	• European Commission (2018)[267]
3. E-PROCUREMENT		**COST SAVINGS**
Cost savings from using e-procurement channels	Sized based on the reduction in transaction costs from shifting to e-procurement for government projects. In South Korea, the Public Procurement Service estimated that the government saved USD8 billion in transaction costs annually through reduced labour costs, reduced lead-time and a more streamlined process. A country-level estimate was derived based on public procurement volumes.	• Public Procurement Service[268]
4. GEOGRAPHIC INFORMATION SYSTEM ENABLED TAX COLLECTION		**INCREASED TAX COLLECTION**
Use of big data and location-based information to improve tax collection	Sized based on the increase in tax collected from using big data and GIS-enabled services. In Brazil, the government managed to raise its Federal Tax collection by about 13 percent through adopting big data in audit corporate tax declaration. A country-level estimate was derived based on the country's tax evasion rate as a percentage of GDP relative to Brazil's.	• Bill & Melinda Gates Foundation and AlphaBeta (2018)[269]

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GOVERNMENT (CONT'D)

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
5. DIGITISATION OF GOVERNMENT PAYMENTS		**COST SAVINGS**
Use of digital services to distribute payments	Sized based on reduction in costs from using digital services in distributing government payments. The International Monetary Fund (2017) estimated that developing countries could save roughly 0.8 percent to 1.1 percent of GDP from digitalising government payments. A country-level estimate was derived based on the country's GDP.	• International Monetary Fund (2017)[270]
5. DATA ANALYTICS FOR GOVERNMENT TRANSFER PAYMENTS		**COST SAVINGS**
Use of data analytics in government transfer payments	Sized based on reduction in costs from using data analytics in determining eligible recipients of government transfer payments. McKinsey & Company estimated that 5 to 10 percent of government transfer payments globally are improper payments that could be addressed by adopting data analytics. A country-level estimate was derived based on the country's GDP.	• McKinsey & Company (2017)[271]

HEALTH

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. REMOTE PATIENT MONITORING		**COST SAVINGS**
Application of remote monitoring systems to improve patient care	Sized based on cost savings to the healthcare system through reduced hospital visits, length of patients' stays and medical procedures. McKinsey Global Institute (2013) estimated that such systems would reduce hospital visits, length of patients' stays and number of procedures relating to chronic diseases, resulting in 10 percent to 20 percent savings for the healthcare system. A country-level estimate was derived from the World Bank's estimate of total healthcare spend and the country's share of spending on chronic diseases.	• McKinsey Global Institute (2013)[272] • World Bank[273]
2. TELEHEALTH APPLICATIONS		**COST SAVINGS**
Use of internet and mobile technologies for medical consultations	Sized based on cost savings to the healthcare system through reduced doctor visits. Goldman Sachs (2015) estimated that the US healthcare system could save USD100 billion by adopting telehealth. A country-level estimate was derived based on relative national healthcare expenditure.	• Goldman Sachs (2015)[274]

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HEALTH (CONT'D)

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
3. DATA-BASED PUBLIC HEALTH INTERVENTIONS		**GDP INCREMENTS**
Use of analytics to direct highly targeted health interventions for at-risk populations	Sized based on the economic value of reduced disability-adjusted life years (DALYs) due to timely public health interventions. McKinsey Global Institute (2018) indicated that the most significant and measurable impacts were on maternal and child health, as well as public sanitation and hygiene. It estimated a 0.4 percent reduction in DALYs for "high-income" countries, and 1.5 percent for other countries. Income of countries classified based on the World Bank's definition. Economic value was taken to be this multiplied by GDP per capita, and was estimated based on the proportion of the population suffering from chronic diseases. A country-level estimate was derived based on national population sizes and GDP per capita.	• McKinsey Global Institute (2018)[275] • UN Population Division (2018)[276] • World Bank[277]
4. DETECTION OF COUNTERFEIT PHARMACEUTICAL DRUGS		**COST SAVINGS**
Use of IoT and advanced analytics to detect counterfeit drugs	Sized based on cost savings from reduced counterfeit pharmaceutical drugs in the country due to higher detection rates. EU IPO (2016) estimated that the annual cost of counterfeit pharmaceutical drugs to Europe's pharmaceutical industry was EUR10 billion. McKinsey Global Institute (2013) assessed that 30 percent to 50 percent of all drugs sold were addressable by this technology, and that its success rate was between 80 percent and 100 percent. A country-level estimate on the national cost of counterfeit drugs was derived based on the country's relative healthcare expenditure.	• EU Intellectual Property Office (2016)[278] • McKinsey Global Institute (2013)[279]
5. SMART MEDICAL DEVICES AND WEARABLES		**GDP INCREMENTS**
Analyzing data across connected implants, smart medical devices and wearables in personalized and predictive care	Sized based on the economic value of reduced disability-adjusted life years (DALYs) due to health improvement measures prompted by data from such devices. McKinsey Global Institute (2018) estimated that smart medical devices reduced DALYs by 1 percent reduction in high-income countries, and 0.6 percent in other countries. The economic value was taken to be this multiplied by GDP per capita. Classification of the country's income level was based on the World Bank's definition. A country-level estimate was derived based on national population sizes and GDP per capita, and was estimated based on the proportion of the population suffering from chronic diseases.	• McKinsey Global Institute (2018)[280] • UN Population Division (2018)[281] • World Bank[282]

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HEALTH (CONT'D)

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
6. ELECTRONIC MEDICAL RECORDS		**COST SAVINGS**
Use of cloud-based electronic medical record systems	Sized based on the cumulative savings (such as saving of physician and nursing time) from adopting electronic health records (EHR). McKinsey Global Institute (2014) estimated that widespread adoption of electronic medical records could increase India's annual economic value by USD3 billion. The global economic impact of HER was estimated based on India's share of the global healthcare expenditure. A country-level estimate was derived based on its relative national healthcare expenditure according to World Bank data and the global EHR market growth rates.	• McKinsey Global Institute (2014)[283] • World Bank[284] • Transparency Market Research[285]

INFRASTRUCTURE

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. SMART GRIDS		**COST SAVINGS**
Use of digital communications technology in detecting and optimizing electricity networks	Sized based on cost savings from energy savings due to lower consumption and efficiency improvements. The International Herald Tribune (2018) reported that engineers indicated a 5 to 10 percent in energy savings from using smart grids. A country-level estimate was derived based on total electricity consumption. Business and Sustainable Development Commission (2017) estimated that the global average wholesale price of electricity was USD100/Mwh.	• The International Herald Tribune (2011)[286] • World Bank[287] • Business and Sustainable Development Commission (2017)[288]
2. 5D BIM AND PROJECT MANAGEMENT TECHNOLOGIES		**COST SAVINGS**
Use of integrated modelling platforms to simulate construction cost and timeline impacts of decisions in project planning, design, construction, operations, and maintenance	Sized based on cost reductions from improved coordination between different development parameters, as well as the continuous insight provided on project costs. McKinsey Global Institute (2013) estimated that streamlining project delivery could bring about 15 percent savings to infrastructure cost, with 15 percent to 25 percent of these savings coming from 5D BIM technologies. A country-level estimate was derived based on domestic construction sector costs.	• McKinsey Global Institute (2013)[289] • Global infrastructure Outlook[290]

283. McKinsey Global Institute (2014), India's technology opportunity: Transforming work, empowering people. Available at: https://www.mckinsey.com/~/media/McKinsey/Industries/Technology%20Media%20and%20Telecommunications/High%20Tech/Our%20Insights/Indias%20tech%20opportunity%20Transforming%20work%20empowering%20people/McKinsey Global Institute%20India%20tech_Executive%20summary_December%202014.ashx
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INFRASTRUCTURE (CONT'D)

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
3. PREDICTIVE MAINTENANCE TECHNOLOGIES		**COST SAVINGS**
Using data from sensors to ensure prompt and predictive maintenance, minimizing downtime	Sized based on the economic value of benefits from sizeable applications including the predictive maintenance of public transit systems and water leakage detection and control. McKinsey Global Institute (2018) estimated a 2.3 percent reduction in average commuting time from predictive transit for "high-income" countries, and 1.4 percent for other countries. On water leakage detection and control, McKinsey Global Institute (2018) estimated a 1.4 percent reduction in water consumption for "high-income" countries, and country-level estimates were used in other countries. Classification of the country's income level was based on the World Bank's definition. The Business and Sustainable Development Commission (2017) estimated that the global average price of water was USD0.90/m3. A country-level estimate was derived based on the country's average commuting time, population, GDP per capita and domestic water consumption.	• McKinsey Global Institute (2018)[291] • World Bank[292] • UNESCO-IHE (2011)[293] • Business and Sustainable Development Commission (2017)[294]
4. SMART BUILDINGS		**COST SAVINGS**
Use of physical sensor networks, energy storage and data analytics to improve resource efficiency of buildings and reduce energy and water consumption, as well as carbon emissions	Sized based on the economic value of the reduction in greenhouse gas emissions (GHG) and water consumption by building automation systems. McKinsey Global Institute (2018) estimated a 2.9 percent reduction in GHG emissions and a 1.7 percent reduction in water consumption for "high-income" countries. The corresponding figures for other countries were 1.4 percent and 1.1 percent. Classification of the country's income level was based on the World Bank's definition. A Country-level estimate was derived based on its greenhouse gas emissions and water consumption from buildings. Business and Sustainable Development Commission (2017) estimated that the global average price of water was USD0.90/m3 and GHG price was valued at USD50/ton (a global proxy price equating roughly to the financial incentives needed to achieve carbon emissions consistent with a 2-degree pathway).	• McKinsey Global Institute (2018)[295] • IPCC[296] • World Bank[297] • Business and Sustainable Development Commission (2017)[298]

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296. IPCC estimates on global greenhouse gas emissions. Available at: https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data
297. World Bank (2018). Available at: https://blogs.worldbank.org/opendata/new-country-classifications
298. Business and Sustainable Development Commission (2017), Valuing the SDG prize: Unlocking business opportunities to accelerate sustainable and inclusive growth.

MANUFACTURING

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. ADDITIVE MANUFACTURING		**PRODUCTIVITY GAINS/COST SAVINGS**
Use of dynamic, resource efficient 3D printing and related technologies to enable 'on-time' manufacturing & rapid manufacturing	Sized based on the incremental economic value of faster time-to-market due to quicker prototyping and design adjustments, reduced production time, higher material productivity as well as more efficient sales process due to product customisation. McKinsey & Company (2017) estimated that the global economic value of this technology could reach between USD100 billion and USD250 billion by 2025. Current economic value was calculated based on today's global manufacturing sector GDP, and assuming a constant growth rate for the 2030 forecast. A country-level estimate was derived based on the domestic manufacturing sector GDP as a share of the global figure.	• McKinsey & Company (2017)[299]
2. BIG DATA ANALYTICS		**INCREASED REVENUES**
Use of big data analytics in demand forecasting and supply planning	Sized based on increase in revenue from more accurate demand-supply matching leading to higher sales. McKinsey Global Institute (2011) estimated a 2.5 percent to 3 percent increase in profit margin from big data analytics in manufacturing. A country-level estimate was derived based on domestic manufacturing sector GDP.	• McKinsey Global Institute (2011)[300]
3. AUTOMATION AND ROBOTICS		**PRODUCTIVITY GAINS**
Productivity boost from automating mundane and repetitive production tasks	Sized based on productivity boost to manufacturing processes from robots performing mundane and repetitive tasks. McKinsey & Company (2017) estimated that automation and robotics could improve productivity ranging from 0.8 to 1.4 percent of global GDP annually from 2015 to 2065. A country-level estimate was derived based on domestic manufacturing sales.	• McKinsey & Company (2017)[301]
4. IOT-ENABLED SUPPLY CHAIN MANAGEMENT		**COST SAVINGS**
Savings in operating costs from IoT-enabled supply chain management and distribution network management	Sized based on reduction in operating costs from adopting IoT-enabled supply chain management and distribution network management. McKinsey Global Institute (2011) estimated a 2.5 percent to 5 percent savings in distribution and supply chain operating costs could amount to 2 percent to 6 percent of manufacturing sales. A country-level estimate was derived based on domestic manufacturing sector operating costs.	• McKinsey Global Institute (2011)[302]

299. McKinsey & Company (2017), Additive manufacturing: A long-term game changer for manufacturers. Available at: https://www.mckinsey.com/business-functions/operations/our-insights/additive-manufacturing-a-long-term-game-changer-for-manufacturers
300. McKinsey Global Institute (2011), Big data: The next frontier for innovation, competition and productivity. Available at: https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/big-data-the-next-frontier-for-innovation
301. McKinsey & Company (2017), A future that works: Automation, employment, and productivity. Available at: https://www.mckinsey.com/~/media/mckinsey/featured%20insights/digital%20disruption/harnessing%20automation%20for%20a%20future%20that%20works/a-future-that-works-executive-summary-mgi-january-2017.ashx
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TRANSPORT SERVICES

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. SMART ROADS		**TIME SAVINGS**
Use of real-time public transit information, intelligent traffic signals and real-time road navigation to reduce commuting time	Sized based on the economic value of real-time public transit information, intelligent traffic signals and real-time road navigation. McKinsey Global Institute (2018) estimated a 2.2 percent reduction in average commuting time for "high-income" countries, and 5.5 percent for other countries. Classification of the country's income level was based on the World Bank's definition. A country-level estimate was derived based on the average commuting time, population and GDP per capita.	• McKinsey Global Institute (2018)[303] • World Bank[304]
2. AUTONOMOUS VEHICLES		**COST SAVINGS**
Use of AI and sensors to increase fuel efficiency	Sized based on the projected gains in fuel efficiency, compared to conventional vehicles. McKinsey Global Institute (2013) estimated that autonomous cars could travel more closely together, reducing air resistance and improving fuel efficiency by 15 percent to 20 percent. A country-level estimate was derived based on the number of cars, projected number of autonomous vehicles, annual fuel requirement, and cost of fuel.	• McKinsey Global Institute (2013)[305]
3. GEOSPATIAL SERVICES		**PRODUCTIVITY GAINS/COST SAVINGS**
Productivity impact of using location-based information	Sized based on estimated productivity impact geospatial services in the transport sector (land, sea and air). AlphaBeta (2017) estimated that geospatial services could improve productivity of land, sea and air transport by 2.5 percent to 5 percent. These benefits include reduced logistics costs, improved network design and management. A country-level estimate was derived based on the size of the land, sea and air transport sector.	• AlphaBeta (2017)[306]
4. SMART PORTS		**COST SAVINGS**
Use of IoT to enhance port efficiency	Sized based on cost savings from reduced logistics costs due to IoT-enabled data collection and monitoring, as well as intelligent decision-making capabilities. Accenture and SIPG (2016) estimated 3.6 percent savings in logistics costs from building smart ports. A country-level estimate was derived based on logistics sector costs (based on indicated percentages of the country's GDP).	• Accenture and SIPG (2016)[307] • Council of Supply Chain Management Professionals (2013)[308] • World Bank (2016)[309]

303. McKinsey Global Institute (2018), Smart cities: Digital solutions for a more liveable future.
Available at: https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/smart-cities-digital-solutions-for-a-more-livable-future
304. World Bank (2018). Available at: https://blogs.worldbank.org/opendata/new-country-classifications
305. McKinsey Global Institute (2013), Disruptive technologies: Advances that will transform life, business and the global economy.
Available at: https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Disruptive%20technologies/McKinsey Global Institute_Disruptive_technologies_Full_report_May2013.ashx
306. AlphaBeta (2017), The Economic Impact of Geospatial Services: How Consumers, Businesses And Society Benefit from Location-Based Information.
Available at: https://www.alphabeta.com/wp-content/uploads/2017/09/GeoSpatial-Report_Sept-2017.pdf
307. Accenture and Shanghai International Port Group (2016), Connected ports: Driving future trade.
Available at: https://www.accenture.com/t20161012T003018Z__w__/us-en/_acnmedia/PDF-29/accenture-connected-ports-driving-future-trade.pdf
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Available at: http://www.scdigest.com/assets/newsviews/13-06-20-2.php?cid=7168&ctype=content
309. World Bank (2016), Logistics performance index: Ranking by countries. Available at: https://lpi.worldbank.org/international/global

B: SIZING GOOGLE'S ECONOMIC IMPACT IN PAKISTAN

To estimate the **business benefits**, the economic value generated by businesses that used Google's products was calculated. These are in the form of increased revenue (through increased customer outreach and access to new markets), as well as improved productivity (through time savings). The Google products included in this analysis of business benefits include Google Search, YouTube, Google Ads, AdSense, and Google Play.

To estimate **societal benefits**, the resultant revenue gains experienced by Pakistani businesses from the use of Google Ads, AdSense, and YouTube was then used to calculate the job creation benefits indirectly supported by Google.

Estimating the **consumer benefits** supported by Google is a challenging task. This is because individuals typically do not have to pay for the Google products that they use. There are several established methodologies for estimating the benefits of free services, including consumer surplus based on the consumer's willingness to pay (how much an individual values a Google product). Primary data used in the analysis was collected from a consumer survey of 500 Internet users in Pakistan. This sample size is statistically significant based on Pakistan's online population, at a 95 percent confidence level (the level typically adopted by researchers). The survey was conducted online, which was deemed suitable given the intention to survey Internet users. The sample was also checked for its representativeness of Pakistan's Internet population based on demographic variables including age, income level, and the geographical location of respondents. In addition to the consumer survey, this research also leveraged big data gathering methods such as that used to determine the amount of time saved by using Google Maps for driving and public transport, as well as third-party sources. The Google products included in this analysis of consumer benefits include Google Search, Google Play, YouTube, Google Drive, Photos, Docs, and Sheets.

BUSINESS AND JOB CREATION BENEFITS

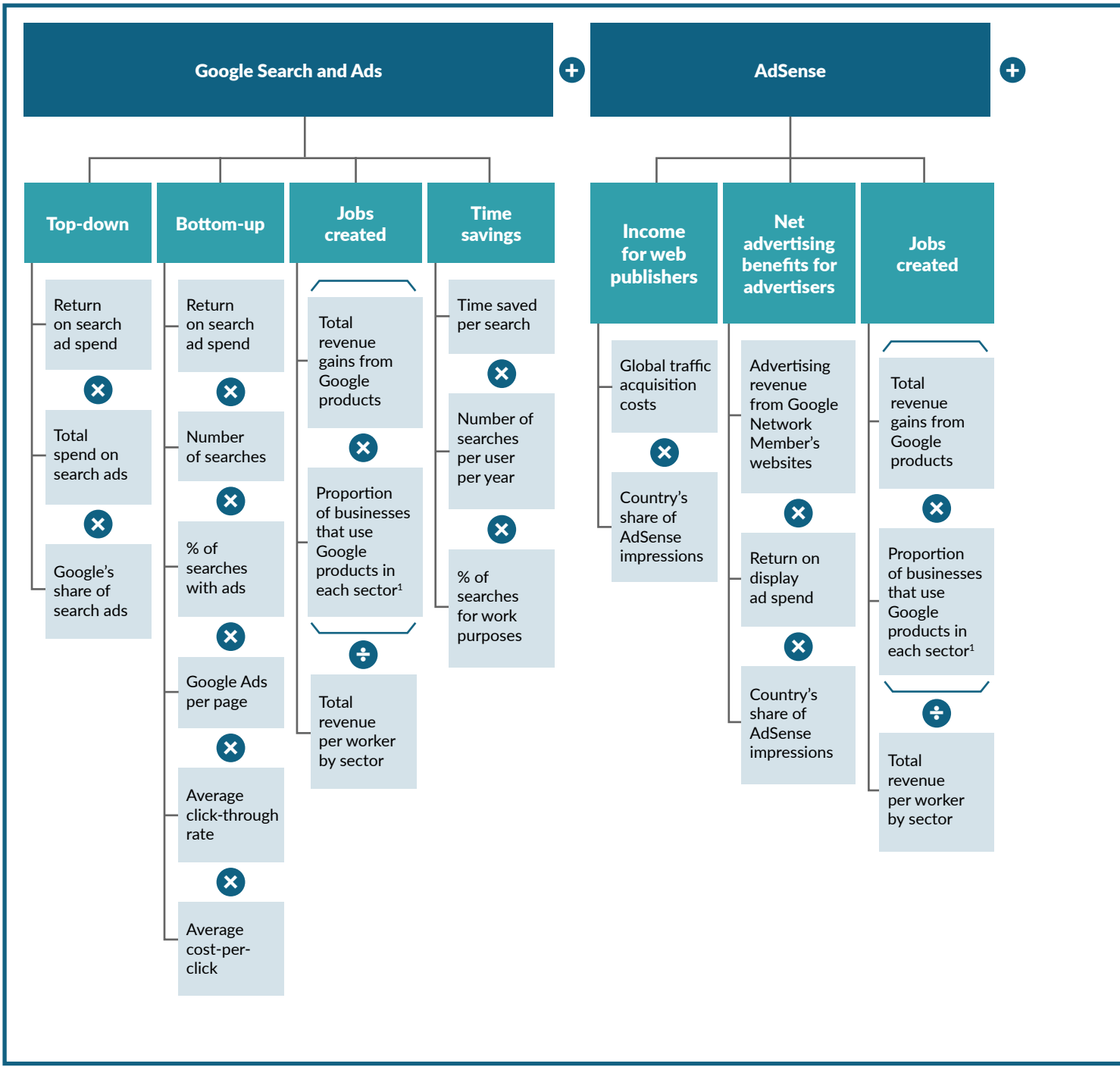
The business benefits supported by Google include the gross revenue, income or savings generated by businesses using Google products. These benefits do not include the flow-on economic effects generated, such as further purchases from their suppliers or the economic activity generated by the employees of these businesses who spend their wages in the broader economy. These benefits also do not account for activity that may have been displaced by Google, nor attempt to estimate the incremental impact of Google on the Pakistan economy beyond what would be the case if Google did not exist but other companies like it did. Exhibit B1 summarises the methodology used for sizing the business benefits of Google's products, as well as the job creation benefits.

GOOGLE SEARCH AND ADS

The business benefits of Google Search and Ads were estimated using two methods – a top-down approach and a bottom-up approach. The top-down approach estimated the total size of the search advertising segment in the country and the proportion of this space that Google represents. The bottom-up approach estimated the number of Google searches conducted in the country, the proportion of searches with advertisements, the number of advertisements per search, the average click-through rate (CTR), and the average cost-per-click (CPC).

EXHIBIT B1:

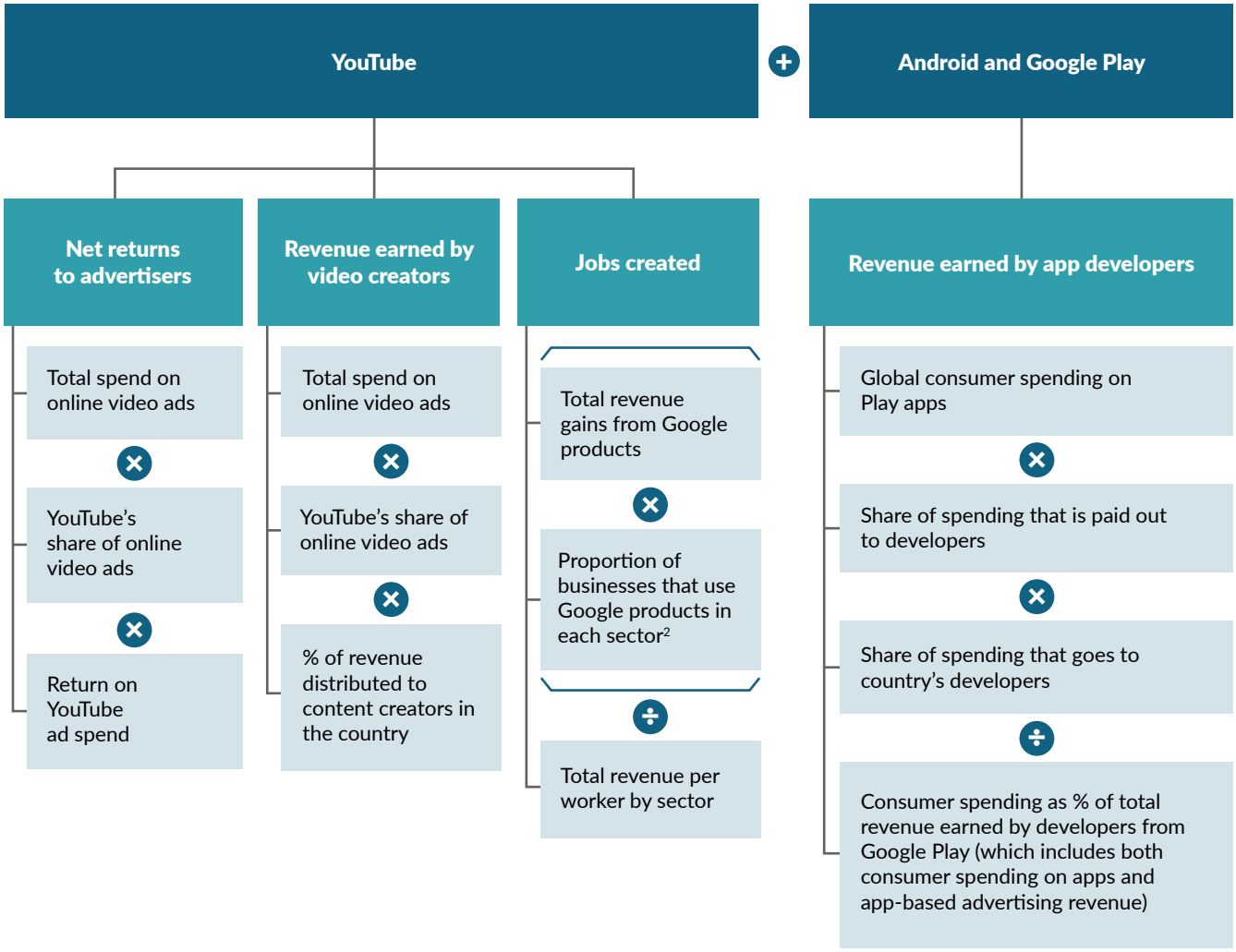
METHODOLOGY FOR SIZING BUSINESS AND JOB CREATION BENEFITS FROM GOOGLE



1. In the absence of such publicly available data, this was proxied based on the proportion of businesses that use websites in each sector in the Philippines, a country with similar level of digital adoption and economic development. This data is available from Philippine Statistics Authority (2018), "2018 Census of Philippine Business and Industry: Economy-Wide". Available at: https://psa.gov.ph/content/2018-census-philippine-business-and-industry-economy-wide

2. In the absence of such publicly available data, this was proxied based on the proportion of businesses that use a social media account in each sector in the Philippines, a country with similar level of digital adoption and economic development. This data is available from Philippine Statistics Authority (2018), "2018 Census of Philippine Business and Industry: Economy-Wide". Available at: https://psa.gov.ph/content/2018-census-philippine-business-and-industry-economy-wide Note: This report's methodology for measuring Google's economic impact is consistent with the methodology used in the Google Economic and Social Impact South Korea and New Zealand 2021 reports.

SOURCE: AlphaBeta analysis


YouTube
Android and Google Play
Net returns to advertisers
Revenue earned by video creators
Jobs created
Revenue earned by app developers
Total spend on online video ads
YouTube's share of online video ads
Return on YouTube ad spend
Total spend on online video ads
YouTube's share of online video ads
% of revenue distributed to content creators in the country
Total revenue gains from Google products
Proportion of businesses that use Google products in each sector[2]
Total revenue per worker by sector
Global consumer spending on Play apps
Share of spending that is paid out to developers
Share of spending that goes to country's developers
Consumer spending as % of total revenue earned by developers from Google Play (which includes both consumer spending on apps and app-based advertising revenue)

To estimate the income generated by businesses paying for online advertising through Google a return on investment (ROI) ratio range of 3.4 – 8 was applied, and both estimates were reported.[310] This ROI ratio was developed from a few assumptions:

- Using a large sample of proprietary data, Hal Varian, Google's Chief Economist, estimated that businesses received USD2 in revenue for every USD1 spent on advertising. This finding was published in the American Economic Review in 2009.

- Businesses also receive free clicks because of unpaid Google Search. Using research published in the International Journal of Internet Marketing and Advertising in 2009 by Jansen and Spink, the Google US Economic Impact Study assumed that businesses receive five clicks for every click on a paid advertisement.

- Unpaid clicks are not considered as commercially valuable, so the US Economic Impact Study assumed their value at 70 percent of paid clicks.

- Because of these assumptions, an ROI ratio of 8 was estimated. This ROI ratio was taken as an upper bound. To derive a lower bound, we built on the academic findings detailed in the Google UK Economic Impact Study to set a lower bound of 3.4.

Table 2 shows the inputs and sources used for estimating the business benefits of Google Search and Ads.

ADSENSE

The direct business benefits from AdSense were estimated as the net advertising benefits generated by businesses placing advertisements on publisher sites such as websites, blogs, and forums.[311] We estimated this figure using Google's published global advertising revenue from Google network's websites and multiplied this by the country's share of global AdSense impressions.[312] In addition, we applied an ROI ratio that advertisers earn using display advertising, derived from academic literature.

The benefits of AdSense to content creators were also estimated as the total income that they earn from placing advertisements sourced through Ads next to content on their website. The total income earned by the country's content creators was estimated from Google's global payments to website publishers, also known as their traffic acquisition costs, and applying the country's share of AdSense impressions to estimate the payments specific to the country.

Table 3 shows the inputs and sources used for estimating the business benefits of AdSense.

YOUTUBE

We estimated the direct benefits of YouTube to video advertisers in the country based on the total video advertising spend in the country and YouTube's share of that market. This estimate was then multiplied with the ROI ratios for YouTube advertisement.

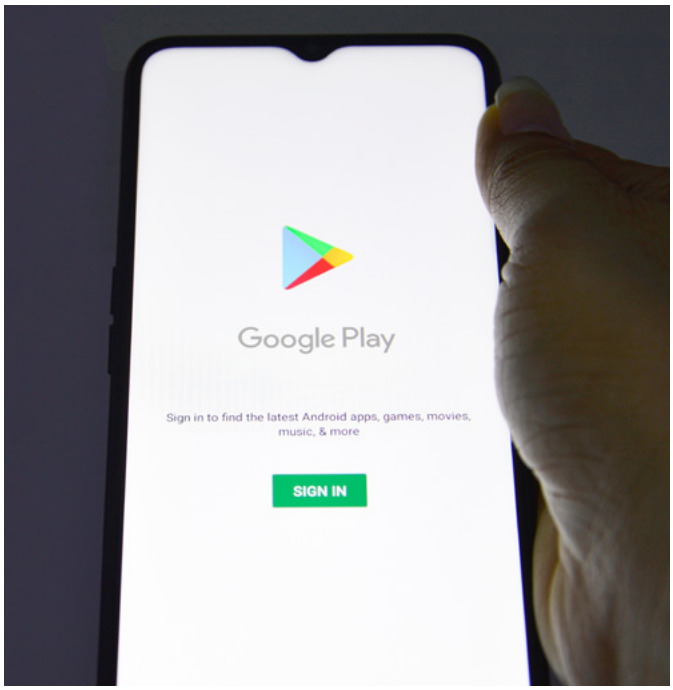
Table 4 shows the inputs and sources used for estimating the business benefits of YouTube.

GOOGLE SEARCH (TIME SAVINGS)

We estimated the time saving benefits that businesses gained from using Google Search based on the amount of time saved per search, the number of searches conducted per worker, and the share of searches that were conducted for work purposes.

Table 5 shows the inputs and sources used for estimating the time savings benefits of Google Search.

310. ROI reflects the net advertising benefits that businesses receive from online advertising (i.e., total revenue minus online advertising cost).
311. This refers to the increase in revenues and sales that can be directly attributed to advertising minus the related advertising expenditure.
312. This methodology does not account for price differences across countries due to the lack of availability of reliable data on cost per impression by country.



GOOGLE PLAY

We estimated the revenue earned by app developers in the country from consumer spending on Google Play based on global consumer spending on Google Play, the share of the spending that was paid out to app developers, and the share of the spending that went to the country's app developers. The revenue from consumer spending earned by app developers in the country was scaled up to include advertising revenue to arrive at the total revenue supported by Google Play in the country, using estimates for the distribution of revenue across consumer spending and ads.

Table 6 shows the inputs and sources used for estimating the business benefits of Google Play.

JOB CREATION BENEFITS FROM GOOGLE PRODUCTS

We estimated the number of jobs that are indirectly supported through revenue gains experienced by Pakistani businesses from the use of Google's products for advertising. These include revenue gains from Google Ads, AdSense and YouTube. The underlying principle here is that as businesses gain increased revenue as they market their goods and services more effectively through the use of these Google services, their businesses expand and they will need to hire more employees to support the increased demand. This is a conservative estimate as it does not include "spillover jobs" such as new jobs that get created in the supply chain - e.g., supplier companies that also require to hire more as they sell an increased level of raw materials or component services to these businesses. To estimate the job creation impacts robustly, these were computed at the sectoral level, based on the breakdown of Google-supported revenue gains by sector, and revenue per worker in each sector. The breakdown of these Google-supported revenue gains by sector was estimated based on the average of the following two metrics: 1) share of businesses using websites (to proxy for the use of Google Ads and AdSense) or the share of businesses with social media accounts (to proxy for the use of YouTube) by sector; and 2) revenues of businesses in each sector. The total revenue gains supported by Google's advertising products in each sector was then divided by the respective revenue per worker figures for each sector to obtain the number of jobs indirectly supported by Google in each sector. The total number of jobs indirectly supported by Google in Pakistan's economy was taken as a sum of the estimated job creation benefits across all sectors. The share of businesses using websites and the share of businesses with a social media account for Pakistan were proxied with website usage and social media adoption among businesses in the Philippines. The Philippines was selected as it falls in the same income category, and has a similar level of digital adoption as Pakistan based on the Digital Adoption Index by the World Bank.[313]

Table 7 shows the inputs and sources used for estimating the job impact from Google Ads, AdSense and YouTube.

313. *Sources include: The World Bank (2020)," New World Bank country classifications by income level: 2020-2021" Available at: https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021; The World Bank (2016), Digital Adoption Index. Available at: https://www.worldbank.org/en/publication/wdr2016/Digital-Adoption-Index*

TABLE 2: INPUTS AND SOURCES FOR CALCULATING BUSINESS BENEFITS OF GOOGLE SEARCH AND ADS

APPROACH	METRIC	SOURCE
Top down approach	Total market expenditure on search advertising	• Statista (2020)[314]
	Google Search's market share	• StatCounter (2020)[315]
Bottom-up approach	Google Search traffic data	• AlphaBeta Consumer Survey (2020)
	% pages that display advertisements	• Varian (2009)[316], Jansen & Spink (2009)[317] • Deloitte (2015)[318]
	Advertisements per page on average	• Varian (2009)[319], Jansen & Spink (2009)[320] • Deloitte (2015)[321]
	CTR for Search (Estimate)	• Word Stream (2019)[322] • BannerTag (2019)[323]
	Average CPC for Search (Estimate)	• Word Stream (2018)[324] • Adstage (2019)[325]
Both Methods	ROI ratio Lower and Upper Bound	• Varian (2009)[326], Jansen & Spink (2009)[327] • Deloitte (2015)[328]

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317. Jansen, B. J., & Spink, A. (2009), "Investigating customer click through behaviour with integrated sponsored and non-sponsored results." International Journal of Internet Marketing and Advertising, Vol. 5, No. 1-2, pp. 74-94.
318. Deloitte (2015), Google's Economic Impact United Kingdom.
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321. Deloitte (2015), Google's Economic Impact United Kingdom.
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324. Irvine, M. (2018), "Average Cost per Click by Country: Where in the World Are the Highest CPCs?" Word Stream. Available at: http://www.wordstream.com/blog/ws/2015/07/06/average-cost-per-click
325. Adstage (Q3 2019), Paid media - benchmark report. Available at: https://cdn2.hubspot.net/hubfs/4350015/Benchmark%20Report/Q3%202019%20Paid%20Media%20Benchmark%20Report.pdf
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327. Jansen, B. J., & Spink, A. (2009), "Investigating customer click through behaviour with integrated sponsored and non-sponsored results." International Journal of Internet Marketing and Advertising, Vol. 5, No. 1-2, pp. 74-94.
328. Deloitte (2015), Google's Economic Impact United Kingdom.

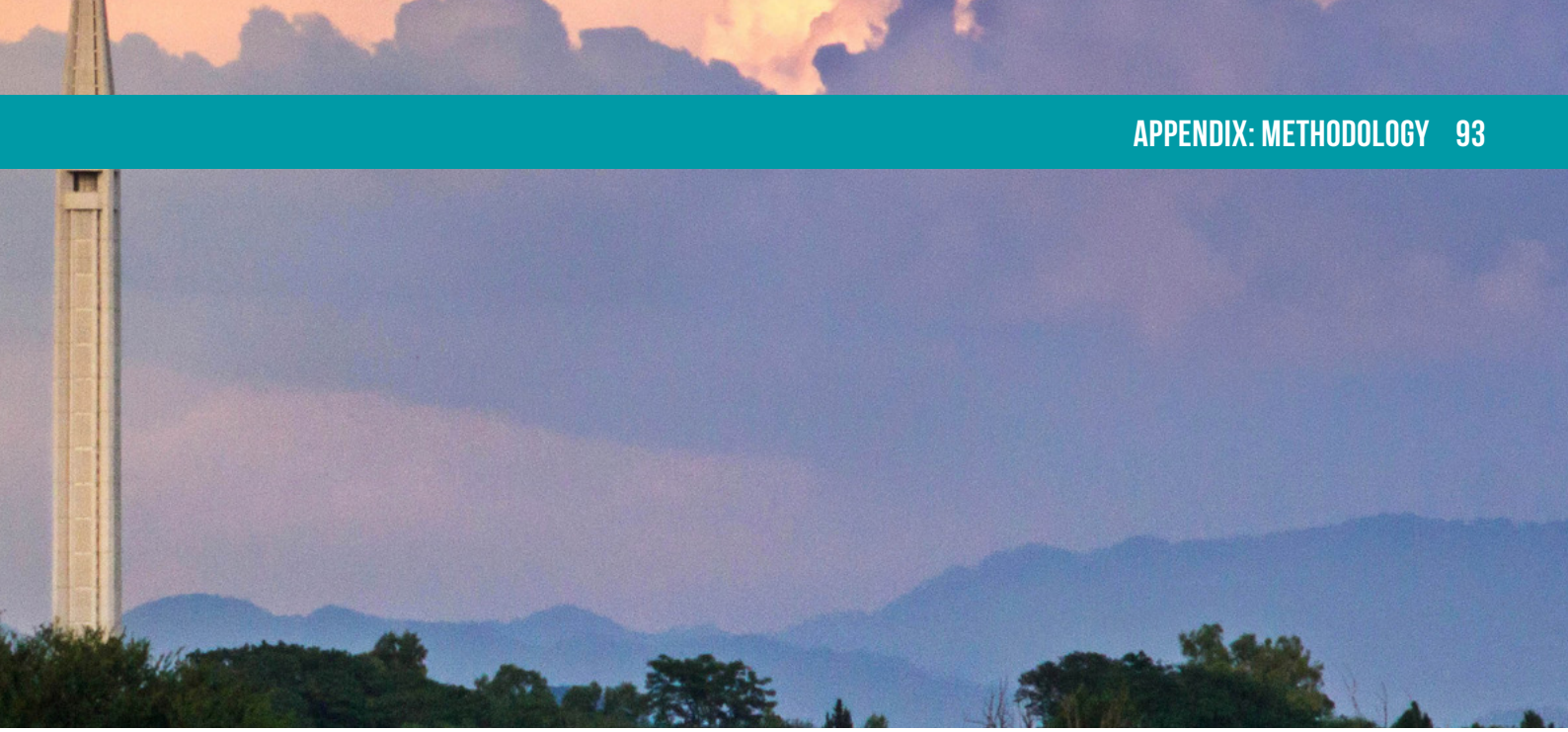

TABLE 3: INPUTS AND SOURCES FOR CALCULATING BUSINESS BENEFITS OF ADSENSE

ESTIMATION	METRIC	SOURCE
Net advertising benefits for advertisers	Advertising revenue from Google Network Member's websites	• Alphabet (2019)[329]
	ROI ratio	• Gupta et al. (2015)[330]
Revenue to content creators	Global traffic acquisition costs related to AdSense	• Alphabet (2019)[331]
Both estimates	Country share of global impressions on AdSense (Estimate)	• DoubleClick (2012)[332] • Internet World Stats (2021)[333] • Digital Pakistan (2019)[334]

TABLE 4: INPUTS AND SOURCES FOR CALCULATING BUSINESS BENEFITS OF YOUTUBE

METRIC	SOURCE
Total video advertising spend in country	• Statista (2019)[335]
YouTube's market share	• AlphaBeta Consumer Survey (2020)
YouTube ROI ratio	• Business Insider (2014)[336]

329. Alphabet (2019). Form 10-K for fiscal year ended December 31, 2019 - Submission to US SEC.
Available at: https://www.sec.gov/Archives/edgar/data/1652044/000165204420000008/goog10-k2019.htm
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Available at: https://www.sec.gov/Archives/edgar/data/1652044/000165204420000008/goog10-k2019.htm
332. Google DoubleClick (2012). What's trending in display for publishers?.
Available at: https://www.slideshare.net/RFONNIER/display-business-trends-publisher-edition-google-2012
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334. Digital Pakistan (2019), "Creating an Ecosystem for #DigitalPakistan". Available at: https://digitalpakistan.pk/blog/creating-an-ecosystem-for-digitalpakistan-conversationsjazz/
335. Statista (2020), "Video advertising – Pakistan". Available at: https://www.statista.com/outlook/218/122/video-advertising/Pakistan
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Available at: http://www.businessinsider.sg/youtube-ads-have-better-roi-than-tv-according-to-google-2016-4/?r=US&IR=T#mL3ZFqo0vlab2xq2.97

TABLE 5: INPUTS AND SOURCES FOR CALCULATING TIME SAVING BENEFITS OF GOOGLE SEARCH

METRIC	SOURCE
Time saved per search	• Varian (2014)[337] • Chen et al. (2014)[338]
Average daily searches per worker	• AlphaBeta Consumer Survey (2020)
% of searches for work purposes	• AlphaBeta Consumer Survey (2020)

TABLE 6: INPUTS AND SOURCES FOR CALCULATING BUSINESS BENEFITS OF GOOGLE PLAY

METRIC	SOURCE
Global consumer spending on Google Play	• Sensor Tower (2020)[339]
Share of the spending that is paid out to app developers	• Google (2020)[340]
Share of the spending that goes to the country's app developers	• Caribou Digital (2016)[341]
Consumer spending as % of total revenue earned by developers from Google Play (which includes both consumer spending on apps and app-based advertising revenue)	• Appota/ AdSota (2017)[342]

TABLE 7: INPUTS AND SOURCES FOR CALCULATING JOB IMPACT

APPROACH	METRIC	SOURCE
Revenue per worker by sector	Number of employees in Pakistan by sector	• Pakistan Bureau of Statistics (2018)[343]
	Gross value added by sector	• Pakistan Bureau of Statistics (2020)[344]
Breakdown of business benefits for Google Search and Ads, AdSense, and YouTube	Businesses using a website from each sector as % of total	• Philippine Statistics Authority (2017)[345]
	Businesses with a social media account as % of total	

337. Hal Varian (2014), "Economic value of Google" (Presentation).
Available at: http://cdn.oreillystatic.com/en/assets/1/event/57/The%20Economic%20Impact%20of%20Google%20Presentation.pdf
338. Chen, Y., YoungJoo Jeon, G., & Kim, Y.-M. (2014), "A day without a search engine: an experimental study of online and offline searches". Experimental Economics, Vol 17, Issue 4, pp 512-536.
339. Sensor Tower (2020), "Consumer Spending in Mobile Apps Grew 17% in 2019 to Exceed NZ$83 Billion Globally".
Available at: https://sensortower.com/blog/app-revenue-and-downloads-2019
340. Google (2020). Available at: https://support.google.com/googleplay/android-developer/answer/112622?hl=en
341. Caribou Digital (2016), Winners and Losers in the Global App Economy.
Available at: https://www.cariboudigital.net/wp-content/uploads/2016/02/Caribou-Digital-Winners-and-Losers-in-the-Global-App-Economy-2016.pdf
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Available at: https://www.pbos.gov.pk/sites/default/files/tables/rename-as-per-table-type/Table-4.pdf
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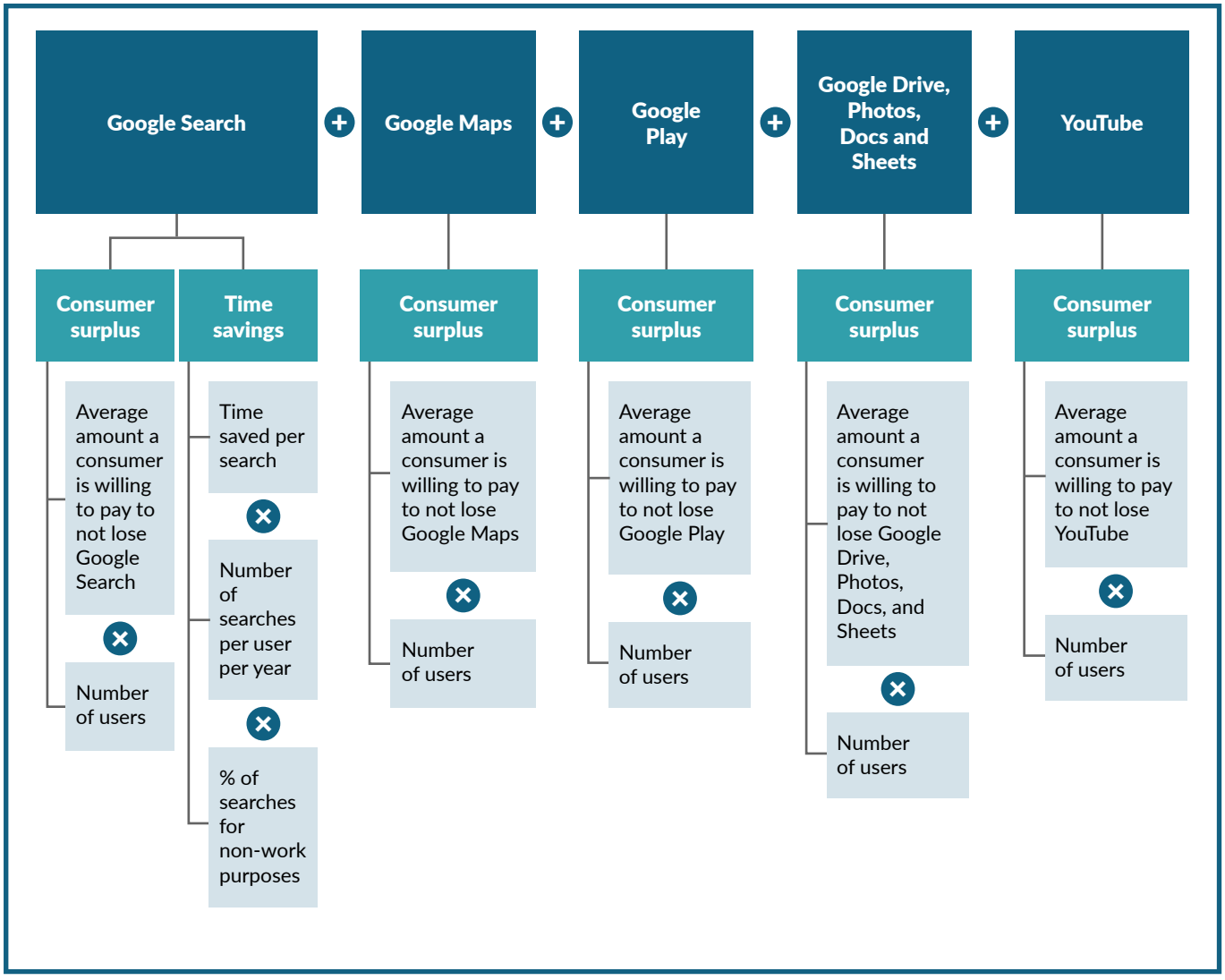
Available at: https://psa.gov.ph/sites/default/files/2017%20SICT%20Publication_signed.pdf

CONSUMER BENEFITS

The consumer benefits supported by Google are challenging to measure and calculate because individuals typically do not pay for the services. In the absence of price indicators, we adopted the economic "willingness to pay" principle to estimate the value of consumer benefits by asking individuals how much they value specific products – also known as consumer surplus. We also calculated the time savings accrued to consumers from their use of Google Search (which increases the efficiency of information gathering). Exhibit B2 summarises the methodology used for sizing consumer surplus and time savings of relevant products.

EXHIBIT B2:
METHODOLOGY FOR SIZING CONSUMER BENEFITS FROM GOOGLE



Note: This report's methodology for measuring Google's economic impact is consistent with the methodology used in the Google Economic and Social Impact New Zealand 2021 report.
SOURCE: AlphaBeta analysis

GOOGLE SEARCH

We estimated the benefits of Google Search to consumers using two metrics: consumer surplus and time savings.

To calculate the consumer surplus for Google Search, we multiplied the number of Google Search users with the average willingness to pay obtained from the consumer survey.

To calculate time savings, we applied time saving estimates from an experiment that measured the time taken to conduct a search online versus a search at the library.[346] This study found that a search that takes 21 minutes in the library takes 7 minutes online. After accounting for the fact that people now ask more questions due to the ease of online search, we estimated the time saved across the country by using Google Search.

The share of Google Search users in the country who have made use of Google Search for self-enrichment purposes such as learning new skills or acquiring knowledge in a new topic was also estimated using the consumer survey.

Table 8 shows the inputs and sources used for calculating the consumer benefits of Google Search.

GOOGLE MAPS

We sized the benefits of Google Maps to consumers using willingness to pay, where consumers were asked to value their favourite online maps service. To calculate the consumer surplus for Google Maps, we multiplied the number of Google Maps users with the average willingness to pay obtained from the consumer survey.

Table 9 shows the inputs and sources used for calculating the consumer benefits of Google Maps.

GOOGLE PLAY

We calculated the benefits of Google Play to consumers using willingness to pay, where consumers were asked to value their favourite online distribution platform for digital products. Results from the survey of the country's online population were used.

Table 10 shows the inputs and sources used for calculating the consumer benefits of Google Play.

GOOGLE DRIVE, PHOTOS, DOCS, AND SHEETS

We calculated the benefits of Google Drive, Photos, Docs, and Sheets to consumers using willingness to pay, where consumers were asked to value their favourite online cloud-based file storage and document collaboration service. Results from the survey of the country's online population were used.

Table 11 shows the inputs and sources used for calculating the consumer benefits of Google Drive, Photos, Docs, and Sheets.

YOUTUBE

We calculated the benefits of YouTube to consumers using willingness to pay, where consumers were asked to value their favorite online video service. Results from the survey of the country's online population were used.

Table 12 shows the inputs and sources used for calculating the consumer benefits of YouTube.

346. Chen et al. (2014) A day without a search engine: an experimental study of online and offline searches. Experimental Economics, Vol 17, Issue 4, pp 512-536.

TABLE 8: INPUTS AND SOURCES FOR CALCULATING CONSUMER BENEFITS OF GOOGLE SEARCH

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that consumers value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• Digital Pakistan (2019)[347]
	Search users as % of OP	• AlphaBeta Consumer Survey (2020)
Time saved per user	Time saved per search	• Varian (2014)[348] • Chen et al. (2014)[349]
	Average daily searches per user	• AlphaBeta Consumer Survey (2020)
	% of searches for non-work purposes	• AlphaBeta Consumer Survey (2020)
Share of Search users who have made use of Search for self-enrichment purposes	% of Search users in country who made use of Search for self-enrichment purposes	• AlphaBeta Consumer Survey (2020)

TABLE 9: INPUTS AND SOURCES FOR CALCULATING CONSUMER BENEFITS OF GOOGLE MAPS

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that consumers value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• Digital Pakistan (2019)[350]
	Map users as % of OP	• AlphaBeta Consumer Survey (2020)

TABLE 10: INPUTS AND SOURCES FOR CALCULATING CONSUMER BENEFITS OF GOOGLE PLAY

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that consumers value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• Digital Pakistan (2019)[351]
	Google Play users as % of OP	• AlphaBeta Consumer Survey (2020)

347. Digital Pakistan (2019), "Creating an Ecosystem for #DigitalPakistan". Available at: https://digitalpakistan.pk/blog/creating-an-ecosystem-for-digitalpakistan-conversationsjazz/
348. Hal Varian (2014), "Economic value of Google" (Presentation).
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349. Chen, Y., YoungJoo Jeon, G., & Kim, Y.-M. (2014), "A day without a search engine: an experimental study of online and offline searches". Experimental Economics, Vol 17, Issue 4, pp 512-536.
350. Digital Pakistan (2019), "Creating an Ecosystem for #DigitalPakistan". Available at: https://digitalpakistan.pk/blog/creating-an-ecosystem-for-digitalpakistan-conversationsjazz/
351. Digital Pakistan (2019), "Creating an Ecosystem for #DigitalPakistan". Available at: https://digitalpakistan.pk/blog/creating-an-ecosystem-for-digitalpakistan-conversationsjazz/

TABLE 11: INPUTS AND SOURCES FOR CALCULATING CONSUMER BENEFITS OF GOOGLE DRIVE, PHOTOS, DOCS, AND SHEETS

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that consumers value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• Digital Pakistan (2019)[352]

TABLE 12: INPUTS AND SOURCES FOR CALCULATING CONSUMER BENEFITS OF YOUTUBE

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that consumers value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• Digital Pakistan (2019)[353]
	YouTube users as % of OP	• AlphaBeta Consumer Survey (2020)
Share of YouTube users who have made use of YouTube to learn advanced digital skills	% of YouTube users in country who made use of YouTube to learn advanced digital skills	• AlphaBeta Consumer Survey (2020)

352. Digital Pakistan (2019), "Creating an Ecosystem for #DigitalPakistan". Available at: https://digitalpakistan.pk/blog/creating-an-ecosystem-for-digitalpakistan-conversationsjazz/
353. Digital Pakistan (2019), "Creating an Ecosystem for #DigitalPakistan". Available at: https://digitalpakistan.pk/blog/creating-an-ecosystem-for-digitalpakistan-conversationsjazz/

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