

UNLOCKING VIETNAM'S DIGITAL POTENTIAL:

Harnessing the
economic opportunities of
digital transformation with
Google's contribution

αlphaβeta
strategy x economics

OCTOBER 2021





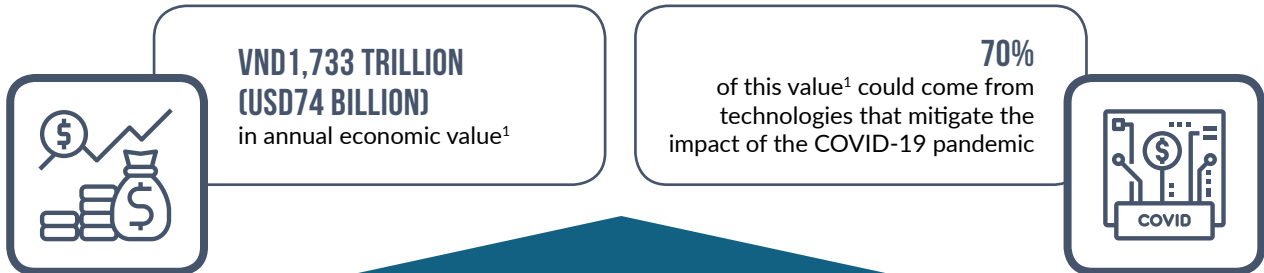
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UNLOCKING VIETNAM'S DIGITAL POTENTIAL



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



THREE PILLARS OF ACTION

DEVELOP THE LOCAL TECH ECOSYSTEM



1

DIGITALLY UPSKILL WORKERS AND STUDENTS



2

DEVELOP A CONDUCIVE ENVIRONMENT FOR DIGITAL TRADE



3

EXAMPLES OF GOOGLE'S CONTRIBUTIONS TO EACH PILLAR

Google's "INDIE GAMES ACCELERATOR" program supports the growth of Vietnam's game development industry

"ACCELERATE VIETNAM DIGITAL 4.0" provided digital skills training for more than 500,000 SMEs and students

"GROW WITH GOOGLE" provides digital tools for local businesses to conduct cross-border transactions

GOOGLE'S BROADER ECONOMIC BENEFITS

BUSINESSES

Google supports VND64.9 TRILLION (USD2.8 BILLION) in annual benefits to businesses in Vietnam²

INTERNET USERS

Google supports VND149.5 TRILLION (USD6.4 BILLION) in annual benefits to Internet users in Vietnam²

SOCIETY

Google.org is solving some of humanity's biggest challenges by combining funding, innovation, and technical expertise to support underserved communities and provide opportunities for everyone

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 report's Appendix for methodology.

EXECUTIVE SUMMARY

With a young and tech-savvy population, Vietnam is well placed to benefit from the digital economy.

With 70 percent of its citizens below the age of 35, a high literacy rate of over 98 percent among those aged 15 to 35 (surpassing the global rate of 91 percent), and more than a third of the population who use smartphones, Vietnam has a young, educated and technologically-savvy population.¹ The country also has the second-fastest-growing Internet economy (behind Indonesia) in Southeast Asia, with a recent study projecting the gross merchandise value (GMV) of its Internet economy services to grow at 29 percent per annum between 2020 and 2025.² In recognition of the significant economic prospects presented by digital technologies, the government has established a range of policies to advance digital adoption and innovation in the country. Key strategies include its “Industry 4.0” policy and the “Vietnam National E-commerce Development Program 2014-2020”.³

However, Vietnam still faces several obstacles to fully unlocking the benefits of digital technologies.

These include regulatory obstacles that could constrain the full potential of its local tech ecosystem, limited digital connectivity, and a shortage of digital skills. A study commissioned by the Asia Internet Coalition

(AIC) highlighted that regulations on data localization and data privacy could inhibit the expansion of Vietnam’s tech players.⁴ Internet users in Vietnam have also been facing slow connectivity issues, where the average broadband speed is estimated to be significantly slower than other Southeast Asian countries – about ten times slower than Singapore (70.86 Mbps), and at a third of Malaysia’s (23.86 Mbps) and half of Thailand’s (18.21 Mbps).⁵ In relation to digital skills, while increased emphasis has been placed on upskilling its workforce digitally in recent years, there is scope for more efforts here. The World Economic Forum’s “Global Competitiveness Index 2019”, for example, ranked Vietnam 67th out of 141 countries on the level of digital skills in its working population.⁶ The country also performed poorly on the “2020 Global Talent Competitiveness Index”, where it was ranked 96th out of 132 countries.⁷ These are important hurdles the country needs to address in order to capture the full economic potential afforded by technology.

Digital transformation is not just about the technology sector – most of the benefits, in fact, go to traditional, non-tech sectors. Neglecting the impact of digital technology on traditional sectors in Vietnam, such as manufacturing, risks overlooking its transformative

1. Temasek (2018), “Generation V: how Vietnam’s youths are powering the e-economy”.

Available at: <https://www.temasek.com.sg/en/news-and-views/stories/future/generation-v-how-vietnam-s-youths-are-powering-the-e-economy>

2. Google (2020), e-Conomy SEA 2020. Available at: <https://www.thinkwithgoogle.com/intl/en-apac/consumer-insights/consumer-journey/e-conomy-sea-2020-resilient-and-racing-ahead-what-marketers-need-to-know-about-this-years-digital-shifts/>

3. Sources include: Vietnam Investment Review (2019), “Resolution to aid 4.0 breakthrough”. Available at: <https://www.vir.com.vn/resolution-to-aid-40-breakthrough-71065.html>; Huong Dieu Nguyen, Vietnam E-commerce and Digital Economy Agency, Ministry of Industry and Trade (undated), “Vietnam’s policies to promote the development of e-commerce” (Presentation deck). Available at: https://www.unescap.org/sites/default/files/3.%20Vietnam%20Huong%20Dieu%20Nguyen_0.pdf

4. Asia Internet Coalition (2017), Digital platforms and services: A development opportunity for ASEAN.

Available at: https://aicasia.org/wp-content/uploads/2019/07/AIC_final-report.pdf

5. Sources include: Saigoneer (2019), “Laggy Internet plagues Vietnam once again after 3 undersea cables break”. Available at: <https://saigoneer.com/vietnam-news/18104-laggy-internet-plagues-vietnam-once-again-after-3-undersea-cables-break>; Vietnam Insider (2020), “Slow Internet in Vietnam to continue for longer as undersea cable repair delayed again”. Available at: <https://vietnaminsider.vn/slow-internet-in-vietnam-to-continue-for-longer-as-undersea-cable-repair-delayed-again/>

6. World Economic Forum, (2019) “The Global Competitiveness Report 2019”.

Available at: http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

7. 2020 Global Talent Competitiveness Index. Available at: <https://gtcistudy.com/the-gtci-index/>

effects. Digital technologies applied in traditional industries have the potential to revolutionize the way businesses are conducted. In fact, a recent study shows that traditional industries such as retail can experience up to 75 percent of the economic benefits afforded by the Internet, because of these sectors' large sizes (e.g., the retail industry contributes 16 percent of Vietnam's total gross domestic product or GDP) and low technology adoption rates (implying the significant potential for digitization).⁸

This report finds that, if leveraged fully in the economy, digital technologies can unlock VND1,733 trillion (USD74 billion) in Vietnam by 2030.⁹ To put this into perspective, this is equivalent to about 27 percent of the country's GDP in 2020. The largest projected beneficiaries are the manufacturing, agriculture and food, and education and training sectors.

The key messages of this report include:

- **Eight key technologies hold transformative potential for businesses and workers in Vietnam.**

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 for new business models, revenue streams, productivity savings, and GDP increments, these technologies could create significant economic value for both businesses and the government in Vietnam.

- **Digital adoption is also crucial for the country to gain resilience during the COVID-19 crisis and in the post-pandemic future.**

By allowing businesses to engage customers digitally, and minimize logistical bottlenecks amidst supply chain disruptions, technologies can help businesses manage the severe economic impacts of COVID-19. It is estimated that a

substantial 70 percent of the country's total digital opportunity – worth VND1,216 trillion (USD52 billion) – could be derived from such technology applications.¹⁰

- **Three pillars of action are required for Vietnam to fully capture its digital opportunity:**

- First, it is crucial that the country continues **to develop the local technology ecosystem.** Regulations on foreign technology transfer and improvements to digital infrastructure have been conducive to the development of the local tech ecosystem.¹¹ Vietnam could go further to address gaps in the coverage of its digital infrastructure, as well as address regulatory challenges faced by local developers and make it easier for them to do business. There are positive examples of supportive regulations in other countries. For example, Singapore's "FinTech Regulatory Sandbox" allows financial institutions and fintech players to experiment with innovative financial products and services by relaxing specific legal and regulatory requirements, which the sandbox participant will otherwise be subject to, over a six-month period.
- Second, the government could continue **to digitally upskill workers and students.** The government has placed a strong focus on equipping the current workers and future workforce with the digital skills required to access digital opportunities. The country could go further in creating sector-specific digital skills training programs, increasing the availability of Science, Technology, Engineering and Mathematics (STEM) apprenticeships, and enhancing the focus on "soft skills" in K-12 curriculums. For example, Finland's "phenomenon-based teaching and learning" (PBL) adopts a multidisciplinary

8. World Bank (2019), *The digital economy in Southeast Asia: Strengthening the foundations for future growth*. Available at: <http://documents1.worldbank.org/curated/en/328941558708267736/pdf/The-Digital-Economy-in-Southeast-Asia-Strengthening-the-Foundations-for-Future-Growth.pdf>

9. This economic value includes productivity gains, revenue boosts, cost savings, time savings, increased wages, increased tax collection and GDP increments generated by digital technologies.

10. Based on AlphaBeta analysis. See Appendix A for details on the methodology.

11. These include: (i) commitments not to impose custom duties on digital products; (ii) commitments to adopt or maintain a legal framework that provides for the protection of the personal information of e-commerce users; (iii) non-discriminatory treatment of digital products; (iv) rules against localization requirements; (v) commitments to provide reasonable network access for telecommunications suppliers. See: Henry S. Gao (2018), "Digital or trade? The contrasting approaches of China and US to digital trade", *Journal of International Economic Law*, Vol 21, Issue 2. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3162557

approach to equip students with critical thinking skills and the ability to approach issues from different angles.¹²

- Third, it is crucial that the country *develops a conducive environment for digital trade*.

This requires the promotion of open cross-border data flows, easing of restrictive data policies, encouraging the interoperability of digital frameworks, and minimizing border frictions.

A useful first step would be for Vietnam to adopt the “Asia-Pacific Economic Cooperation (APEC) Privacy Framework” and join the “APEC Cross Border Data Privacy Rules System”.¹³

- **Through its programs, partnerships, and products, Google is making a significant contribution to advancing Vietnam’s digital transformation journey across all three pillars.**

Through the provision of digital tools, such as Google Cloud, and programs such as “Indie Games Accelerator” and “Google for Startups Accelerator: Southeast Asia” to support the growth of tech-based startups in both traditional and emerging sectors, Google promotes an innovation-oriented environment that enables businesses to scale in a cost-efficient manner. Through digital skills programs like “Accelerate Vietnam Digital 4.0” and “Coding for the Future with Google”, Google is supporting the development of a digitally skilled workforce, particularly for micro, small and medium-sized enterprises (MSMEs) that aspire to leverage digital technologies to improve productivity and customer outreach. A survey conducted between April 2019 and March 2020 found that 73 percent of small and medium-sized enterprises (SMEs) saw an increase in customer engagement and 45 percent saw an increase in revenue or profit after attending the “Accelerate Vietnam Digital 4.0” program.¹⁴ Google products such as Google Play, as well as programs

organized in partnership with the government also help accelerate the internationalization of local businesses.

- **Google also delivers wider benefits to Vietnam’s businesses, Internet users, and the broader society.** Google’s products are estimated to have generated total economic benefits worth **VND64.9 trillion (USD2.8 billion)** and **VND149.5 trillion (USD6.4 billion)** to businesses and Internet users in Vietnam, respectively. These products include Google Search, Google Ads, AdSense, Google Play, Google Maps, Google Drive, YouTube, and Google Docs, Sheets and Photos. Benefits to businesses come in the form of increased revenue through better customer outreach and access to new markets, and improved productivity through cost and time savings. It is estimated that over 170,000 jobs are supported in the economy through the use of Google Ads, AdSense and YouTube.¹⁵ These jobs are created through the use of Google products that enable businesses to expand their customer base and increase revenue, thereby leading to increased hiring demand. In addition, the Android operating system supports more than 71,000 jobs in Vietnam’s economy.¹⁶ Internet users, on the other hand, experience greater convenience, access to information, and more learning and skills development opportunities. Beyond direct economic contributions to businesses and individuals, Google also delivers benefits to the broader society in Vietnam through programs such as “Google Workspace for Education” (formerly known as “G Suite for Education”) for online learning, as well as initiatives like “Ad Grants” (digital advertising grants for nonprofits), “YouTube Nonprofit Program” (tools that help nonprofits receive donations via YouTube) and “Google Workspace for Nonprofits” (which help nonprofits improve internal collaboration processes).

12. Sources: World Economic Forum (2017), “Is this Finnish school the perfect design?”

Available at: <https://www.weforum.org/agenda/2017/10/why-finland-is-tearing-downwalls-in-schools>; David Tay (2017), “Finn and fun: lessons from Finland’s new school curriculum”. The Straits Times. Available at: <https://www.straitstimes.com/singapore/education/finn-fun>

13. AlphaBeta (2018), The data revolution: how Malaysia can capture the digital trade opportunity at home and abroad. Available at: [https://research.hinrichfoundation.com/hubfs/Digital%20Trade%20Project/malaysia-hinrich-foundation-digital-trade-report.pdf?_hsfp=85913225&_hssc=251652889.2.1615816368461&_hstc=251652889.93064eec0561399750d048f46d468959.1615816368460.1615816368460.1615816368460.1615816368460.1](https://research.hinrichfoundation.com/hubfs/Digital%20Trade%20Project/malaysia-hinrich-foundation-digital-trade-report.pdf?_hsfp=85913225&_hssc=251652889.2.1615816368461&_hstc=251652889.93064eec0561399750d048f46d468959.1615816368460.1615816368460.1615816368460.1)

14. Kantar (2020), Google Economic Impact. Available at: https://www.kantar.com.au/Google/Google_Economic_Impact.pdf

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.

16. See Appendix B for details on the methodology.



**SIZING THE PRIZE
— THE ECONOMIC
OPPORTUNITY OF DIGITAL
TRANSFORMATION
IN VIETNAM**

Digital transformation will deliver profound economic benefits to every sector. Neglecting the impact of digital technology on traditional sectors like agriculture and manufacturing risks overlooking its transformative effects. Digital technologies will not only reinvent the way traditional businesses conduct their activities but also improve their product and service offerings. If leveraged fully, digital transformation can create up to VND1,733 trillion (USD74 billion) worth of economic value annually in Vietnam by 2030. This is equivalent to about 27 percent of the country's GDP in 2020. The largest economic beneficiary of digital transformation in Vietnam is its agriculture and food sector, which accounts for about 17 percent of the total economic value.

Digital adoption is also crucial for the country to gain resilience during the COVID-19 crisis and in the post-pandemic future. By supporting businesses in engaging customers digitally, resuming business operations, and minimizing logistical bottlenecks, technology applications can help businesses and workers manage the economic ramifications of the COVID-19 pandemic. We estimate that a substantial 70 percent of Vietnam's digital opportunity – worth VND1,216 trillion (USD52 billion) – could be derived from technology applications that help businesses and workers manage the economic impacts of COVID-19.



“SIZING THE PRIZE”

THE ECONOMIC VALUE OF DIGITAL TRANSFORMATION

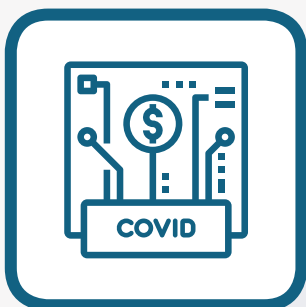


IF LEVERAGED FULLY,
DIGITAL TRANSFORMATION CAN CREATE AN
IMPACT OF UP TO...



**VND1,733 TRILLION
(USD74 BILLION)**

in annual economic value¹



70%

of this value¹ could come from technologies
that help mitigate the economic impacts of the
COVID-19 pandemic

... IN VIETNAM BY 2030

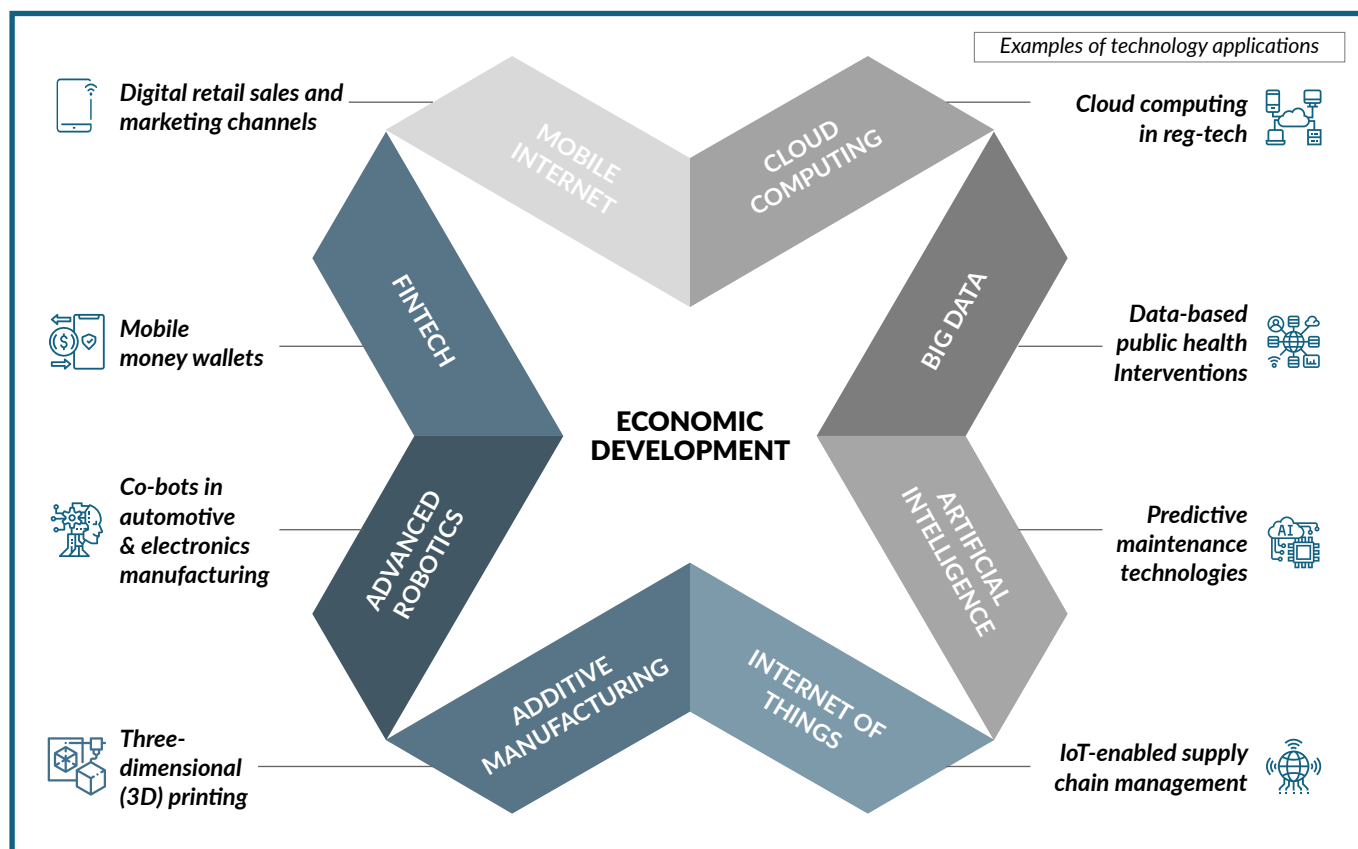
1. Economic value refers to GDP increments, productivity gains, cost savings, time savings, increased revenues, increased wages and increased tax collection.
Note: Based on AlphaBeta estimates. Figures have been rounded.

1.1 DIGITAL TRANSFORMATION CAN UNLOCK UP TO VND1,733 TRILLION (USD74 BILLION) WORTH OF ECONOMIC VALUE IN 2030

Digital technologies can unlock significant economic value in Vietnam. In particular, eight key technologies hold transformative potential for the country (Exhibit 1). Chapter highlight 1 shows an overview of these technologies.

To assess the economic potential of digital transformation in Vietnam, 43 technology applications – each mapping to one of the eight identified technologies – were identified across ten industry sectors, and the economic value of each was estimated under a scenario of full adoption in 2030 (Exhibit 2).

EXHIBIT 1: EIGHT KEY TECHNOLOGIES COULD TRANSFORM VIETNAM’S ECONOMY



CHAPTER HIGHLIGHT 1.

EIGHT KEY TECHNOLOGIES WITH TRANSFORMATIVE POTENTIAL FOR VIETNAM

Drawing upon an extensive range of literature on emerging technologies and their potential economic benefits, eight key technologies hold transformative potential for workers, businesses, and economies.¹⁷ These include:

- **Mobile Internet.** The rapid rise of the smartphone and associated increase in mobile Internet penetration rates have accelerated the growth of Internet services worldwide. While the mobile Internet in Vietnam has already driven the adoption of new business models such as the app economy, over-the-top (OTT) services, and mobile-commerce (or “m-commerce”), there are several mobile Internet applications that have yet to see full adoption in the country. These include the use of mobile telehealth applications in the health 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 centers and servers can be cost-prohibitive particularly for MSMEs. 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 analyze 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 analyze customer preferences more effectively to increase customer satisfaction. With the information derived from analytics, businesses can also design targeted programs 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.¹⁸ 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. 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.¹⁹ 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 optimized 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.²⁰ 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.²¹ There is a range of potential benefits, such as the ability to handle complex, low-volume components where rapid turnaround is critical.²²

19. 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

20. Boston Consulting Group (2019), *Advanced robotics in the factory of the future*.

Available at: <https://www.bcg.com/publications/2019/advanced-robotics-factory-future>






























































21. 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>

22. 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.

EXHIBIT 2:

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

Agriculture & food 	Consumer, retail & hospitality 	Education & training 	Financial services 
<ul style="list-style-type: none">  Precision farming technologies  IoT-enabled supply chain management  Food safety technologies  Real-time market information 	<ul style="list-style-type: none">  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 	<ul style="list-style-type: none">  E-career centers and digital jobs platforms  Personalized learning  Online retraining programs 	<ul style="list-style-type: none">  Big data analytics  Reg tech  Digital banking services  Mobile money wallets
Government 	Health 	Infrastructure 	Manufacturing 
<ul style="list-style-type: none">  E-services  Cloud computing  E-procurement  Geographic Info. System enabled tax collection  Data analytics for government transfer payments  Digitization of government payments 	<ul style="list-style-type: none">  Remote patient monitoring  Telehealth applications  Data-based public health Interventions  Detection of counterfeit pharmaceutical drugs  Smart medical devices  Electronic medical records 	<ul style="list-style-type: none">  Smart grids  5D BIM & project management technologies  Predictive maintenance technologies  Smart buildings 	<ul style="list-style-type: none">  Big data analytics  Additive manufacturing  IoT-enabled supply chain management  Automation & robotics
Resources 	Transport services 	<p>Key technologies:</p> <ul style="list-style-type: none"> <li style="width: 50%;"> Mobile Internet <li style="width: 50%;"> Fintech <li style="width: 50%;"> Advanced robotics <li style="width: 50%;"> Additive manufacturing <li style="width: 50%;"> Cloud computing <li style="width: 50%;"> Big Data <li style="width: 50%;"> AI <li style="width: 50%;"> IoT 	
<ul style="list-style-type: none">  Smart exploration and automation in mining operations  Predictive safety technologies  Predictive maintenance technologies 	<ul style="list-style-type: none">  Smart roads  Smart ports  Autonomous vehicles  Geospatial services 		

Taking into account the combined economic value of the 43 technology applications, it is estimated that **digital technologies can create an annual economic value of VND1,733 trillion (USD74 billion) in Vietnam by 2030.**²³

This is equivalent to 27 percent of Vietnam's GDP in 2020 (Exhibit 3).²⁴

The agriculture and food sector is projected to be technology's largest economic beneficiary in Vietnam.

With about 17 percent of the country's total digital opportunity estimated to be accrued to this sector, the sector could experience annual economic benefits of up to VND302 trillion (USD13 billion) in 2030.²⁵ Other key sector beneficiaries include education and training (VND282 trillion or USD12.1 billion), consumer, retail and hospitality (VND263 trillion or USD11.3 billion), manufacturing (VND170 trillion or USD7.3 billion), and health (VND163 trillion or USD7 billion).²⁶

The key digital opportunities in the top five sector beneficiaries are as follows:

- **Agriculture and food.** Integrating digital technologies in the primary industry can improve smallholder farmers' welfare and transform the entire food value chain. This is important given that the agriculture sector contributes almost 14 percent of GDP in Vietnam, but agricultural value added per worker has been growing at one of the slowest rates in the region between 1990 and 2013.²⁷ To boost agriculture productivity, IoT-enabled precision farming technologies allow for the targeted application of water and nutrients on cropland, thereby reducing the number of inputs required and even boosting yields. Some domestic

corporations are already harnessing precision farming technologies to great effect (see Case Study 1). Another technology application is the use of mobile Internet to address information failures in the market prices of agricultural produce. Farmers with real-time access to market information on supply and demand are able to increase their bargaining power with traders, and increase revenue.²⁸ IoT-enabled tracking technologies could also tackle food losses in supply chains by recovering about ten to 15 percent of the total producer value of its agricultural goods that would have gone to waste.²⁹

- **Education and training.** Digital technologies not only enhance the quality of instruction and productivity of teaching staff, but also facilitate demand-supply matching in the job market. Multiplier effects from an expanding network of jobseekers and employers have enabled digital jobs platforms to gather a wider universe of work opportunities, which provides jobseekers with more options and greater transparency of the wages they can command in the market. Research has shown that e-career centers and digital jobs platforms could potentially raise national employment by 2.9 percent in middle-income Southeast Asian nations.³⁰ In addition, online learning platforms are essential not only for expanding education access, but have also proven to be particularly crucial to allow students to continue their learning during the COVID-19 pandemic. When the outbreak forced educational institutions to close temporarily in Vietnam, online learning was rapidly rolled out by schools and universities. Viettel Telecom

23. 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.

24. General Statistics Office of Vietnam (2020), "Gross domestic products at current prices by economic type and by economic sector". Available at: <https://www.gso.gov.vn/px-web-2/?pxid=V0304-05&theme=T%C3%A0i%20kho%E1%BA%A3n%20qu%E1%BB%91c%20gia>

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. Sources include: General Statistics of Office Vietnam (2020), "Gross domestic product at current prices by economic sector". Available at: <https://www.gso.gov.vn/en/national-accounts/>; Pham Chi Lan (2019), "Reaping long-term gains from Vietnam's land reforms". Available at: https://cmp.smu.edu.sg/sites/cmp.smu.edu.sg/files/pdf/5.%20AMI_SMU_May2018_Vietnam.pdf

28. International Labour Organization (2017), *Improving market access for smallholder farmers: What works in out-grower schemes – evidence from Timor-Leste*.

Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_547157.pdf

29. McKinsey & Company (2014), "Three paths to sustained economic growth in Southeast Asia".

Available at: <https://www.mckinsey.com/featured-insights/asia-pacific/three-paths-to-sustained-economic-growth-in-southeast-asia#>

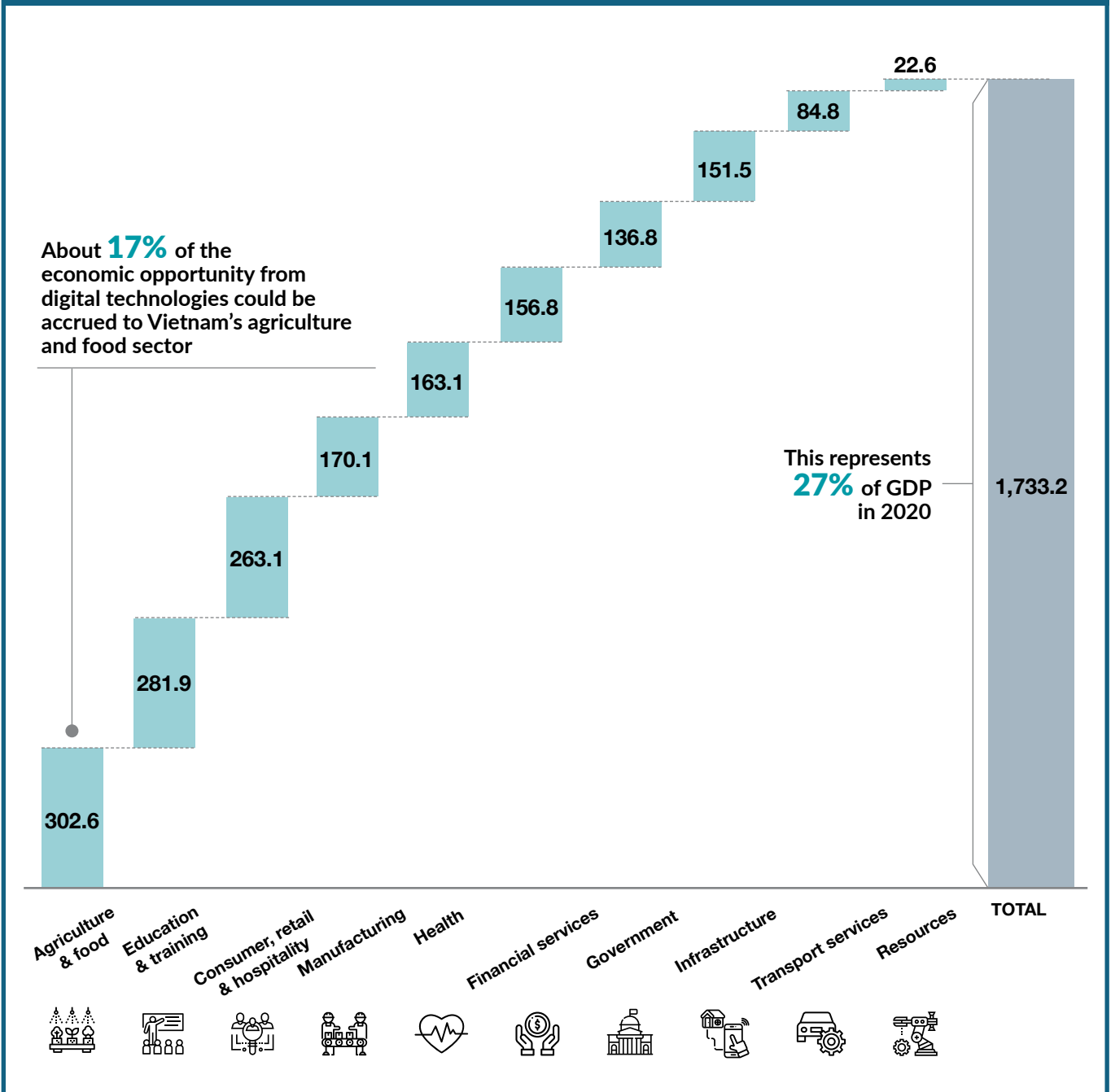
30. McKinsey Global Institute (2015), *A labour market that works: Connecting talent with opportunity in the digital age*.

Available at: <https://www.mckinsey.com/-/media/McKinsey/Featured%20Insights/Employment%20and%20Growth/Connecting%20talent%20with%20opportunity%20in%20the%20digital%20age/MGI%20Online%20talent%20A%20labor%20market%20that%20works%20Full%20report%20June%202015.ashx>

EXHIBIT 3:

IN 2030, DIGITAL TECHNOLOGIES COULD SUPPORT UP TO VND1,733 TRILLION (USD74 BILLION) OF ANNUAL ECONOMIC IMPACT IN VIETNAM

POTENTIAL ANNUAL ECONOMIC VALUE FROM DIGITAL TECHNOLOGIES, BY SECTOR¹
VND 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 were considered.

Note: Numbers may not sum due to rounding.

SOURCE: AlphaBeta analysis

CASE STUDY 1. LOCAL INFORMATION TECHNOLOGY SERVICE COMPANY LEVERAGES JAPANESE PRECISION FARMING TECHNOLOGY TO IMPROVE YIELD QUALITY

FPT Corporation, the largest information technology service company in Vietnam, collaborated with Fujitsu, a Japanese firm, to implement the “Akisai” precision farming technology, which monitors the cultivation area in real-time using sensors. This technology has allowed tomatoes to be planted at high density with 4,000 to 6,000 plants per 1,000 square metres and contain three times as much antioxidants as that of conventional tomato crops.³¹ By mapping the spatial and temporal needs of farmland, agricultural drones allow for crop and livestock conditions to be monitored more reliably than manual inspections, while also minimizing farmer exposure to harmful pesticides.³²



31. FPT (2016), “FPT and Fujitsu officially open Fujitsu-FPT Akisai Farm and Vegetable factory”.

Available at: <https://www.fpt.com.vn/en/newsroom/detail/fpt-and-fujitsu-officially-open-fujitsu-fpt-akisai-farm-and-vegetable-factory>

32. OECD (2020), Report of the OECD Risk Reduction Seminar on Evolving Digital and Mechanical Technologies for Pesticides and Pest Management.

Available at: [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono\(2020\)3&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2020)3&doclanguage=en)

collaborated with the Ministry of Education and Training to develop Viettel Study, a platform enabling teachers to develop online learning content and teach online. Since February 2020, 3.38 million new accounts have been created and the number of page visits reached 160 million when schools shifted to online learning.³³

- **Consumer, retail and hospitality.** Digital technologies could support businesses in the consumer, retail and hospitality sector by enhancing their existing goods and service offerings, as well as increasing the productivity of their operations. In the retail industry, the productivity gains from marketing and selling goods through digital channels have been estimated to range from six to 15 percent - these arise as a result of being able to reduce manpower requirements, harness inventory efficiencies and cutting real estate costs (e.g., rental of store space).³⁴ This is an opportunity that is already being increasingly captured in Vietnam, with four out of ten Southeast Asia's most visited e-commerce platforms in 2019 being Vietnamese (Thegioididong; Sendo; Tiki; Dien May XANH).³⁵ The e-commerce industry can also be transformed through computer vision technology to verify the authenticity of products on online marketplaces. Through vision software algorithms, the bot is able to capture images of brand logos on products listed by sellers and matches them to its internal database before predicting the brand of the product. The engineering division of Tiki, a Vietnamese e-commerce platform, experimented with this technology and recorded about 92 percent accuracy in its brand predictions.³⁶ If fully adopted in Vietnam, by 2030, IoT-enabled inventory management can provide a revenue uplift of

USD5.5 billion through the recapturing of retail sales lost due to stockouts.³⁷ In the hospitality industry, AI-enabled customer check-in and service procedures do not only serve to address health and safety concerns during a pandemic by minimizing human contact, they can also help boost staff productivity and create greater service value overall. By freeing staff up from mundane administrative tasks, staff may focus on addressing more complex customer demands or personalizing customer service (e.g., customized meal preferences). Finally, big data analytics has the potential to offer the tourism industry a significant boost to marketing and service delivery efforts. By drawing upon data about consumer preferences and running analytics on them, tourism companies stand to improve their revenues from more well targeted promotions to prospective customers. A global study has reflected that tour companies experienced a revenue uplift of six to ten percent from integrating proprietary data to create personalized tourist experiences.³⁸

- **Manufacturing.** Adopting digital technologies will be crucial to achieving Vietnam's Industry 4.0 ambitions. These include national targets to increase the proportion of the economic value-add of high-tech products from its manufacturing and processing industries to at least 45 percent in 2030, and to accelerate digital adoption particularly in the food, textile and footwear, electronics and automobile manufacturing industries.³⁹ A range of technology applications can help deliver these objectives. For instance, IoT and big data analytics in smart factories, which can improve demand forecasting and production planning, and in turn improve customer service levels. Another is robotics

33. Vietnam Investment Review (2020), "Domestic leaders stepping into limelight with e-learning apps".

Available at: <https://www.vir.com.vn/domestic-leaders-stepping-into-limelight-with-e-learning-apps-76001.html>

34. 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>

35. Sources include: TMO Group (2020), "Must-know: 10 Largest Southeast Asia Online Marketplaces". Available at: <https://www.tmogroup.asia/must-know-southeast-asia-online-marketplaces/>; ISEAS Yusof Ishak Institute (2020), Vietnam's booming e-commerce market. Available at: https://www.iseas.edu.sg/wp-content/uploads/pdfs/ISEAS_Perspective_2020_4.pdf

Available at: https://www.iseas.edu.sg/wp-content/uploads/pdfs/ISEAS_Perspective_2020_4.pdf

36. Tiki Engineering (2019), "Applying machine learning to solve brand/logo detection problem". Available at: <https://engineering.tiki.vn/brand-logo-detection-f3951e425954>

37. Based on AlphaBeta analysis. See Appendix A for details on the methodology.

38. Boston Consulting Group (2020), "Bionic revenue management in travel and tourism".

Available at: <https://www.bcg.com/publications/2020/bionic-revenue-management-travel-tourism>

39. Vietnam Briefing (2020), "Vietnam sets ambitious goals in new National Industrial Policy but can it stay competitive?"

Available at: <https://www.vietnam-briefing.com/news/vietnam-sets-ambitious-goals-in-new-national-industrial-policy.html/#:~:text=Industry%204.0%20introduces%20technologies%20such,digital%20revolution%E2%80%9D%20are%20already%20underway.>

Available at: <https://www.vietnam-briefing.com/news/vietnam-sets-ambitious-goals-in-new-national-industrial-policy.html/#:~:text=Industry%204.0%20introduces%20technologies%20such,digital%20revolution%E2%80%9D%20are%20already%20underway.>

and automation, which the McKinsey Global Institute (MGI) estimates could inject productivity gains of between 0.8 and 1.4 percent of global GDP annually from 2015 to 2065.⁴⁰ Given the large size of Vietnam’s manufacturing sector (which accounts for about 16 percent of national GDP), this potential could be significant – it is estimated that by 2030, robotics and automation technologies can bring an estimated USD11.7 billion worth of productivity gains to Vietnam’s manufacturing sector.⁴¹ A further application is additive manufacturing, which allows for the creation of bespoke parts with complex geometries and little wastage – this technology could bring about efficiencies in the form of faster product development cycles, speedier parts consolidation, while potentially increasing the customer base through mass customization.⁴² By reducing the time-to-market, additive manufacturing will bring about an estimated global economic impact of between USD100 billion and USD250 billion by 2025.⁴³ Some local enterprises are already harnessing some of these digital technologies to great effect. (see Case Study 2).

- **Health.** There is ample scope for digital technologies to reduce healthcare costs in Vietnam. Remote patient monitoring, for example, scales up healthcare capacity rapidly by allowing clinicians to delegate the monitoring of multiple patients to ancillary staff, enabling them to focus on other patient-facing activities. By eliminating unnecessary hospitalization for patient observation, MGI estimates that remote patient monitoring could reduce the cost of treating chronic diseases in health systems by ten to 20 percent.⁴⁴ This is crucial in ensuring the long-term sustainability of the



country’s healthcare system, particularly given that public hospitals in Vietnam face overcrowding and high occupancy rates.⁴⁵ Cities in Vietnam can also implement data-based public health interventions to identify high-risk segments of the population and target interventions more precisely; a study shows that such interventions could potentially reduce disability-adjusted life years (DALY) by 1.6 percent in Vietnam.⁴⁶ For example, in Thailand, the state-run Rajavithi Hospital utilized Google’s AI eye screening program to analyze patients’ eye screening results and assess their risk of vision loss, which enables high-risk individuals to undergo preemptive treatment for diabetic eye disease.⁴⁷ Besides, digital technologies have proven to improve the accuracy of disease detection - initial findings from the AI eye screening program reflect a 95 percent accuracy rate as compared with 74 percent by opticians.⁴⁸

40. McKinsey Global Institute (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>

41. Sources include: World Bank (2019), “Manufacturing (% of GDP)”. Available at: <https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=VN>; Based on AlphaBeta analysis. See Appendix A for details on the methodology.

42. Forbes (2018), “Additive Manufacturing Is driving the future of the automotive industry”.

Available at: <https://www.forbes.com/sites/sarahgoehrke/2018/12/05/additive-manufacturing-is-driving-the-future-of-the-automotive-industry/#2eb708e775cc>

43. 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>

44. McKinsey Global Institute (May 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>

45. PwC (2014), *The Vietnamese healthcare industry: moving to next level*.

Available at: <https://www.pwc.com/vn/en/advisory/deals/assets/the-vietnamese-healthcare-industry-moving-to-next-level-pwc-vietnam-en.pdf>

46. The disability-adjusted life year (DALY) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. McKinsey Global Institute (2018), *Smart cities: Digital solutions for a more liveable future*. Available at: <https://www.mckinsey.com/~/media/McKinsey/Industries/Public%20and%20Social%20Sector/Our%20Insights/Smart%20Cities%20Digital%20solutions%20for%20a%20more%20liveable%20future/MGI-Smart-Cities-Full-Report.pdf>

47. Reuters (2018), “Google launches Thai AI project to screen for diabetic eye disease”. Available at: <https://www.reuters.com/article/us-thailand-google-idUSKBN1OC1N2>

48. Reuters (2018), “Google launches Thai AI project to screen for diabetic eye disease”. Available at: <https://www.reuters.com/article/us-thailand-google-idUSKBN1OC1N2>

CASE STUDY 2. LOCAL DAIRY COMPANY VINAMILK BUILDS SMART FACTORY THAT INCREASES PRODUCTIVITY

Vinamilk is Vietnam's largest dairy company with 120,000 dairy cows producing more than 950 tons of fresh milk daily.⁴⁹ It also owns one of only three mega-dairy plants in the world with the most advanced automated and integrated production lines. Its mega factory is equipped with autonomous laser-guided vehicle (LGV) robots that are operated through a centralized system to ensure smooth and efficient transfers within the production line and transports finished products to the smart warehouse. The warehouse is also fully automated where 15 self-propelled vehicles transport two trays of cargo at a time. Since implementing these technologies, the company's productivity has increased by three-fold and now produces 1.2 billion finished products annually.⁵⁰



Photo Source: <https://alexwa.com/vinamilk-bumper-award-in-management>

49. Dairy reporter (2020), "Dairy majors investing heavily as Vietnam ramps up milk production". Available at: <https://www.dairyreporter.com/Article/2020/01/08/Dairy-majors-investing-as-Vietnam-ramps-up-milk-production>
50. Vinamilk (2020), "production of UHT fresh milk with modern equipment and advanced technologies". Available at: <https://www.vinamilk.com.vn/en/improvement-innovation/new-production-technologies>

1.2 TECHNOLOGIES WILL BE CRUCIAL IN ADDRESSING THE ECONOMIC IMPACTS OF COVID-19

Despite having one of the greatest successes globally in containing the domestic spread of the COVID-19 virus, Vietnam's economy has not emerged from the pandemic unscathed. After the rapid spread of the virus globally in early 2020, the country's GDP in the second quarter of 2020 grew just 0.36 percent – down sharply from 3.8 percent growth experienced in the first quarter.⁵¹ The International Monetary Fund (IMF) has also forecasted that Vietnam's real GDP growth will fall to 1.6 percent in 2020 from 6.5 percent in 2019, before recovering to 6.7 percent in 2021.⁵²

This hefty economic loss is largely driven by the country's strong reliance on tourism and trade, both of which have been heavily impacted by the pandemic. Large-scale travel restrictions introduced to contain the pandemic's spread, coupled with a slump in travel demand, have crippled Vietnam's tourism industry, which accounts for six percent of the total GDP.⁵³ In 2020, the country's tourism industry recorded significant losses in revenue of over 58 percent compared with 2019, as international visitors fell by almost 80 percent during the same period.⁵⁴ In response to the decrease in international travel, the Ministry of Culture, Sports and Tourism aims to develop domestic tourism through programs such as "Vietnamese People Travel Vietnam" and "Safe And Attractive Vietnamese Tourism", although the average

expenditure of domestic tourists was half as much as that of foreign tourists in 2019.⁵⁵

A heavily trade-dependent economy that ranks as one of the world's top 30 net exporters,⁵⁶ Vietnam's export sector has been especially hit hard by the pandemic due to disruptions to regional and global supply chains. In particular, garment and textile exports, which contribute to a significant 16 percent of total GDP, experienced a year-on-year decline of 11.6 percent in August 2020.⁵⁷ On the other hand, the United States-China trade tensions pose an unprecedented opportunity for Vietnam to grow its export sector, as multinationals shift their production from China to Southeast Asian countries.⁵⁸ It is thus now a critical time for Vietnam to capitalize on these global trends and rapidly build up its export sector.

Technology adoption will be crucial for businesses and workers to manage the crisis's impacts. **Of Vietnam's total digital opportunity of VND1,733 trillion (USD74 billion), a substantial 70 percent – VND1,216 trillion (USD52 billion) – could be driven by technologies that help businesses and workers mitigate the impacts of COVID-19** (Exhibit 4).

VND1,216 trillion (USD52 billion) alludes to the combined value of technology applications that allow

51. Business Times (2020), "Vietnam Q2 GDP growth slows to 0.36%". Available at: <https://www.businesstimes.com.sg/government-economy/vietnam-q2-gdp-growth-slows-to-036>
52. International Monetary Fund (October 2020), "Real GDP growth".

Available at: https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEO_WORLD/VNM

53. Vietnam Briefing (2019), "Vietnam's tourism sector: Opportunities for investors in 2020". Available at: <https://www.vietnam-briefing.com/news/vietnams-tourism-sector-opportunities-investors-2020.html/#:~:text=Vietnam%20expects%20to%20attract%20approximately,projects%20and%20the%20night%20economy.>

54. Nhan Dan (2020), "Vietnam tourism towards domestic market in 2021".

Available at: <https://en.nhandan.org.vn/travel/item/9452202-vietnam-tourism-towards-domestic-market-in-2021.html>

55. In 2019, the average expenditure per day of foreign tourists is USD117.8 as compared with average expenditure per day of domestic tourists is USD48.6. General Statistics Office of Vietnam (2020), "Average expenditure per day of foreign tourists".

Available at: <https://www.gso.gov.vn/en/px-web/?pxid=EO828&theme=Trade%2C%20Price%20and%20Tourist>

56. According to World Bank Open Data. Available at: <https://data.worldbank.org/>

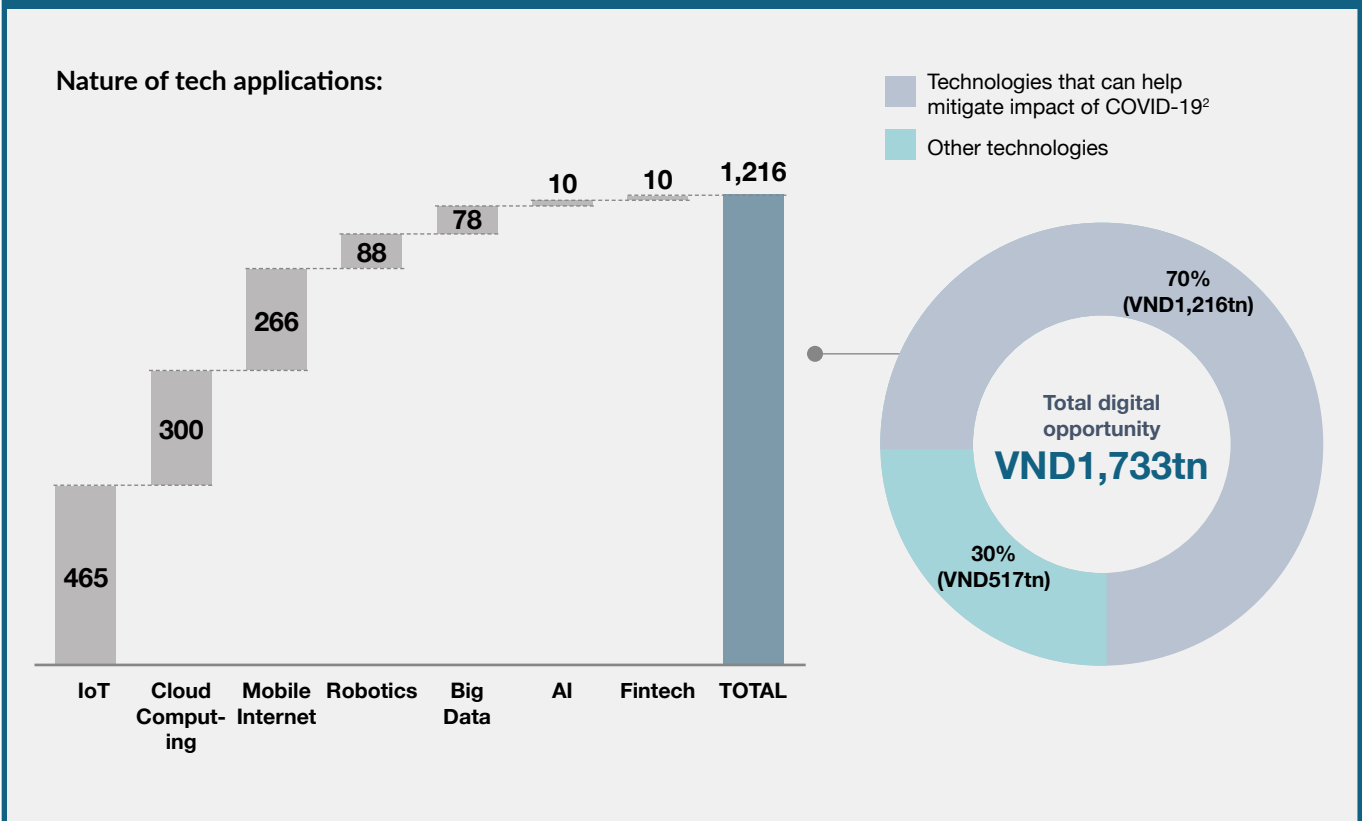
57. Sources include: Nikkei Asia (2020), "Vietnam revamps as world's mask factory to offset COVID hit". Available at: <https://asia.nikkei.com/Economy/Trade/Vietnam-revamps-as-world-s-mask-factory-to-offset-COVID-hit>; Vietnam Briefing (2020), "Seizing investment opportunities in Vietnam's garment and textile industry". Available at: <https://www.vietnam-briefing.com/news/seizing-investment-opportunities-vietnams-textile-garment-industry.html/#:~:text=The%20garment%20and%20textile%20industry,16%20percent%20of%20total%20GDP.>

58. Vietnam Insider (2018), "Apple supplier to shift production from China to Vietnam". Available at: <https://vietnaminsider.vn/apple-moving-production-from-china-to-vietnam/>



EXHIBIT 4:
70% OF THE TOTAL ECONOMIC VALUE IS DRIVEN BY TECH APPLICATIONS THAT CAN HELP COMPANIES MITIGATE THE IMPACTS OF COVID-19

POTENTIAL ANNUAL ECONOMIC VALUE DERIVED FROM KEY TECHNOLOGIES¹
 VND 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.
 2. These refer to technology applications that enable companies to sustain business continuity and improve business performance despite implications of the COVID-19 pandemic. For example, in the retail sector, the digitization of retail platforms (e-commerce) enable companies to continue selling their products and services despite government-mandated social restrictions and reduced physical crowds as a result of the pandemic.
 SOURCE: Asian Development Bank's "COVID Economic Impact Template" (June 2020); AlphaBeta analysis



businesses to navigate and even flourish during the pandemic and in the post-COVID future.⁵⁹ There are three channels in which such technology applications allow for this (Exhibit 5).

- Business operations: Enabling the continuity of business operations amid remote working arrangements.** With precautionary measures implemented at workplaces to safeguard workers' safety, the resultant reduction in on-site manpower has decreased operating capacity for many businesses, while some businesses have switched to remote working arrangements indefinitely. A range of digital technologies allows for business continuity despite these circumstances, by facilitating virtual collaboration among co-workers, and automating production processes, and allowing the remote control of physical operations from off-site locations. Examples of relevant technology applications include automation and AI customer service in hotels, remote patient monitoring, and robotics and automation in the manufacturing sector. Combined, such technology applications are projected to deliver a total annual economic value

of VND658.8 trillion (USD28 billion) if fully adopted by 2030 (Exhibit 5). In the hospitality industry, to ensure the safe recovery of tourism activities after the pandemic, AI-enabled customer check-in and service procedures do not only serve to address health and safety concerns by minimizing human contact, but they can also help boost staff productivity and create greater service value overall. Remote check-ins, such as the "E-Visitor Authentication" (EVA) in Singapore which uses facial recognition technology, are estimated to reduce the time taken to verify visitors' particulars by up to 70 percent.⁶⁰ At the same time, by freeing their time up from mundane administrative tasks, on-site staff may focus on higher value-add tasks such as addressing more complex customer demands or personalizing customer service.

- Customer interactions: Facilitating customer interactions, transactions, and marketing through digital platforms.** Social distancing measures targeted at containing the COVID-19 outbreak have severely restricted customer interactions and transactions for businesses

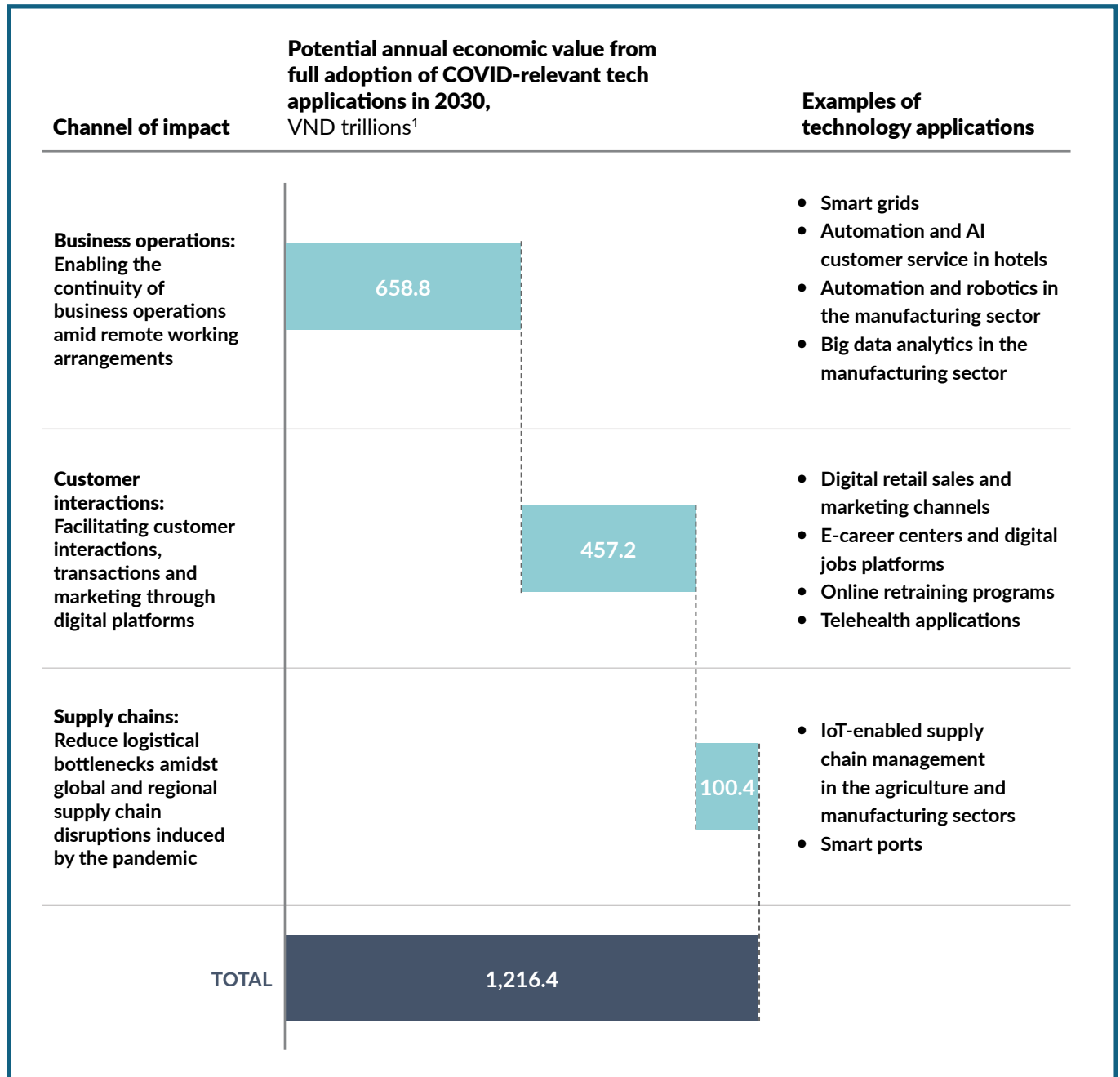
59. Of the 43 technology applications in this study, 23 allow businesses to build resilience during the COVID-19 pandemic through the three specified channels. See Appendix A3 for more details.

60. The Straits Times (2019), "Faster check-in at Singapore hotels with new automated facial recognition system".

Available at: <https://www.straitstimes.com/singapore/speedier-check-in-process-for-hotels-possible-with-new-automated-facial-recognition-system>

EXHIBIT 5:

TECH APPLICATIONS THAT HELP BUSINESSES MITIGATE COVID-19 IMPACTS CAN GENERATE VND1,216 TRILLION (USD52 BILLION) IN ANNUAL ECONOMIC VALUE BY 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



that heavily rely on physical interactions. As customers gravitate towards online marketplaces and services, technologies enable businesses to continue customer interactions and marketing activities online. Examples of relevant technology applications include digital retail sales and marketing channels in the retail industry, online F&B delivery channels in the hospitality industry, e-career centers and digital jobs platforms in the recruitment industry, and telehealth apps in the health sector. Combined, such technology applications are projected to deliver a total annual economic value of VND457.2 trillion (USD19.7 billion) if fully adopted by 2030 (Exhibit 5). As outlined in Chapter highlight 2, digital platforms have become an important tool for facilitating customer or stakeholder interactions across a variety of sectors. Case study 3 illustrates an example of a Vietnamese hospitality business that successfully leveraged digital technologies to weather the COVID-19 crisis.

- **Supply chains: Reduce logistical bottlenecks amidst global and regional supply chain disruptions induced by the pandemic.** Businesses have had to cope with supply chain disruptions when lockdown measures cut the supply of important raw materials and components and brought delays to the arrival of key components. These disruptions can be managed by technologies that allow for the remote tracking of goods that cross borders, and that enhance the capabilities of businesses to search and switch to alternative channels or sources. Examples of relevant technology applications include IoT-enabled supply chain management in the agriculture and manufacturing sectors and smart ports. Combined, such technology applications are projected to deliver a total annual economic value of VND100.4 trillion (USD4.3 billion) if fully adopted by 2030 (Exhibit 5). Embedded in distribution networks, sensor data-driven operations analytics from IoT devices, such as remote reporting of position,

CHAPTER HIGHLIGHT 2: THE IMPORTANCE OF DIGITAL PLATFORMS FOR MULTIPLE SECTORS IN VIETNAM DURING THE PANDEMIC

During the COVID-19 pandemic where in-person transactions and engagements have been restricted or massively scaled-down, digital platforms have been instrumental in allowing such activities to continue. There are several examples of the use of such platforms in three sectors:

- In the **consumer, retail, and hospitality** sector, e-commerce platforms serve as a marketplace between sellers and buyers which allow for cross-border exchange of goods and services. Such platforms have risen in popularity in Vietnam, where the domestic e-commerce market is projected to grow at a compound annual growth rate of 34 percent between 2020 and 2025 – the highest growth rate observed among Southeast Asian nations.⁶¹ E-commerce has also been acknowledged as a focal point of the country’s “National Digital Transformation Roadmap”.⁶²
- In the **health** sector, digital telehealth platforms allow for medical consultations to be conducted between doctors and patients, thereby improving access to healthcare, particularly in remote areas. During the pandemic, the Vietnamese Government launched a digital medical examination and treatment platform which allows doctors in central hospitals to remotely conduct medical consultations for patients living in rural areas.⁶³
- In the **education and training** sector, online job-matching platforms have been instrumental in addressing unemployment by rapidly matching newly unemployed workers with urgent job openings which would otherwise have flown under the radar. According to MGI, e-career centers and digital jobs platforms could increase employment rates by 2.9 percent.⁶⁴ This is particularly important given that the COVID-induced global economic slowdown has put 900,000 workers in Vietnam out of work, and caused nearly 18 million workers to experience declines in their incomes due to reduced working hours.⁶⁵ Over a longer time horizon, online retraining programs could also help displaced workers upgrade their skills and regain employment, which contributes to long-term labor productivity.⁶⁶

61. Google (2020), e-Conomy SEA 2020. Available at: <https://www.thinkwithgoogle.com/intl/en-apac/consumer-insights/consumer-journey/e-conomy-sea-2020-resilient-and-racing-ahead-what-marketers-need-to-know-about-this-years-digital-shifts/>

62. Asia Pacific Foundation of Canada (2020), “Vietnam in the Post-COVID Era: Realizing a ‘Digital Country’”. Available at: <https://www.asiapacific.ca/publication/vietnam-post-covid-era-realizing-digital-country>.

63. Online newspaper of the Government (2020), “Remote platform, Bluezone app launched in support of medical treatment, including COVID-19”. Available at: <http://news.chinhphu.vn/Home/Remote-platform-Bluezone-app-launched-in-support-of-medical-treatment-including-COVID-19/20204/39790.vgp>

64. McKinsey Global Institute (2015), A labour market that works: Connecting talent with opportunity in the digital age. Available at: [https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Employment%20and%20Growth/Connecting%20talent%20with%20opportunity%20in%20the%20digital%20age/MGI Online talent A labor market that works Full report June 2015.ashx](https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Employment%20and%20Growth/Connecting%20talent%20with%20opportunity%20in%20the%20digital%20age/MGI%20Online%20talent%20A%20labor%20market%20that%20works%20Full%20report%20June%202015.ashx)

65. The Straits Times (2020), “Vietnam says 31 million workers impacted by COVID-19 pandemic, risk of rising unemployment”.

Available at: <https://www.straitstimes.com/asia/se-asia/vietnam-says-31-million-workers-impacted-by-pandemic-risk-of-rising-unemployment>

66. McKinsey Global Institute (2015), A labour market that works: Connecting talent with opportunity in the digital age. Available at: [https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Employment%20and%20Growth/Connecting%20talent%20with%20opportunity%20in%20the%20digital%20age/MGI Online talent A labor market that works Full report June 2015.ashx](https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Employment%20and%20Growth/Connecting%20talent%20with%20opportunity%20in%20the%20digital%20age/MGI%20Online%20talent%20A%20labor%20market%20that%20works%20Full%20report%20June%202015.ashx)

CASE STUDY 3.

THIEN MINH GROUP ADDS DIGITAL OFFERINGS TO ITS HOSPITALITY PORTFOLIO

When the COVID-19 pandemic brought international tourism to a standstill, Thien Minh Group (TMG), Vietnam's largest integrated tourism and retail business, pivoted its focus from the international tourism market to focus on the domestic market.⁶⁷ In line with the company's broader strategy to develop an ecosystem of services and become a "super app" of Vietnam, TMG introduced online F&B delivery services and digitized its traditional hotel services. Instead of laying off workers to reduce cost, TMG trained its 3,000 staff to improve customer service, such as speaking proper Vietnamese and offering authentic local food, as they shift to serving local customers.⁶⁸ To save its restaurant chain, the company also expanded into online F&B delivery services to deliver 100,000 meals daily to customers in Hanoi and Saigon.⁶⁹ As a result of these digitally-enabled changes, the company managed to retain its existing staff and plans to expand its food delivery service country-wide.⁷⁰ At the same time, to reduce physical contact between hotel staff and guests, TMG launched an online application "TMG Go". The mobile application contains features that allow online check-in, ordering room services, and hotel excursion booking services.⁷¹



Photo Source: <https://tmgroup.vn/tmg-in-the-news/thien-minh-group-launches-tmg-go-app.html>

67. TMG (2020), "TMG's Kien on steering iVIVU.com and group through the storm in Vietnam".

Available at: <https://tmgroup.vn/tmg-in-the-news/tmgs-kien-on-steering-ivivu-com-and-group-through-the-storm-in-vietnam.html>

68. TMG (2020), "Thien Minh Group launches TMG GO App". Available at: <https://tmgroup.vn/tmg-in-the-news/thien-minh-group-launches-tmg-go-app.html>

69. VNExpress (2020), "Switch to new products help businesses survive coronavirus crisis".

Available at: <https://e.vnexpress.net/news/business/economy/switch-to-new-products-helps-businesses-survive-coronavirus-crisis-4081659.html>

70. VNExpress (2020), "Switch to new products help businesses survive coronavirus crisis".

Available at: <https://e.vnexpress.net/news/business/economy/switch-to-new-products-helps-businesses-survive-coronavirus-crisis-4081659.html>

71. TMG (2020), "Thien Minh Group launches TMG GO App". Available at: <https://tmgroup.vn/tmg-in-the-news/thien-minh-group-launches-tmg-go-app.html>

allow businesses to optimize transportation and improve their distribution management. The adoption of IoT in manufacturing supply chains is estimated to reduce distribution and supply chain operating costs by 2.5 to five percent.⁷² Similarly, in “smart ports”, IoT devices can be attached to specific storage containers or to raw materials or products themselves to allow for such tracking. In addition, comprehensive real-time data on cargo schedule and ship positions allow terminal staff to plan anchorage areas and avoid critical berths from being taken out of service by quarantined vessels, reducing bottlenecks and idle time.⁷³

In addition, technologies can boost the export capabilities of firms in Vietnam during and after the

pandemic. Digital advancements have meant that companies in Vietnam may export digital goods and services seamlessly to other countries in spite of restrictions on physical cross-border flows. Digital tools ranging from simple Internet search engines to more sophisticated cloud computing technologies allow enterprises to operate with ease across geographies by connecting with consumers, suppliers, and investors across the globe. Past research by AlphaBeta and the Hinrich Foundation reflects that digital exports (comprising the export of digitally-enabled goods and services) accounted for about two percent of the country’s total export value in 2017, and could potentially grow further by almost seven-fold by 2030.⁷⁴ Chapter highlight 3 shows further details of this research.



72. McKinsey Global Institute (2011), *Big data: The next frontier for innovation, competition, and productivity*. Available at: https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Big%20data%20The%20next%20frontier%20for%20innovation/MGI_big_data_full_report.pdf

73. World Ports Sustainability Program (2020), *WPSP COVID-19 guidance documents for Ports*. Available at: https://safety4sea.com/wp-content/uploads/2020/05/WPSP-COVID-19-Guidance-document-for-ports-2020_05.pdf

74. Hinrich Foundation and AlphaBeta (2018), *The data revolution: How Vietnam can capture the digital trade opportunity at home and abroad*. Available at: https://alphabeta.com/wp-content/uploads/2019/03/digitaltrade_vietnam-en_1-pg-view-hi-res.pdf

CHAPTER HIGHLIGHT 3: THE IMPORTANCE OF DIGITAL TECHNOLOGIES FOR BOOSTING VIETNAM'S EXPORT SECTOR

Though trade has traditionally been dominated by physical goods, growth in global goods trade has flattened while global data flows have surged, with the amount of cross-border bandwidth having grown 45 times since 2005.⁷⁵ This is projected to increase by an additional nine times over the next five years as flows of information, searches, communication, video, transactions, and intra-company traffic, continue to rise.⁷⁶ Digital trade is therefore crucial as a way to increase and diversify Vietnam's export base.



Digital technologies are already being leveraged to some extent to boost Vietnam's exports. In 2017, the country's digital exports were valued at VND97 trillion (USD4.3 billion).⁷⁷ This means that if "digital" were a sector, it would rank as the country's eighth-largest export sector (after the exports of iron and steel). This value encompasses the export value of **digitally-enabled products** which includes goods exported via e-commerce platforms and revenues earned from overseas downloads of domestically developed smartphone apps, as well as the export value of **digitally-enabled services** which includes telecommunication services (e.g., export of video conferencing, digital file-sharing and Voice Over Internet Protocol or VOIP services) and online video advertising revenues gained from abroad. Two key drivers of Vietnam's digital export value in 2017 are e-commerce exports (VND52 trillion or USD2.3 billion) – fueled by the growing online presence of companies in Vietnam seeking to establish stronger footholds in global markets, as well as overseas downloads of locally developed apps (VND8.2 trillion or USD361 million) – due to the country's massive mobile gaming market.

However, most businesses in Vietnam have yet to tap the digital export opportunity, and the research found that a significantly larger digital export opportunity in 2030 was at stake. It estimated that in the absence of digital trade barriers, such as policies that restrict cross-border data flows or the international exchange of digital services, Vietnam's digital export value could grow by almost seven-fold to reach VND65.2 trillion (USD28.7 billion) in 2030. In addition, many businesses, particularly SMEs, still face substantial challenges in bridging the gap to global markets. They often lack the resources to research international sales opportunities, build global business networks and promote their products overseas. These barriers would have to be addressed – especially today in the wake of the COVID-19 pandemic and its grave impact on physical trade – in order for Vietnam to unlock the full value in its export economy.

75. McKinsey Global Institute (2016), *Digital globalization: The new era of global flows*.

Available at: <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows>

76. McKinsey Global Institute (2016), *Digital globalization: The new era of global flows*.

Available at: <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows>

77. Hinrich Foundation and AlphaBeta (2018), *The data revolution: How Vietnam can capture the digital trade opportunity at home and abroad*.

Available at: https://alphabeta.com/wp-content/uploads/2019/03/digitaltrade_vietnam-en_1-pg-view-hi-res.pdf



CAPTURING THE PRIZE — THREE PILLARS OF ACTION

To fully capture the digital opportunity, three pillars of action are required:

1. Develop the local tech ecosystem;
2. Digitally upskill workers and students; and
3. Develop a conducive environment for digital trade.

The country is already making significant strides in all three pillars. Regulations on foreign technology transfer and improvements to digital infrastructure have been conducive to the development of the local tech ecosystem. To digitally upskill Vietnam's workers and students, the government established sector skills councils to equip current workers with the skills required to access digital opportunities and places a strong focus on digital technology in educational curriculums. As an export-oriented economy, Vietnam also has a strong emphasis on promoting digital trade opportunities through its participation in the "Comprehensive and Progressive Agreement for Trans-Pacific Partnership" (CPTPP) to facilitate cross-border data flows.

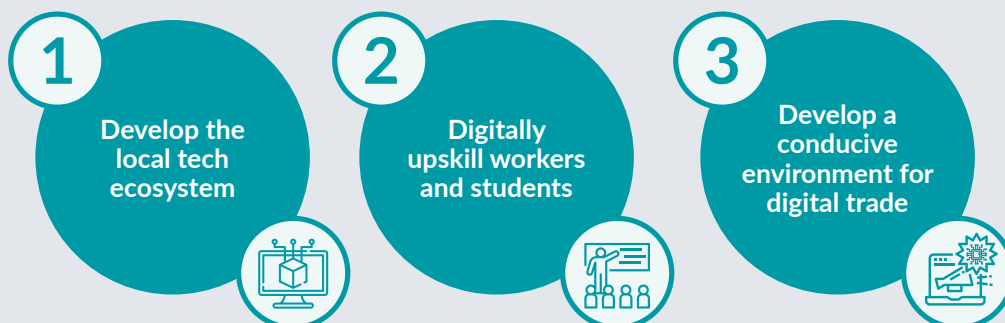
To develop the local tech ecosystem, Vietnam would benefit from enhancing the reliability of the country's digital infrastructure and addressing regulatory hurdles faced by local tech players. To digitally upskill workers and students, the country could consider creating digital skills training programs in non-tech sectors, enhancing the availability of Science, Technology, Engineering, and Mathematics (STEM) apprenticeships, and increasing the focus on "soft skills" development. To develop a conducive environment for digital trade, the country could ease restrictive data policies and minimize border frictions for businesses to access digital trade opportunities.

“CAPTURING THE PRIZE”

THREE PILLARS OF ACTION



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



Significant effort has already been made in the following areas

- Facilitate foreign technology transfer
- Enhance access to digital infrastructure nationwide
- Equip current workers with the relevant skills required to access digital opportunities
- Inculcate a strong focus on digital technology in educational curriculums
- Bridge the urban-rural divide through more inclusive digital skills programs
- Promote open cross-border data flows

However there are areas in which Vietnam can further strengthen its approach on

- Incorporate network redundancy to enhance the reliability of digital infrastructure
- Develop “regulatory sandboxes” to promote innovation while addressing regulatory headwinds
- Create sector-specific digital skills training programs, particularly in non-tech sectors
- Increase the availability of STEM apprenticeships
- Increase “soft skills” focus to complement technical education
- Ease restrictive data policies
- Encourage interoperability of digital frameworks
- Minimize border frictions

2.1 PILLAR 1: DEVELOP THE LOCAL TECH ECOSYSTEM

For Vietnam to fully capture the economic opportunities afforded by digital technologies, there needs to be strong policy support for the growth of the local technology ecosystem.

Vietnam has already made significant efforts in the following areas:

- Facilitate foreign technology transfer.** High-quality foreign inflows provide a window of opportunity for domestic firms to draw on international expertise and benefit from technology transfer. For example, in partnership with South Korea, the Việt Nam-Korea Techno Park Investment and Development Joint Stock Company (VKTP) is proposing to build the country's first techno park which aims to attract investments worth USD2-3 billion from high-tech companies within six to nine years of operation.⁷⁸ To support foreign technology transfer to businesses in Vietnam, the "Law on Technology Transfer" was revised in 2017 to allow the commercialization of technologies including AI, IoT, education technology (EdTech), online-to-offline digital marketing, e-commerce, FinTech and agriculture tech (AgriTech).⁷⁹ Additionally, the "Law on Support for Small and Medium-sized Enterprises" that came into effect in 2018 supports start-ups in areas such as investments, preferential loans, and incentives for venture capitals.⁸⁰ Under the "National Innovation Initiative 2025" policy, the government aims to raise an estimated
- Enhance access to digital infrastructure nationwide.** Vietnam has been focused on developing new digital infrastructure and expanding Internet coverage across the country. The government has set a target to provide affordable nationwide fifth-generation (5G) network coverage by 2030 and a CISCO study estimated that the number of 5G subscribers in Vietnam is expected to reach 6.3 million by 2025.⁸² This serves as a stepping stone for the country's largest mobile carrier, Viettel Group, to roll out 5G services scheduled for 2021 – a wireless standard that offers speeds about 100 times faster than fourth-generation (4G) mobile network and support advanced technology applications such as autonomous driving.⁸³ By deploying 5G services, telecom companies in Vietnam are estimated to experience an increase in revenue by up to USD300 million annually from 2025.⁸⁴ To close geographical gaps in digital access, the government dedicated VND7.3 trillion (USD314 million) to the development of broadband infrastructure nationwide that prioritizes remote and isolated areas, disadvantaged areas, border areas and islands under the "Program on the Provision of Public Telecommunication Services" (Decision No. 868/QĐ-TTg).⁸⁵

78. VNExplorer (2020), "South Korean group proposes \$150 million technopark in Dong Nai".

Available at: <https://vnexplorer.net/south-korean-group-proposes-150-million-technopark-in-dong-nai-a202036379.html>

79. OpenGov Asia (2017), "New technology transfer law in Vietnam aims to promote adoption of latest advances and commercialisation of research".

Available at: <https://opengovasia.com/new-technology-transfer-law-in-vietnam-aims-to-promote-adoption-of-latest-advances-and-commercialisation-of-research/>

80. The Supreme People's Court (2017), "Law on Support for Small- and Medium-sized Enterprises".

Available at: <https://www.toaan.gov.vn/webcenter/portal/spc/document-detail?dDocName=TOAAN011016&Keyword=>

81. Ministry of Science and Technology of Viet Nam (2020), "National Program 844".

Available at: <http://en.dean844.most.gov.vn/about-initiative-for-the-startup-ecosystem-in-vietnam-until-2025-isev.htm>

82. Ministry of Information and Communications (2020), "5G key for Vietnam in Fourth Industrial Revolution".

Available at: <https://english.mic.gov.vn/Pages/TinTuc/140494/5G-key-for-Vietnam-in-Fourth-Industrial-Revolution.html>

83. Nikkei Asia (2018), "Vietnam's Viettel to roll out 5G service in 2021". Available at: <https://asia.nikkei.com/Business/Companies/Vietnam-s-Viettel-to-roll-out-5G-service-in-2021>

84. Ministry of Information and Communications (2020), "5G key for Vietnam in Fourth Industrial Revolution".

Available at: <https://english.mic.gov.vn/Pages/TinTuc/140494/5G-key-for-Vietnam-in-Fourth-Industrial-Revolution.html>

85. Data61 (2019), Vietnam's future digital economy: Towards 2030 and 2045. Available at: https://data61.csiro.au/~media/D61/Files/18-00566_DATA61_REPORT_VietnamsFutureDigitalEconomy2040_ENGLISH_WEB_190528.pdf?la=en&hash=C65B73AAE00BA560D60E5563DDA98AF8AA6F1D68

However, the local technology ecosystem in Vietnam continues to face several hurdles to growth. These include limitations in the reliability of its digital infrastructure, and regulatory barriers. To address these hurdles, the country could consider the following actions:

- **Incorporate network redundancy to enhance the reliability of digital infrastructure.** While Vietnam has been rapidly expanding its digital infrastructure, the country lacks network redundancy that allows its networks, servers, and Internet connectivity to remain in service through alternative communications paths and backup equipment. Unlike Malaysia and Indonesia which are connected to more than ten submarine optic-fiber cables, Vietnam is currently connected to only five cables and experiences frequent submarine cable breakage incidents due to weather, seismic activity and marine activities.⁸⁶ Of the five cables, the Asia-America Gateway (AAG) cable has been prone to cuts, causing intermittent issues; yet, it is responsible for carrying more than 60 percent of the country's international Internet traffic.⁸⁷ To build Vietnam's resilience to submarine cable disruptions, the country should look to invest in more international submarine cable routes.
- **Develop "regulatory sandboxes" to promote innovation while addressing the regulatory headwinds faced by local tech players.** While the country has made some headway in creating a conducive environment to leverage digital technology, mobile game developers face several regulations that constrain their ability to generate revenue from the domestic market. Since 2017, around 142 illegal games have been removed from app stores for violating the country's regulations.⁸⁸ These include Decree No. 72/2013/ND-CP on

the management, provision and use of Internet services and online information, which stipulates that video games in which multiple players interact with each other simultaneously through the game's server must have a license for providing games services, and have their content approved before they may be published in Vietnam.⁸⁹ However, in order to have their games licensed, foreign companies must either collaborate with companies in Vietnam or establish a local branch in Vietnam in which the foreign company's capital contribution must not exceed 49 percent.⁹⁰ Moreover, the reviewing and licensing process for a game typically takes about 20 days to over a month if violations are found by the appraisal council -- and during this period, the game must be taken down from application stores and websites in Vietnam.⁹¹ These have caused the exit of several foreign tech companies that have supported the growth of the domestic developer ecosystem. Such companies include Supercell, a Finnish mobile game development company behind popular games such as "Clash of Clans", "Hay Day" and "Clash Royale", who had hired 132 staff in Vietnam.⁹² Without unduly constraining the growth of Vietnam's thriving game development scene, the government could consider regulatory sandboxes that allow companies to develop innovations in regulation-free environments. By allowing entities to operate under relaxed regulatory requirements, regulatory authorities can also receive feedback on ways to ensure the current policies do not compromise the safety of consumer data and proprietary information while encouraging innovation.⁹³ An international best practice that could be considered is the FinTech regulatory sandbox launched by the Monetary Authority of Singapore or MAS (Case Study 4).

86. Analysys Mason (2020), *Economic impact of Google's APAC network infrastructure*.

Available at: <https://www.analysismason.com/contentassets/b8e0ea70205243c6ad4084a6d81a8aa8/impact-of-googles-network-investments-in-apac---september.pdf>

87. Analysys Mason (2020), *Economic impact of Google's APAC network infrastructure*.

Available at: <https://www.analysismason.com/contentassets/b8e0ea70205243c6ad4084a6d81a8aa8/impact-of-googles-network-investments-in-apac---september.pdf>

88. Nikkei Asia (2019), "Vietnam cracks down on illegal 'cross-border' online games".

Available at: <https://asia.nikkei.com/Business/Business-trends/Vietnam-cracks-down-on-illegal-cross-border-online-games>

89. Lexology (2020), "Vietnam - regulations on online games that foreign investors need to know".

Available at: <https://www.lexology.com/library/detail.aspx?g=a9ae7d6e-3839-4628-b40b-2e5840dda2a7>

90. Lexology (2020), "Vietnam - regulations on online games that foreign investors need to know".

Available at: <https://www.lexology.com/library/detail.aspx?g=a9ae7d6e-3839-4628-b40b-2e5840dda2a7>

91. Lexology (2020), "Vietnam - regulations on online games that foreign investors need to know".

Available at: <https://www.lexology.com/library/detail.aspx?g=a9ae7d6e-3839-4628-b40b-2e5840dda2a7>

92. Financial Times (2014), "Two Supercell games pull in \$2mn a day". Available at: <https://www.ft.com/content/24f7dc08-93c7-11e3-a0e1-00144feab7de>

93. Hong Kong Monetary Authority (2019), "GFiN - one year on: A reflection of the GFiN's achievements and challenges since inception, and ambitions for the future".

Available at: <https://www.hkma.gov.hk/eng/news-and-media/press-releases/2019/06/20190625-3/>

CASE STUDY 4. MAS' "FINTECH REGULATORY SANDBOX" PROVIDES A SAFE TESTING BED FOR INNOVATIVE FINANCIAL PRODUCTS OR SERVICES

The "FinTech Regulatory Sandbox" set up in 2016 allows financial institutions and FinTech players to experiment with innovative financial products and services by relaxing specific legal and regulatory requirements, which the sandbox participant will otherwise be subject to, over a six-month period. Instead, the sandbox puts in place safeguards to contain the consequences of failure and maintain the overall safety and soundness of the financial system.⁹⁴ As of 2019, three participants have successfully completed their experiment and exited the sandbox, namely insurance tech start-up PolicyPal, currency exchange provider Thin Margin and AI-enabled digital asset management platform Kristal Advisors. During the six-month period, PolicyPal tested its AI-enabled management of insurance policies and validated its distribution model in Singapore to earn its insurance license.



94. Monetary Authority of Singapore (2020), "Overview of Regulatory Sandbox". Available at: <https://www.mas.gov.sg/development/fintech/regulatory-sandbox>

2.2 PILLAR 2: DIGITALLY UPSKILL THE CURRENT WORKFORCE AND FUTURE TALENT

To fully reap the benefits of digital transformation, it is critical to ensure that individuals in Vietnam are equipped with digital skills to access job opportunities, run businesses and enhance productivity in their work. The opportunities to access digital skills training should be made available to all segments of the society, including typically underserved communities such as ethnic minorities and inhabitants of less economically developed regions. The seeds for a future generation of adaptable and digitally skilled workforce must be planted early to ensure a healthy talent pipeline.

Vietnam is already advancing this goal of building digital talent through the following actions:

- Equip current workers with the relevant skills required to access digital opportunities.** This has been a growing area of focus for the government. Passed in 2019, “Resolution No. 52-NQ/TW Guidelines for Participation in the Fourth Industrial Revolution” aims to leverage “Industry 4.0” technologies such as big data analytics and automation to grow Vietnam’s digital economy, with a target for this to account for 30 percent of GDP by 2030.⁹⁵ Passed in 2018, the “Law on Support for Small and Medium-sized Enterprises” institutes vocational upskilling policies and incentives for MSMEs to adopt digital technologies.⁹⁶ Outside the technology sector, digital skill development efforts have been especially focused on the agricultural and tourism industries. In 2019, the government created “sector skills councils” to coordinate the
- Inculcate a strong focus on digital technology in educational curriculums.** It is critical to ensure that the seeds for a future generation of adaptable and digitally skilled workforce are planted early. This includes developing an agile education system that is responsive to the changing technological landscape, as well as programs aimed at digitally skilling graduates. During the COVID-19 outbreak when schools were closed temporarily, more than 79 percent of students were provided access to online platforms such as the “Learning Management System” where teachers uploaded video lessons.⁹⁷ To equip the future workforce with digital skills, a key policy in Vietnam introduces compulsory computer-related education for K-12 students. Starting with being taught how to use basic productivity software such as word processing in the earlier grades, students then progress to learn how to use coding software in the later grades.⁹⁸ These efforts have led to an increase in the number of individuals with Information and Communication technology or ICT-relevant degrees or qualifications – for example, the number of people enrolled in Technical and Vocational Education and Training (TVET) doubled between 2016 and 2018, with IT and technology engineering courses being

95. Vietnam Investment Review (2019), “Resolution to aid 4.0 breakthrough”. Available at: <https://www.vir.com.vn/resolution-to-aid-40-breakthrough-71065.html>

96. The Supreme People’s Court (2017), “Law on Support for Small- and Medium-sized Enterprises”.

Available at: <https://www.toaan.gov.vn/webcenter/portal/spc/document-detail?dDocName=TOAAN011016&Keyword=>

97. Vietnam Investment Review (2019), “Skill-powered growth for Vietnam’s 4.0 economy”.

Available at: <https://www.vir.com.vn/skill-powered-growth-for-Vietnam-40-economy-65002.html>

98. G20 (2010), A Skilled Workforce for Strong, Sustainable and Balanced Growth. Available at: https://www.ilo.org/skills/pubs/WCMS_151966/lang-en/index.htm

99. Vietnam Net (2020), “Vietnam leads in digital transformation in education: UNICEF”.

Available at: <https://vietnamnet.vn/en/society/vietnam-leads-in-digital-transformation-in-education-unicef-682329.html>

100. FinanceTwitter (2019), “Forget Khat Jawi – Vietnam the top producer of programmers, even Myanmar has started computer coding for kids”.

Available at: <http://www.financetwitter.com/2019/08/forget-khat-jawi-Vietnam-the-top-producer-of-programmers-even-myanmar-has-started-computer-coding-for-kids.html>



among the most popular.¹⁰¹ The country has also performed relatively well on international assessments of students' science and mathematics skills. In the 2015 Program for International Student Assessment (PISA), Vietnam was ranked eighth globally in its performance on science, with a point score of 16 points higher than the United Kingdom and 29 points higher than the United States.¹⁰²

- **Bridge the urban-rural divide through more inclusive digital skills programs.** Various efforts have been launched by the government to bridge the digital divide between urban and rural regions in Vietnam. According to the Vietnam e-Commerce Association's "Index of Human Resource and Information Technology Infrastructure" which measures the quality of human resources in the IT industry, the ease of recruiting digital talent is significantly higher in Hanoi and Ho Chi Minh City than in other regions in the country.¹⁰³ To address this, the government is partnering with the software company, SAP, and the global humanitarian aid organization, the United Nations Children's Fund (UNICEF), to provide around 11,000 secondary school and TVET students from disadvantaged communities in the country with digital skills training.¹⁰⁴ The government also partnered with the International Telecommunications Union (ITU) to launch the "YouthSpark Digital Inclusion" project to close the urban-rural digital skills gap for secondary school students.¹⁰⁵ Targeted to benefit up to 50,000 students and 300 teachers, this public-private initiative consists of a series of ICT and computer science-related training lessons and materials.¹⁰⁶
- **Create sector-specific digital skills training programs, 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. An international

However, studies show that Vietnam's workforce remains inadequately prepared for the digital economy. For instance, the World Economic Forum's Global Competitiveness Index 2019 ranked the country 97th out of 141 countries on the share of its working population with digital skills. A survey by the Ministry of Industry and Trade (MOIT) and the United Nations Development Program (UNDP) found that 85 percent of enterprises in Vietnam had "either done nothing or very little" to prepare their businesses for changes brought about by digital technologies.¹⁰⁷ The country can therefore go further to improving the digital capacities of its working population and enterprises:

101. MoLISA (2019), *On integration of TVET with the labor market and solutions by 2025*.

Available at: https://drive.google.com/file/d/1tW9DcodvgnF2-UC52kk_88d3PF94meU4/view

102. OECD, "PISA 2015 database". Available at: <https://www.oecd.org/pisa/data/2015database/>

103. Vietnam e-Commerce Association (2019), *E-Business Index 2019 Report*. Available at: <https://drive.google.com/file/d/1i-KZHyawSb4Wladiwi4hvpj8V-yYrTrU/view>

104. The ASEAN Post (2019), "Vietnam's youth need to upskill". Available at: <https://theaseanpost.com/article/Vietnams-youth-need-upskill/>

105. ITU Digital Inclusion Division (2016), "Vietnamese rural students to receive digital skills training via public-private collaboration".

Available at: <http://digitalinclusionnewslog.itu.int/2016/06/26/vietnamese-rural-students-to-receive-digital-skills-training-via-public-private-collaboration/>

106. ITU Digital Inclusion Division (2016), "Vietnamese rural students to receive digital skills training via public-private collaboration".

Available at: <http://digitalinclusionnewslog.itu.int/2016/06/26/vietnamese-rural-students-to-receive-digital-skills-training-via-public-private-collaboration/>

107. Asia Foundation (2020), *The Future of Work Across ASEAN*. Available at: https://asiafoundation.org/wp-content/uploads/2020/02/The-Future-of-Work-Across-ASEAN_full.pdf

best practice worth considering is Singapore’s “SGUnited Jobs and Skills Package” (Case Study 5). The package features traineeship programs (under “SGUnited Traineeship Program” and skills training (under the “SGUnited Skills Program”) to equip graduates and mid-career professionals with industry-relevant skills for jobs in growing sectors and the digital economy.

- **Increase the availability of Science, Technology, Engineering and Mathematics (STEM) apprenticeships.** There is a clear skills mismatch in Vietnam’s graduate pool. Despite the relatively high share of graduates from ICT-related courses, it has been estimated that Vietnam’s labor market faces a shortfall of 500,000 data scientists and up to one million ICT workers.¹⁰⁸ Further, university graduates face the highest unemployment rates in the country.¹⁰⁹ A key driver behind this trend is the lack of practical applicability in higher education curriculums. There have been some innovative approaches abroad that could help improve this. In Singapore, local universities such as Nanyang Technological University (NTU) and the National University of Singapore (NUS) partnered with tech companies, such as Alibaba and Grab, to provide education certification programs and allow students to participate in internships focused on data science and artificial intelligence at these companies. Up to 100 researchers and students in the Grab-NUS AI Lab are applying their skills in a real-world business environment to create cutting-edge smart mobility solutions.¹¹⁰
- **Increase “soft skills” focus to complement technical education.** Beyond developing students’

technical know-how, it is recommended that further focus be placed on the development of “soft skills” such as problem solving, critical thinking and adaptive learning. Research has shown that such intrinsically human skills will grow in importance as technologies displace physical tasks.¹¹¹ However, Vietnam’s education system has been characterized to rely on rote learning and memorization. A report by the World Bank found that despite impressive literacy and numeracy achievements among graduates in Vietnam, there is a shortfall in critical thinking, teamwork, and communication skills.¹¹² With research indicating that such cognitive and behavioral skills start to be formed in one’s early years, schools in Vietnam could adopt teaching approaches with a stronger focus on team-based project work, case problem solving, and cross-disciplinary thinking.¹¹³ An example of an education system that seeks to cultivate these skills is Finland’s, which is regarded as one of the best in the world. The country has been leading the world in The Economist’s “Worldwide Educating for the Future Index” in 2019 for its effectiveness in preparing students for the demands of work and life in a rapidly changing landscape, including equipping the future workforce with soft skills such as communication, entrepreneurship and global awareness.¹¹⁴ The country introduced a pedagogy known as “phenomenon-based teaching and learning” (PBL) in 2017. Intended to equip students with the critical thinking skills and the ability to approach issues from different angles, PBL-based lessons are a shift away from learning in “silos” towards multidisciplinary learning where students learn about world topics (e.g., climate change) in a holistic manner.¹¹⁵

108. Sources include: APEC (2017), *Data science and analytics skills shortage: equipping the apec workforce with the competencies demanded by employers*. Available at: <https://www.apec.org/Publications/2017/11/Data-Science-and-Analytics-Skills-Shortage>; CSIRO and Data 61, and supported by Australian Aid and Ministry of Science and Technology, Vietnam (2019), *Vietnam’s future digital economy: towards 2030 and 2045*. Available at: <https://research.csiro.au/aus4innovation/foresight/>

109. Phan Vo Minh Thang, Winai Wongsurawat, 2016, *Enhancing the employability of IT graduates in Vietnam*. Available at: <http://lib.hcmup.edu.vn:8080/eFileMgr/Baibaokhoahoc/nuocngoai/khoacntt/phanvominhthang/htu.2017-08-08.5755253671>

110. Economic Development Board (2018), “Singapore’s big ambitions for big data in 2019”. Available at: <https://www.edb.gov.sg/en/business-insights/insights/singapore-s-big-ambitions-for-big-data-in-2019.html>

111. McKinsey Global Institute (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/MGI-A-future-that-works-Executive-summary.ashx>

112. World Bank (2014), *Skilling up Vietnam: preparing the workforce for a modern market economy*. Available at: <https://www.worldbank.org/en/country/vietnam/publication/vietnam-development-report2014-skilling-up-vietnam-preparing-the-workforce-for-a-modern-market-economy>

113. World Bank (2014), *Enhancing competitiveness in an uncertain world. East Asia and Pacific Economic Update (October)*, World Bank Group, Washington, DC.

114. The Economist (2020), “The Worldwide Educating for the Future Index 2019”. Available at: https://educatingforthefuture.economist.com/?utm_source=PR&utm_medium=Perspectives&utm_campaign=YidanPrize

115. Sources: World Economic Forum (2017), “Is this Finnish school the perfect design?” Available at: <https://www.weforum.org/agenda/2017/10/why-finland-is-tearing-down-walls-in-schools>; David Tay (2017), “Finn and fun: lessons from Finland’s new school curriculum”. *The Straits Times*. Available at: <https://www.straitstimes.com/singapore/education/finn-fun>

CASE STUDY 5.

SINGAPORE'S SGD2 BILLION (USD 1.5 BILLION) "SGUNITED JOBS AND SKILLS PACKAGE" PROVIDE RESKILLING AND JOB OPPORTUNITIES ACROSS MULTIPLE SECTORS FOR WORKERS AFFECTED BY THE COVID-19 ECONOMIC SLOWDOWN

Amid the economic slowdown during the pandemic, the Singapore government launched a SGD2 billion (USD1.5 billion) "SGUnited Jobs and Skills Package" that created 25,000 traineeship positions and provided training for about 30,000 job seekers looking to upgrade their skills in 2020. The package features two key initiatives - the "SGUnited Traineeship Program" and "SGUnited Skills Program".

The "SGUnited Traineeship Program" was introduced in March 2020 to provide new graduates with opportunities to gain industry-relevant experience and boost their employability when the economy recovers. The Ministry of Manpower and Workforce Singapore, a statutory board under the Ministry of Manpower, created 21,000 traineeship positions that lasted up to nine months in the Research and Development (R&D) sector, including universities, A*STAR ("Agency for Science, Technology and Research") research institutes, AI Singapore, and local deep-tech startups.¹¹⁶ At the end of 2020, the sectors with the highest number of placements include healthcare (2,290), information and communications (1,870), manufacturing (1,760), professional services (1,770) and financial services (1,700).¹¹⁷ Host companies under this program also received co-funding of up to 80 percent of training allowance from Workforce Singapore.

Another key program was the "SGUnited Skills Program" which provided job-seekers access to industry-relevant and certifiable full-time training courses ranging between six to 12 months at highly subsidized rates. Courses were carefully curated with education institutions and industry partners to tailor training based on industry needs such as automation system technician training in the advanced manufacturing sector and digital marketing for wholesale trade.¹¹⁸ During the training, participants would have the opportunity to apply their newly gained skills and knowledge to participate in industry projects, workplace immersions, and receive career guidance. In addition, participants could receive a training allowance of SGD1,200 (USD895).¹¹⁹

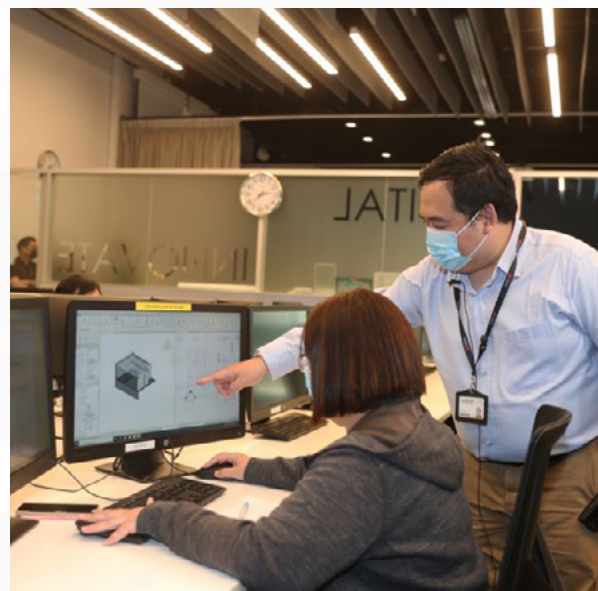


Photo Source: <https://www.straitstimes.com/forum/sgunited-skills-trainees-can-work-but-must-fulfil-commitments>

116. Workforce Singapore (2020), SGUnited Traineeships Programme factsheet for trainees.

Available at: https://www.wsg.gov.sg/content/dam/ssg-wsg/wsg/sgunited-trainees/SGUT_Factsheet_Trainees_Dec2020_Online.pdf

117. 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>

118. MySkillsFuture (2020), "SGUnited Skills".

Available at: <https://www.myskillsfuture.sg/content/portal/en/career-resources/career-resources/education-career-personal-development/sgunited-skills.html>

119. MySkillsFuture (2020), "SGUnited Skills".

Available at: <https://www.myskillsfuture.sg/content/portal/en/career-resources/career-resources/education-career-personal-development/sgunited-skills.html>

2.3 PILLAR 3: DEVELOP A CONDUCTIVE ENVIRONMENT FOR DIGITAL TRADE

To fully maximize the opportunities presented by digital technologies for its export sector, there is a strong impetus for Vietnam to create a more favorable policy environment to enable digital trade. This includes facilitating the access of its businesses to digital trade and export opportunities, as well as promoting a conducive environment for cross-border data flows.

Vietnam has implemented the following actions:

- **Promote open cross-border data flows.** A positive step that Vietnam has taken is to join the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), which establishes key principles for its member states under which free cross-border e-commerce data flows may take place.¹²⁰ Vietnam should fully implement and uphold its commitments in the CPTPP, including that of allowing for cross-border data flows amongst CPTPP parties.

However, the country faces a number of obstacles to maximizing its digital trade opportunity, and could consider the following actions:

- **Ease restrictive data policies.** Vietnam has extensive data policies that substantially restrict cross-border data flows that are necessary for digital trade and contravene its international commitments in the CPTPP. For example, Vietnam forbids direct access to the Internet through foreign “Internet Service Providers” (ISPs) and requires domestic ISPs to store information

transmitted on the Internet for at least 15 days.¹²¹ Another regulation is the mandatory data localization requirement for over-the-top services, as well as the need for a broad range of online companies (including social networks, online gaming sites and search engines) to have at least one server in Vietnam “serving the inspection, storage and provision of information at the request of competent state management agencies”.¹²²

Law enforcement and customer protection concerns can be addressed without requiring data localization, which imposes significant costs on the economy. Academic research has shown that Vietnam’s legislation on data localization could potentially reduce GDP by around 1.7 percent, and the amount of domestic investments by 3.1 percent.¹²³ Businesses should be allowed to partake in cross-border data exchanges, 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 Vietnam to adopt the “APEC Privacy Framework” and join the “APEC Cross Border Data Privacy Rules System”. The country can also consider adopting “International Organization for Standardization” (ISO) Standards such as ISO27018 that specify controls to protect personal data.

- **Encourage interoperability of digital frameworks.** Another opportunity is to encourage

120. These include: (i) commitments not to impose custom duties on digital products; (ii) commitments to adopt or maintain a legal framework that provides for the protection of the personal information of e-commerce users; (iii) non-discriminatory treatment of digital products; (iv) rules against localization requirements; (v) commitments to provide reasonable network access for telecommunications suppliers. See: Henry S. Gao (2018), “Digital or trade? The contrasting approaches of China and US to digital trade”, *Journal of International Economic Law*, Vol 21, Issue 2. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3162557

121. Nigel Cory (2017), “The critical role of data in the global economy”, Information Technology and Innovation Foundation.

Available at: <http://www2.itif.org/2017-usitc-global-digital-trade.pdf>

122. Nigel Cory (2017), “The critical role of data in the global economy”, Information Technology and Innovation Foundation.

Available at: <http://www2.itif.org/2017-usitc-global-digital-trade.pdf>

123. Matthias Bauer et al. (2014), *The costs of data localisation: Friendly fire on economic recovery*, European Centre for International Political Economy (ECIPE).

Available at: https://ecipe.org/wp-content/uploads/2014/12/OCC32014_1.pdf

interoperability of digital frameworks, particularly on payment gateways, to avoid the costs of companies having to customize their approaches to every single market. One opportunity for Vietnam is to support the implementation of the data management initiative under the “Master Plan on ASEAN Connectivity 2025” (MPAC 2025), which aims to improve transparency and accountability on data regulation requirements in ASEAN and identify areas to enhance performance and coordination.¹²⁴

- **Minimize border frictions.** In the Digital Trade Restrictiveness Index developed by European Centre for International Political Economy (ECIPE), Vietnam ranks third in a list of 65 countries

under the indicator “trading restrictions”.¹²⁵

This is due to its strict licensing and registration requirements for online social networks, general information websites, mobile telecommunications network-based services, and certain online games services, as well as the mandatory local registration and licensing requirement for foreign companies to physically establish in Vietnam.¹²⁶ Cross-border trade would be greatly enhanced by removing disclosure requirements of key intellectual property, and minimizing unnecessary procedures and duties. Local establishment requirements can be cost-prohibitive especially for MSMEs, and pose as a disincentive to businesses by effectively serving as an additional tax on operations.



124. ASEAN Secretariat (2016), Master Plan on ASEAN Connectivity 2025. Available at: <https://connectivity.asean.org/strategic-area/connecting-asean-an-overview/>

125. Martina Ferracane et al (2018), Digital Trade Restrictiveness Index, European Centre for Political Economy (2018). Available at: https://ecipe.org/wp-content/uploads/2018/05/DTRI_FINAL.pdf

126. Martina Ferracane et al (2018), Digital Trade Restrictiveness Index, European Centre for Political Economy (2018). Available at: https://ecipe.org/wp-content/uploads/2018/05/DTRI_FINAL.pdf

A woman with long brown hair and black-rimmed glasses is looking down and to the right. The image is partially obscured by a large teal diagonal graphic that covers the bottom-left portion of the frame. The background is a light blue gradient.

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

As an important player spearheading digital transformation in Vietnam, Google has made significant contributions in each of the three pillars for digital transformation in Vietnam outlined in Chapter 2. Through the provision of tools such as Google Cloud and programs such as “Indie Games Accelerator” and “Google for Startups Accelerator: Southeast Asia”, which support the growth of tech-based startups in both traditional and emerging sectors, Google promotes an innovation-oriented environment that enables businesses to scale in a cost-efficient manner. Through digital skills programs like “Accelerate Vietnam Digital 4.0” and “Coding for the Future with Google”, Google is supporting the development of a digitally skilled workforce, particularly for MSMEs that aspire to leverage digital technologies to improve productivity and customer outreach. Google products such as Google Play, as well as programs organized in partnership with the government also help accelerate the internationalization of local businesses.

In addition, Google's applications create numerous benefits for businesses, Internet users and the broader society in Vietnam. Businesses and Internet users in the country are estimated to have derived total annual economic benefits from these products worth VND64.9 trillion (USD2.8 billion) and VND149.5 billion (USD6.4 billion), respectively.¹²⁷ For businesses, such benefits come in the form of increased revenue through increased customer outreach and access to new markets, as well as improved productivity through cost and time savings. It is estimated that over 170,000 jobs are supported in the economy through the use of Google Ads,

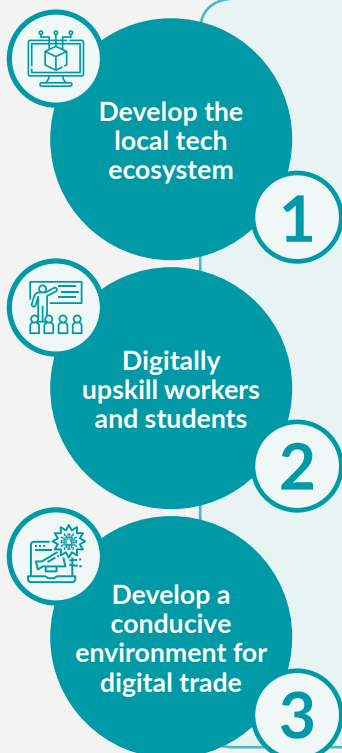
127. The Google products included in the estimation of benefits to businesses are Google Search and Ads, AdSense, YouTube, and Google Play. The Google products included in the estimation of benefits to Internet users are Google Search and Ads, Google Maps, YouTube, Google Drive and Google Play.

“ADVANCING THE PRIZE”

GOOGLE’S CONTRIBUTION TO VIETNAM’S DIGITAL TRANSFORMATION JOURNEY



EXAMPLES OF INITIATIVES BY Google



- Google’s “**INDIE GAMES ACCELERATOR PROGRAM**” supports the growth of Vietnam’s game development industry
- “**ACCELERATE VIETNAM DIGITAL 4.0**” provided digital skills training for more than 500,000 SMEs and students
- “**GROW WITH GOOGLE**” provides digital tools for local businesses to conduct cross-border transactions

GOOGLE ALSO DELIVERS WIDER BENEFITS TO BUSINESSES, INTERNET USERS AND SOCIETY IN VIETNAM

BUSINESSES

Through productivity boosts and customer outreach, Google is estimated to support **VND64.9 trillion (USD2.8 billion)** worth of annual benefits for businesses in Vietnam¹

INTERNET USERS

By helping Internet users save time and generating value through their products, Google is estimated to support **VND149.5 trillion (USD6.4 billion)** worth of annual benefits for Internet users in Vietnam²

SOCIETY

Google.org supported The Asia Foundation with a USD3.3 million grant to launch the “**Go Digital ASEAN**” initiative to provide digital skills training to marginalized communities, including MSMEs, women and underemployed youth

1. Benefits to businesses refer to the estimated economic impact from the following products: Google Search; Google Ads; YouTube; AdSense; AdSense; and Google Play.
 2. Benefits to Internet users refer to the estimated economic impact from the following products: Google Search; Google Maps; YouTube; Google Drive; Docs, Sheets and Photos; and 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.

AdSense and YouTube. These jobs are created through the use of Google products that enable businesses to expand their customer base and increase revenue, thereby leading to increased hiring demand. In addition, the Android operating system supports more than 71,000 jobs in Vietnam's economy. Internet users, on the other hand, experience greater convenience, access to information, and more avenues for new learning and skills development opportunities. Beyond its economic contributions to businesses and individuals, Google delivers benefits to the broader society. By providing a USD3.3-million (VND76.2-trillion) grant to fund digital skills training for marginalized communities and support MSMEs recovery from the COVID-19 pandemic, Google has uplifted the country's overall digital economy.

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

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

To **promote an innovation-oriented environment to develop Vietnam's local technology ecosystem (Pillar 1)**,

Google has done the following:

- **Developing products that support allow local tech enterprises to scale in a cost-efficient manner.** By tapping on the Google Cloud Platform (GCP), local businesses can access a range of IT infrastructure services that enable them to scale their digital services and operations at low cost, as well as tap on specialized technologies such as AI and machine learning. Case Study 6 illustrates an example of how a local e-commerce platform has seamlessly scaled its operations through the use of GCP and coped with high volumes during peak periods.
- **Promoting the growth of Vietnam's local developer ecosystem.** Besides supporting businesses through its cloud infrastructure, Google has built local developer communities to support the sustainable development of

Vietnam's tech ecosystem. Established in seventeen universities in Vietnam, "Developer Student Clubs" (DSC) are university-based community groups which undergraduate and graduate students interested in developer technologies may participate in. With an aim to groom aspiring developers, DSC club activities include peer learning events and platforms where students may showcase their proposed technological solutions to solve local community problems.¹²⁸ Every year, students are invited to join the "DSC Solution Challenge" where they are mentored by "Google Developer Experts" who are experienced technology experts, influencers and thought leaders. There are currently seven Google Developer Experts in Vietnam who are actively contributing to the developer and startup ecosystems. One of the seven Google Developer Experts, Ngoc Ba (Google Developer Expert in Machine Learning), was passionate to impart his skills and educate developers in Vietnam on Machine Learning and open-source technology like TensorFlow and made it available for free in Vietnamese (see Case Study 7).¹²⁹ To support Ngoc in conducting his training, Google provided

128. Google Developers (2020), "Developer Student Clubs". Available at: <https://developers.google.com/community/dsc>

129. Google Developers Experts (2020), "Ngoc Ba". Available at: <https://www.google.com/url?q=https://developers.google.com/community/experts/directory/profile/profile-ngoc-ba&sa=D&ust=1611561081924000&usq=AOvVaw2wlcAYSc7NT6EGODjKX6To>

CASE STUDY 6.

LOCAL E-COMMERCE PLATFORM SCALES OPERATIONS THROUGH GCP TO COPE WITH THE SURGE IN ONLINE ORDERS

Tiki is a local e-commerce platform with more than ten million products in its catalog and has been riding on the growing online shopping demand of digitally savvy Internet users in Vietnam. Its TikiNOW, the company's two-hour delivery service, allows customers to receive products within two hours of placing an order. In the past, the e-commerce platform experienced technical limitations that had affected its customers during peak traffic, such as flash sales. Hence, Tiki tended to overscale to be on the safe side that resulted in a lot of wastage. However, after adopting GCP, the business could scale its infrastructure dynamically based on changes in demand. Trung Truong Minh, Director of Infrastructure at Tiki, said, "There has always been a lot of wastage, but all this goes away with Google Cloud."¹³⁰

After leveraging GCP, Tiki was able to deliver 98 percent of its orders on time despite traffic increasing by ten times.¹³¹ During an online sales campaign, "Singles' Day", Tiki experienced the highest number of orders in a 48-hour time period and GCP enabled its systems to scale up by three times.¹³² Additionally, the processing speed of its backend processes has improved 30 percent after migrating to the cloud.¹³³ By allowing users to deploy machine learning models in Google's data centers, instead of building their own infrastructure, GCP's "Google Compute Engine" has enabled Tiki to streamline its processes from inventory allocation and driver dispatching to delivery trip routing.¹³⁴ GCP has supported many businesses in Vietnam like Tiki in their digital transformation process not only by introducing effective digital tools, but also ensuring ease of adoption. During Tiki's migration to the cloud, its on-premises system comprising 12 Kubernetes clusters, over 200 services, and 30 terabytes of data, was migrated within 24 days, one of the fastest migrations to date in the Asia Pacific.¹³⁵



Photo Source: <https://nextunicom.ventures/aspiring-southeast-asian-unicorns-to-watch-a-feature-on-vietnams-tiki/>

130. Google Cloud (2021), "Tiki: Scaling dynamically with Google Cloud to serve customers on the busiest days". Available at: <https://cloud.google.com/customers/tiki-en>

131. Google Cloud (2021), "Tiki: Scaling dynamically with Google Cloud to serve customers on the busiest days". Available at: <https://cloud.google.com/customers/tiki-en>

132. Google Cloud (2021), "Tiki: Scaling dynamically with Google Cloud to serve customers on the busiest days". Available at: <https://cloud.google.com/customers/tiki-en>

133. Google Cloud (2021), "Tiki: Scaling dynamically with Google Cloud to serve customers on the busiest days". Available at: <https://cloud.google.com/customers/tiki-en>

134. Channel Asia (2020), "Tiki deploys Google Cloud in 24 days as Vietnamese commerce demand spikes".

Available at: <https://www.channelasia.tech/article/680016/tiki-deploys-google-cloud-24-days-vietnamese-commerce-demand-spikes/>

135. Kubernetes is an open-source platform that automates manual processes involved in deploying, managing and scaling containerized applications. Source: Google Cloud (2021), "Tiki: Scaling dynamically with Google Cloud to serve customers on the busiest days".

Available at: <https://cloud.google.com/customers/tiki-en>

CASE STUDY 7.

DSC STUDENTS FROM VIETNAM WINS GLOBAL AWARD FOR THEIR APPLICATION

Shareapy is an application developed by DSC students from the Ho Chi Minh City University of Technology that helps to bring people facing similar problems such as financial distress and mental health disorders together. In addition, it is a one-way interactive community where people can express their emotions and stress either privately or publicly without the fear of shame or discrimination. This application won the DSC Solutions Challenge Global Top-Ten winner award for its creativity and innovative use of technology to solve societal challenges. It is noteworthy that the “DSC Solutions Challenge” received over 400 submissions from 69 countries globally; that students from the Ho Chi Minh City University of Technology won a global award is a testament to the future potential of Vietnam’s IT workforce.

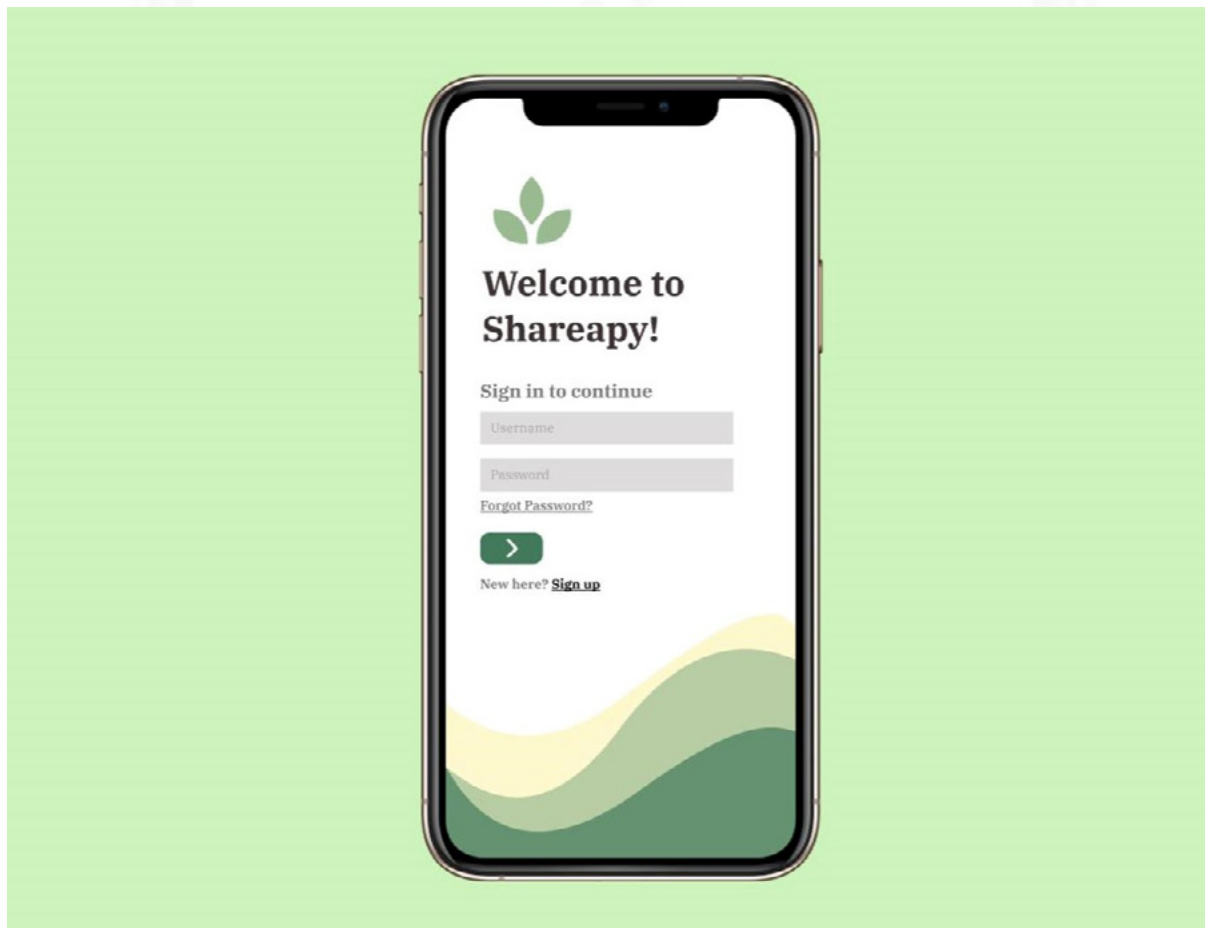


Photo Source: <https://thesmartlocal.com/vietnam/shareapy-app-google-winner/>



education resources, expertise and discount certification vouchers. In 2020, over 30 developers have successfully secured the TensorFlow certification due to his efforts and Google’s support.¹³⁶ Google works closely with “Google Developers Groups” and “Women Techmakers”, a support network for women in technology industry, to educate and train developers on cutting edge technology to advance their skills and deepen their knowledge on the local ecosystem through both physical and online events and programs.

- **Organizing accelerator programs to develop the local gaming industry.** To help independent game developers to achieve their full potential on Google Play, Google implemented the “Indie Games Accelerator” which provides access to capital, community and mentorship.¹³⁷ Game developers selected for the program can receive personalized mentorship from leading game experts and Google, as well as participate in gaming bootcamps. Google has supported ten game studios in Vietnam via the “Indie Games Accelerator” and “Indie Games Accelerator Demo Day”, including Wolffun Game

which owns popular titles like “Tank Raid” and “Heroes’ Strike”. The former, which had five million players worldwide and garnered ten million downloads, bagged the “Google Editors’ Choice” in 2017, while the latter has also been downloaded an estimated 1.7 million.¹³⁸ Case Study 8 describes how Wolffun Game experience in the “Indie Games Accelerator” program eventually brought its games into the international spotlight.

- **Organizing programs to develop innovative solutions for traditional industries.** Besides supporting growth industries such as e-sports, Google has also launched an accelerator program to accelerate the development of tech-based solutions to solve pressing challenges. With a focus on advancing tech-based solutions in traditional sectors such as health and transport services, the “Google for Startups Accelerator: Southeast Asia” program is a three-month online accelerator program that pairs selected startups from Southeast Asia with relevant experts from both Google and the wider industry. In 2020, startups received more than 400 mentoring hours from

136, Medium (2020), “Google developers experts: Transforming global machine learning communities”.

Available at: <https://medium.com/google-developer-experts/google-developers-experts-transforming-global-machine-learning-communities-a2537236cdd4>

137. Google Play (2020), “Indie Games Accelerator”. Available at: <https://events.withgoogle.com/indie-games-accelerator/#content>

138. VNExplorer (2020), “The hunt is still on for Vietnam’s next Flappy Bird”.

Available at: <https://vnexplorer.net/the-hunt-is-still-on-for-vietnams-next-flappy-bird-a2020115477.html>



53 global mentors in areas including technology, product development, business strategy, and leadership management.¹³⁹ From Vietnam, two startups from the healthcare and human resource management industries, Thoucsi.vn and TopCV, were selected for their innovative healthcare and job-seeking solutions. After completing this program, Thoucsi.vn is currently scaling its tech infrastructure on the GCP to expand its outreach to overseas markets.

To **digitally upskill its current workforce and future talent (Pillar 2)**, Google has launched the following efforts in Vietnam:

- **Fostering partnerships with government and education sectors to identify and target digital skill gaps.** In partnership with the Ministry of Industry and Trade (MoIT), Google launched “Accelerate Vietnam Digital 4.0” (also known as “Bộ phận Việt Nam Digital 4.0”) and conducted free digital skills training for more than 500,000 MSMEs, jobseekers, and students.¹⁴⁰ This program included virtual workshops which not only aim

to help entrepreneurs grow their businesses and enhance their management capabilities, but also to create new job opportunities by empowering locals to become digital trainers themselves. A survey found that 97 percent of participants felt more knowledgeable and confident about their digital skills after attending the program. Moreover, 73 percent of SMEs saw an increase in customer engagement after developing their online presence and 45 percent saw an increase in revenue or profit.¹⁴¹

- **Developing digital adoption tools and skills programs for MSMEs during the COVID-19 pandemic.** During the COVID-19 pandemic, Google unveiled several initiatives to support MSMEs with tools and technologies to remain resilient by taking advantage of the downtime to digitally upgrade their products and services. Together with the Vietnam National Administration of Tourism (VNAT) and the Ho Chi Minh City Department of Tourism, Google launched online and offline training courses for SMEs in the travel and tourism industry which have been

139. Google for Startups (2020), “Class of 2020”. Available at: <https://sites.google.com/view/gfs-accelerator-sea/class-of-2020>

140. Local partners include the Vietnam Women’s Union (VWU), Vietnam Chamber of Commerce and Industry branch of Ho Chi Minh City. (VCCI-HCM) and the Vietnam Women Entrepreneurs Council (VWEC). Google Vietnam Digital 4.0 (2020), “Free digital skills training”. Available at: <https://digital40.withgoogle.com/>; and Vietnam Plus (2019), “Google, industry-trade ministry team up to teach digital skills to SMEs”. Available at: <https://en.vietnamplus.vn/google-industrytrade-ministry-team-up-to-teach-digital-skills-to-sme/157935.vnp>

141. Kantar (2020), Google Economic Impact. Available at: https://www.kantar.com.au/Google/Google_Economic_Impact.pdf

CASE STUDY 8.

WOLFFUN GAME LEVELS UP GAME DEVELOPMENT THROUGH GOOGLE'S "INDIE GAMES ACCELERATOR" PROGRAM

Wolffun Game is a Vietnamese game studio founded by Nguyen Dinh Khanh in 2014. Prior to starting this game studio, Khanh did not have any game development experience, and had failed with three startups. Instead of creating games that cater to mass-market hobbyist gamers, Wolffun Game developed real-time multiplayer online battle arena titles on mobile platforms. To improve the quality and appeal of Wolffun's game titles on Google Play Store, Khanh attended the "Indie Games Accelerator" program which supported him in developing skills ranging from product design and game publishing, to working with investors, financial management, leadership and management skills.¹⁴² As a result, the company was able to progress from making only small and simple games such as its casual hybrid pet game like "Tom Cat in Space" to producing online games like "Heroes' Strike" whose quality were on par with international companies and well received by global gamers.¹⁴³ Wolffun Games was eventually recognized by Google as one of the most outstanding game studios from the program.



Photo Source: <https://www.techtimes.vn/6-tua-game-cua-viet-nam-gop-mat-tai-google-indie-games-accelerator/>

142. VTC (2018), "Vietnamese game honored by Google promises to dominate the world mobile game market".

Available at: <https://vtc.vn/game-viet-duoc-google-vinh-danh-hua-hen-khuynh-dao-thi-truong-game-di-dong-the-gioi-ar441228.html>

143. Wolffun Game (2020), "Milestones". Available at: <https://www.wolffungame.com/>

impacted by the pandemic to effectively harness digital platforms.¹⁴⁴ This training is aimed to help Vietnam tourist operators to increase the effectiveness of their online tourism promotion activities and seize market opportunities in the domestic tourism industry. To ease the transition to online retail models, Google launched “Retail University” workshops and webinars to improve digital skills for local retail businesses.¹⁴⁵ Through a series of webinars, Google aims to connect local retail businesses with domestic and international e-commerce solution providers, and teach participants on building an effective e-commerce site to reach online customers. Participants were also introduced to digital tools such as Business Profile, formerly known as Google My Business, and Google Smart Shopping Ads that help drive online traffic to their stores and website, respectively.

- **Developing digital skills education programs and platforms to facilitate e-learning.** These include “Coding for the Future with Google”, which was developed in partnership with the Mekong Community Development Center and Swiss-based Dariu Foundation. During the project’s first installment, nearly 1,300 students and 30 teachers in ten public elementary schools attended more than 10,000 hours of Scratch¹⁴⁶ programming lessons. To date, 387 teachers have been trained to deliver coding lessons and over 300,000 students across a range of education levels – from elementary schools to vocational institutions – have participated in the program’s coding classes in Vietnam.¹⁴⁷ Particularly for students from disadvantaged backgrounds with limited resources, these free coding classes provide an opportunity for them to access technology, and develop their creativity and imagination. One of the students, Tran Hoang Phi Long, who lived

in a remote village was able to learn how to use a computer in school and pick up coding skills despite coming from a low-income household.¹⁴⁸ Similarly, Nguyen Thi My Quyen was living with her mother in a temporary house and the coding classes inspired her to become a computer science teacher, which could help uplift their livelihood.¹⁴⁹ In response to COVID-19 induced school closures, Google’s products and services have enabled remote learning through “Google Workspace for Education” (formerly known as “G Suite for Education”) in Vietnam. The suite of free Google tools and services that are tailored for schools enable educators and students to use productivity tools such as “Google Meet”, a video-conferencing tool to connect students and educators from anywhere, and “Google Classroom”, to join classes and continue their schooling remotely from home.¹⁵⁰

- **Extending digital skilling opportunities to underserved segments of the population.** Google has been expanding its existing digital skilling programs to provide underserved segments of the population with opportunities to participate in the digital economy. also expanded its “Accelerate Vietnam Digital 4.0” initiative to help businesses in suburban, remote areas to access digital knowledge through digital buses. These buses traveled across 59 provinces in Vietnam to provide five days of training in each province. Participants can learn both technical and soft skills from experts working in digital marketing communication and build an online presence on Google platforms.¹⁵¹ Case Study 9 illustrates examples of how businesses in rural Vietnam have expanded rapidly after participating in Google’s digital skilling program which imparted digital marketing skills that attracted customers from around the globe.

144. Ministry of Culture, Sports & Tourism (2020), “Google helps boost digital skills of workers in tourism sector”.

Available at: <https://vietnamtourism.gov.vn/english/index.php/items/15058>

145. Google Ads (2020), “Grow retail with Google”. Available at: https://adsonair.withgoogle.com/events/grow_retail_vn#

146. Scratch is a visual programming language that allows users to create interactive stories, games and animations through arranging blocks of comprehensible codes, and share their creations with an online community.

147. Toi Tre News (2019), “150,000 students to join google backed free programming courses in Vietnam: .

Available at: <https://tuoitrenews.vn/news/education/20191205/150000-students-to-join-googlebacked-free-programming-courses-in-vietnam/52106.html>

148. YouTube (2018), “Tổng kết dự án “Lập trình tương lai cùng Google” - Coding for the future with Google”. Available at: <https://www.youtube.com/watch?v=bU9m0TJWrJI>

149. YouTube (2018), “Tổng kết dự án “Lập trình tương lai cùng Google” - Coding for the future with Google”. Available at: <https://www.youtube.com/watch?v=bU9m0TJWrJI>

150. Google For Education (2020), “G Suite for Education”. Available at: <https://edu.google.com/>

151. Google Vietnam Digital 4.0 (2020), “Digital Buses”. Available at: <https://digital40.withgoogle.com/bus-tour>

CASE STUDY 9.

“ACCELERATE VIETNAM DIGITAL 4.0” PROGRAM: EQUIPPING ENTREPRENEURS IN VIETNAM WITH DIGITAL SKILLS TO GROW THEIR BUSINESS

VU DAI: BRAISED FISH BUSINESS RECEIVES A SALES BOOST AFTER LEVERAGING DIGITAL TOOLS

Toan runs a traditional braised fish business in Vu Dai village and was determined to share this delicacy with all the people of Vietnam. Initially, however, Toan did not know how best to reach out to potential customers. After spending a hefty sum of money advertising through traditional media such as newspapers and flyers, he was discouraged after seeing his flyers being dismissed and thrown away.

When Toan discovered “Google AdWords” after attending the “Accelerate Vietnam Digital 4.0”, he learned about selecting the right keywords to target more relevant customers which drives online traffic to their website. In addition, particularly for budding entrepreneurs like Toan who had little capital to spare, he was able to create effective and compelling banner ads within his budget. Ever since Toan started using “Google AdWords”, the business expanded quickly and hired more employees from the village. He is now able to support employees and their families working as fishermen, woodcutters, and local clay pot artisans.¹⁵²



BUI THI PHUC: PROMOTING HER SPA BUSINESS TO FOREIGN TOURISTS BY MAXIMIZING DIGITAL TOOLS

Inspired by how her grandmother-in-law uses plants and herbs to make natural beauty products, Bui Thi Phuc started Sosono Spa in Hue which prides itself in using natural ingredients. Initially, all her customers were friends, family and neighbors who came to support her new business. To find new clients, Phuc started handing out leaflets and reaching out through social media but to no avail. When she learned about “Accelerate Vietnam Digital 4.0”, she picked up digital tools such as Business Profile. By creating a free Business Profile, domestic and international tourists found Sosono Spa online through Google Search when looking for a good spa house. Additionally, her brand’s reputation was also boosted by online reviews from previous customers who posted on her Business Profile which allowed new customers to find out about the quality of her spa services. After five months, the number of customers at Sosono Spa had more than doubled and 30 percent were foreigners.¹⁵³ With higher revenue, Phuc is planning to expand her business and hire three more staff.

152. Tuấn Hùng Nguyễn Văn (2016), “Google Adwords đã bình chọn món ăn “cá kho làng vũ đại” là đại diện cho món ăn VN”. Available at: <https://www.youtube.com/watch?v=Vy-c22vKzPU>

153. Google Việt Nam (2020), “Bui Thi Phuc, founder of Sosono spa, Hue”. Available at: <https://www.youtube.com/watch?feature=youtu.be&v=NyL1mXnjmY>

- Supporting capacity development for women to participate in the digital economy.** A key program is “Women Will”, which aims to teach female entrepreneurs in Vietnam the relevant digital skills to become stronger business leaders. Aside from digital skills, the program aims to promote gender equality, as well as inspire and connect women through training and events. Over 50,000 women business owners, aspiring entrepreneurs, and employees are expected to participate in the program by 2022. Google’s “Accelerate Digital 4.0” program also places a particular focus on supporting female-owned businesses in Vietnam. About 72 percent of businesswomen who have attended the program saw an increase in their customer engagement online and 43 percent made more money as a result.¹⁵⁴ To provide women in the technology industry a local support network and encourage ground-up initiatives, Google launched the “Women Techmakers” program. Led

by local grassroots leaders, these community-based groups aim to strategically uplift more women in technology across all career levels by equipping them with technical skills through hands-on workshops and in-person training. In Vietnam, there are currently four “Women Techmaker Ambassadors” working towards achieving gender parity in technology.¹⁵⁵

To **promote digital export opportunities (Pillar 3)**, Google is involved in the following:

- Developed platforms that enable local app developers easy access to overseas markets.** Through the Google Play store, mobile game developers can release their applications in multiple countries and reach a global audience of gamers. Case Study 10 illustrates an example of how a game developer in Vietnam, also a graduate of the “Indie Games Accelerator” program, has created



154. Kantar (2020), Google Economic Impact. Available at: https://www.kantar.com.au/Google/Google_Economic_Impact.pdf
 155. Women Techmakers (2020), “Ambassadors”. Available at: <https://www.womentechmakers.com/>

the top piano game in more than 50 countries by tapping on testing and outreach features available in Google Play.

- **Capacity building for local enterprises on the use of digital tools to enter overseas markets.**

In partnership with MoIT and the Vietnam e-Commerce Association (VECOM), Google is helping five select traditional companies in Vietnam to export their products using “Grow with Google” solutions. Through the “Grow with Google” program, local businesses can access free digital training courses and digital tools such as Business Profile and Google Ads to find new export markets. For example, during the COVID-19 pandemic, Google launched an online webinar series “Future-proof Your Cross-border Business” to support business owners looking to sell their

products in international markets by teaching them a range of digital tools such as online payment solutions.¹⁵⁶ A key Google product that supports businesses seeking to expand globally digitally is “Market Finder”. Through “Market Finder”, the free tool helps businesses shortlist promising new target markets, plan operations tailored to the target market, and develop an international marketing strategy.¹⁵⁷ Google’s digital tools such as “Travel Insights with Google” also help augment traditional services in the travel and tourism industry. By providing insights on evolving travel demand, including popular destinations and hotel booking trends, tourism operators are able to leverage real-time data to improve operations and make informed strategic decisions that accelerate the industry’s recovery from the pandemic.



156. Google Ads (2020), “Future-proof Your Cross-border Business”. Available at: https://adsonair.withgoogle.com/events/future_proof_series#

157. Think with Google (2020), “About Market Finder”. Available at: <https://marketfinder.thinkwithgoogle.com/intl/en/article/about-market-finder/>

CASE STUDY 10.

VÕ TUẤN BÌNH BRINGS MUSIC TO 50 COUNTRIES THROUGH MAGIC TILES

Vo Tuan Binh's love for music and technology led him to create music game applications. When Binh was six, he picked up the piano, guitar and Vietnamese bamboo flute and later, graduated with a university degree in technology. After his first music game startup failed, Binh created "Magic Tiles", a game that lets users play with different musical instruments like piano, guitar and drums on their mobile phones. While initial reviews seem promising, the take-up rate has been low and Binh decided to create universal app campaigns on Google Ads to improve their reach. At the same time, he leveraged Firebase technology, Google's mobile platform that helps app developers to quickly develop high-quality apps to enhance the app quality.

One major contributor to the app's eventual success was Google Play.¹⁵⁸ The Vietnamese mobile game developer was first identified by the Google Play team as a high potential indie and invited to the "Indie Games Developer Day" in 2017.¹⁵⁹ Through Google Play's "Early Access Program", Binh was able to provide his open-beta titles for early adopters who were willing to try new games and send actionable, private feedback. These pre-launch tests helped Binh better gauge retention metrics, engagement and gameplay feedback before prioritizing the best title for launch. This has not only increased the appeal of the game and chances of gaining traction among gamers, but also greatly reduced the cost of user acquisition for "Magic Tiles". To Binh's delight, "Magic Tiles" skyrocketed to fame in the US and became one of the top five most popular music games in the foreign market in 2017. After attaining international success, Binh's team doubled to 50 people in the same year and expanded the app's presence regionally with offices in Singapore, Ho Chi Minh City and Hanoi.

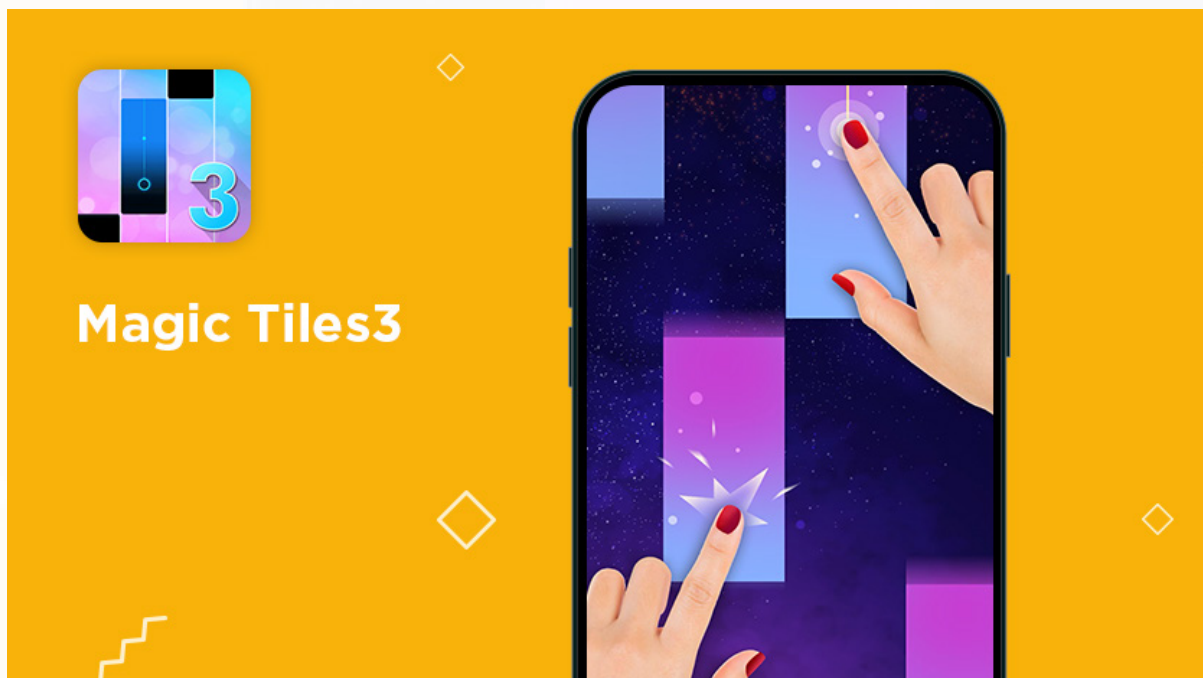


Photo Source: <https://www.mintegral.com/en/case/magic-tiles-3-piano-game/>

158. Tuấn Hùng Nguyễn Văn (2016), "Google Adwords đã bình chọn món ăn "cá kho làng vũ đại" là đại diện cho món ăn VN". Available at: <https://www.youtube.com/watch?v=Vy-c22vKzPU>

159. Google Việt Nam (2020), "Bui Thi Phuc, founder of Sosono spa, Hue". Available at: <https://www.youtube.com/watch?feature=youtu.be&v=NyL1mXnjmY>

GOOGLE’S ECONOMIC IMPACT IN VIETNAM



BENEFITS TO BUSINESSES

Google supports **VND64.9 TRILLION (USD2.8 BILLION)** in annual benefits to businesses in Vietnam¹



Google Search saves the average employee in Vietnam about **138 HOURS PER YEAR** through almost instantaneous access to information



BENEFITS TO INTERNET USERS



Google supports **VND 149.5 TRILLION (USD6.4 BILLION)** in annual benefits to Internet users in Vietnam²



The average **Google Search** user in Vietnam saves **115 HOURS A YEAR** looking for answers, as compared to traditional offline methods



According to AlphaBeta research, **OVER 40%** of **YouTube** users in Vietnam say they use online video services to learn advanced digital skills, such as website development and online marketing

BENEFITS TO SOCIETY



Google.org, Google's philanthropic arm, supports social impact organizations such as The Asia Foundation to launch the **“Go Digital ASEAN”** initiative to help marginalized communities including MSMEs, women and underemployed youth, through digital skills training

1. Benefits to businesses refer to the estimated economic impact from the following products: Google Search; Google Ads; AdSense; YouTube, and Google Play.
 2. Benefits to Internet users refer to the estimated economic impact from the following products: Google Search; Google Maps; YouTube; Google Drive; Docs, Sheets and Photos; and 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, INTERNET USERS AND SOCIETY

Google's applications and services, such as Google Search, Google Ads and Google Play, bring about substantial economic benefits in Vietnam. This study finds that the annual economic value presented by Google's applications and platforms is worth VND64.9 trillion (USD2.8 billion) for businesses, and over VND149.5 trillion (USD6.4 billion) for Internet users.¹⁶⁰ An overview of the assessed economic benefits of Google products to Vietnamese businesses and

Internet users is provided in Exhibit 6. It is important to note that these benefits relate to direct economic benefits received, and do not include the flow-on economic effects generated. In addition, Google brings intangible benefits to the broader society by supporting the country's nonprofit organizations in amplifying their social causes for marginalized communities and promoting the recovery of MSMEs affected by the COVID-19 pandemic.

BENEFITS TO BUSINESSES

Google helps businesses in Vietnam increase revenues

Google applications broaden the reach of businesses in Vietnam to new customers and markets. Online advertising platforms such as **Google Ads** 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 VND61.7 trillion (USD2.65 billion) annually in the form of net returns to businesses in Vietnam from advertising on Google Search results of relevant keywords. Case Study 11 shows examples of how Google Ads have not only enabled local SMEs to acquire new customers domestically, but also expanded their outreach to foreign markets and created export opportunities for traditional businesses.

Beyond search advertising, businesses in Vietnam also benefit from displaying advertisements on Google's network of publisher sites such as websites, blogs,

and forums through AdSense. These net returns are estimated at VND354 billion (USD15.3 million) annually. Meanwhile, by leveraging the various formats of advertisements enabled by **YouTube**, businesses are estimated to receive VND934 billion (USD40.2 million) in net advertising returns annually. In rural Vietnam, it is estimated that 82 percent of users turn to the YouTube mobile app for relaxation, especially for content that is interesting and culturally relevant to them.¹⁶¹ This presents an opportunity for marketers to reach out to Internet users in rural Vietnam.¹⁶²

Google's digital product distribution system, **Google Play**, as well as its operating system, **Android**, have resulted in a variety of benefits to app developers in Vietnam. App developers in Vietnam are estimated to earn an annual income of about VND1.9 trillion (USD81.6 million) from both the domestic and international markets through Google Play.¹⁶³ Further, through the Android operating system, app developers

160. The products included in these estimations include Google Search, Google Ads, AdSense, Google Play, Google Maps, Google Drive, YouTube and Google Docs, Sheets and Photos.

161. Think with Google (2019), "Reaching digital audiences in rural Vietnam".

Available at: <https://www.thinkwithgoogle.com/intl/en-apac/marketing-strategies/data-and-measurement/reaching-digital-audiences-rural-vietnam/>


162. Think with Google (2019), "Reaching digital audiences in rural Vietnam".

Available at: <https://www.thinkwithgoogle.com/intl/en-apac/marketing-strategies/data-and-measurement/reaching-digital-audiences-rural-vietnam/>

163. 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.

EXHIBIT 6:

OVERVIEW OF THE BENEFITS SUPPORTED BY GOOGLE IN VIETNAM

TYPE OF BENEFIT	EASE OF ACCESS TO INFORMATION 	ENTERTAINMENT AND ENRICHMENT 
RELEVANT PRODUCT/S	Google Search	YouTube, Google Play & Android
BENEFITS TO BUSINESSES	<ul style="list-style-type: none"> By allowing for almost instantaneous access to online information, Google Search helps businesses save 138 hours a year per worker in Vietnam 	<ul style="list-style-type: none"> App developers in Vietnam earn about VND1.9 trillion (USD81.6 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 worldwide¹
BENEFITS TO INTERNET USERS	<ul style="list-style-type: none"> By providing almost instantaneous access to information, the average Google Search user in Vietnam saves about 115 hours looking for answers online each year The total annual benefits to Internet users derived from Google Search are estimated at VND30 trillion (USD1.3 billion) 	<ul style="list-style-type: none"> Internet Users can choose from over 3.5 million apps available on the Android ecosystem² By gaining access to a range of digital entertainment options through Google Play and YouTube, the consumer surplus benefits to Internet users in Vietnam are estimated at VND60 trillion (USD2.6 billion) annually

1. 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>



2. 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/>

3. AlphaBeta (2017), The economic impact of geospatial services: How consumers, businesses and society benefit from location-based information. Available at: https://storage.googleapis.com/valueoftheweb/pdfs/GeoSpatial%2520FA_Pages-compressed%2520%25282%2529.pdf

4. Net advertising benefits refer to the additional revenue gained from advertising, less the investment made on the advertising tool.

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

SOURCE: AlphaBeta analysis

<p>INCREASED PRODUCTIVITY AND CONVENIENCE</p> 	<p>ADVERTISING BENEFITS</p> 	<p>TOTAL BENEFITS:</p>
<p>Google Maps, Drive, Photos, Docs & Sheets</p>	<p>YouTube, Google Ads & AdSense</p>	
<ul style="list-style-type: none"> The Business Profile 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 year³ 	<ul style="list-style-type: none"> Google Search and Ads bring about VND61.7 trillion (USD2.7 billion) in net advertising benefits to businesses in Vietnam annually² Advertisers in Vietnam gain VND1.3 trillion (USD55.5 million) in net advertising benefits annually through displaying advertisements on websites and videos using AdSense and YouTube⁴ 	<p>VND64.9 TRILLION (USD2.8 BILLION)</p>
<ul style="list-style-type: none"> The total annual benefits to Internet Users derived from Google Maps, Drive, Photos, Docs, and Sheets that increase productivity and convenience are estimated at VND59 trillion (USD2.5 billion) 	<p>Nil</p>	<p>VND149.5 TRILLION (USD6.4 BILLION)</p>

CASE STUDY 11.

GOOGLE ADS PROVIDE COST-EFFECTIVE METHOD FOR SMES TO IMPROVE THEIR OUTREACH

FLOWER BUSINESS “HOA YEU THUONG” BLOOMS WITH ATTRACTIVE BANNERS ON GOOGLE ADS

Pham Hoan Thai Duong started his florist shop against the backdrop of the Global Financial Crisis in pursuit of his passion for flowers. Recognizing the time-consuming process of having to travel down to the florist and have the flowers wrapped and delivered, Duong built a website as his digital storefront. The virtual flower shop educates customers on the symbolic meaning of each flower type and allows them to select their choice of flowers based on the intended message to the recipient. Without having to visit a physical flower shop, customers can personalize a bouquet of flowers and have them delivered to their friends, families and loved ones within two hours. As the country was still reeling from the 2008 financial crisis, Pham started the business with little capital. He searched the Internet to find out what potential customers were looking for and created banner ads through Google Ads to advertise his business. By displaying pictures that captured the beauty and freshness of the flowers he sold, many customers were attracted to his website, including those who were not intending to buy any flowers initially.

To cater to foreign customers, Hoa Yeu Thuong’s website also had an English version which took his business partners by surprise when their ads showed up on prestigious media sites.¹⁶⁴ The business has since flourished and expanded to provide other types of trending gifts besides flowers such as chocolates. After using Google Ads, the business has delivered over 150,000 flowers in 2019.

ONLINE ADVERTISING DEEMED AS “ONE OF THE MOST EFFECTIVE MARKETING TOOLS” FOR BEANBAG RETAILER

Nguyen Anh Dung started a niche beanbag retail business (“Ghế Lười The Beanbag House”) amid the increasing popularity of apartments. Small apartments demand space-saving interior design solutions such as beanbags that could offer both comfort and versatility by fitting into any space. Initially, Dung was unsure of the best distribution channel as renting showrooms was expensive. Eventually, he decided to create a website (Gheluoi.com) and list his products on nhommua.com, a website offering products at discounted rates, to drive traffic to his website. Dung was overwhelmed when he received over 1,000 orders online overnight.

Foreseeing a future in online marketing, Dung doubled down on his online marketing campaigns and used Google AdWords. At an affordable cost, he could target his ads to a specific group of potential customers based on their interests and search history. Furthermore, his ads would appear as the first recommendation by searching for the company’s name, “ghe luoi”. He remarked, “This is one of the most effective marketing tools I have ever used so far.” Moreover, Dung attributed the online advertising tool as the backbone of his business operation that made him successful.¹⁶⁵

164. Thiên Cà Phê Tiêu Sáo (2014), “Google Vietnam Case Study - Hoa Yeu Thuong”.

Available at: <https://www.youtube.com/watch?v=1Bhzt4hNE-o&feature=youtu.be>

165. Ghế lười Beanbag House (2020), “Gheluoi.com - Hình mẫu thành công của Google”.

Available at: <https://www.youtube.com/watch?v=cmXfVUHzagU&feature=youtu.be>

in Vietnam can readily reach more than one billion users globally.¹⁶⁶ It was additionally found that Android app developers can save up to 25 percent in development time from not having to port their apps across different operating systems.¹⁶⁷

Exhibit 7 summarizes the estimated business benefits in the form of revenue gains experienced by businesses in Vietnam from Google Search and Ads, YouTube, AdSense and Google Play.

By allowing companies to establish a strong online presence through online business listings that show up prominently on the relevant search results of customers in the vicinity, the **Business Profile** feature on Google Maps allows businesses in Vietnam to be discovered by a larger range of customers. Case Study 12 shows how a social enterprise benefitted from acquiring more customers through creating a free Business Profile online and expanded to support more individuals with disabilities as well as their families.

Google's products and services have also proven to become instrumental in helping MSMEs tide over the challenges posed by the COVID-19 pandemic. The crisis has disproportionately affected many MSMEs in Vietnam whose business operations and supply chains have been disrupted, along with the slowdown in industries such as tourism. Having access to digital tools will be vital to help these entrepreneurs stay in business, provide access to wider markets, information and enable the innovation of products and services previously unavailable. Case Study 13 illustrates examples of how local businesses managed to acquire new customers during the COVID-19 pandemic by making use of Business Profile.

GOOGLE HELPS BUSINESSES IN VIETNAM SAVE TIME

Google helps businesses save time by enhancing employees' productivity through improving the speed and ease of access of employees to information and research. In particular, **Google Search** minimizes 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 and time-saving benefits. It is estimated that Google Search helps each worker save about 138 hours per year on average.

GOOGLE SUPPORTS JOBS IN VIETNAM

At a broader level, Google has facilitated job creation in the economy through its products. Through Google Ads, AdSense and YouTube, Google supports the creation of over 170,000 jobs in Vietnam.¹⁶⁸ These jobs are created through the use of Google products that lead to businesses expanding their customer bases and increasing revenue.¹⁶⁹ For instance, businesses that expand their reach to new markets through advertising via Google Ads, AdSense and YouTube would require increased manpower to meet this additional demand.

Through the Android operating system, It was estimated that over 71,000 Vietnamese were employed in jobs that were linked to Android in 2020.¹⁷⁰ This includes more than an estimated 23,000 Vietnamese who are employed directly in Android app development jobs. In addition to this direct employment, Android generates employment through indirect jobs (non-tech-related jobs within the app economy), as well as spillover jobs (jobs created outside of the app industry, such as firms supplying app developers with products and services).

166. 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>

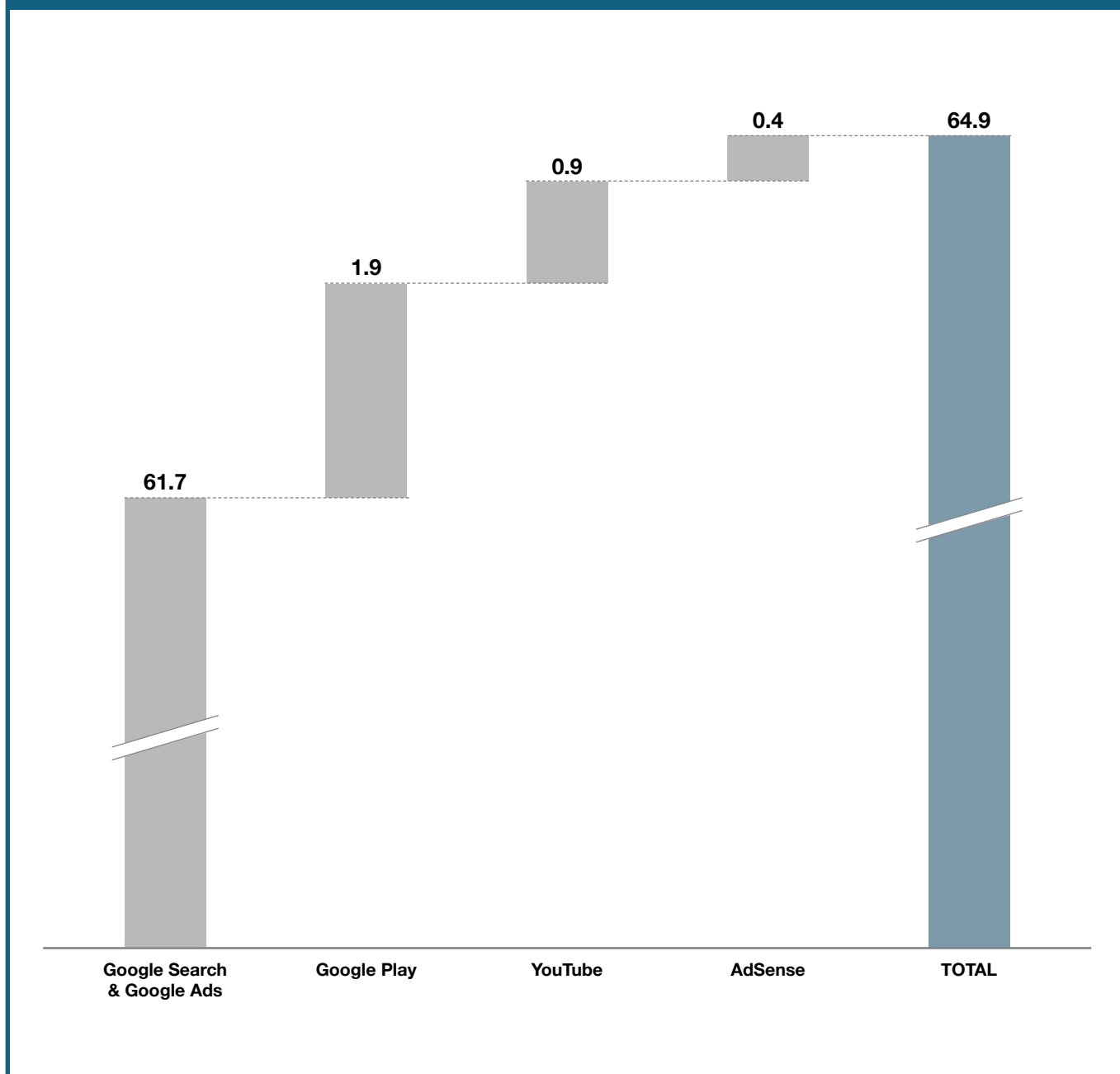
167. AlphaBeta (2018), "AlphaBeta research brief: The estimated economic impact from Android across five Asian markets".

Available at: <https://www.alphabeta.com/wp-content/uploads/2017/08/180820-Android-Economic-Impact.pdf>

168. Refers to jobs supported by Google 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.

169. 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.

170. Based on AlphaBeta estimates. See Appendix B for details on methodology.

EXHIBIT 7:**GOOGLE IS ESTIMATED TO BRING ABOUT VND64.9 TRILLION (USD2.8 BILLION) WORTH OF ANNUAL BENEFITS TO BUSINESSES IN VIETNAM****BREAKDOWN OF GOOGLE’S ESTIMATED ANNUAL BUSINESS BENEFITS IN VIETNAM
VND TRILLION, 2030¹**

1. Figures may not sum due to rounding.

Notes: Figures are estimated based on the latest available annual data as at time of research in 2020.

SOURCE: AlphaBeta analysis

CASE STUDY 12.

REACHING OUT TEAHOUSE: BUSINESS PROFILE HELPS SOCIAL ENTERPRISE GROW BY ATTRACTING MORE CUSTOMERS

After a medical accident left Binh partially paralyzed and wheelchair bound, Binh and his wife, Quyen, founded the social enterprise, “Reaching Out Teahouse”. Understanding the challenges faced by people with disabilities in Hoi An, “Reaching Out Teahouse” was a teahouse that employed people with disabilities and provided them with an avenue of financial independence.

To Quyen and Binh, having more customers means more disadvantaged people would receive support. They listed the teahouse on Business Profile, a free tool that allows businesses to promote their profiles and websites on Google Search and Google Maps. The Business Profile listing attracted more local as well as foreign customers, and as a result, they were able to hire more employees. Today, the social enterprise provides employment for more than 70 people who are now able to support themselves and their families.¹⁷¹



Photo Source: <https://fathomaway.com/reaching-out-teahouse-hoi-an-vietnam/>

171. Google Small Business (2018), “Business Profile Stories: Reaching Out Teahouse”. Available at: <https://www.youtube.com/watch?v=LucbEkXMmcE>

CASE STUDY 13. BUSINESS PROFILE HELPS MSMES SHIFT ONLINE TO WEATHER THE COVID-19 PANDEMIC

FAMILY EMBROIDERY BUSINESS TANMY DESIGN REACHES OUT TO NEW CUSTOMERS WITH BUSINESS PROFILE

The history of Tanmy Design could be traced back to almost half a century ago during the Vietnam war when handkerchiefs were embroidered with love messages by females to their lover or husband. In 1969, Bach Thi Ngai started her embroidery business Tanmy Design which means “new beauty” to tell inspirational stories about the role of Vietnamese women in building the nation. Over the years, the business was passed down to females of every generation and when Nguyen Thuy Linh took over, she was the fourth generation.

When the COVID-19 outbreak occurred, for the first time in 51 years of her family business, Linh had never seen so few customers visiting her store. As

Linh struggled to stay afloat and continue her family legacy, she realized most of her customers found the business online on Google Search. Thus, she decided to switch her publicity strategies by focusing on Business Profile. She updated business information, phone number and business hours on her Business Profile and engaged with local customers online who enquired about her business.

FOOD AND BEVERAGE BUSINESS DALATFOODIE CONNECTS WITH CUSTOMERS ONLINE

Founded in 2015, Do Phan Hoang Suong started DalatFOODIE with the vision of selling affordable organic food to promote nourishment among children. However, when the COVID-19 pandemic hit the country, customers were fearful of contracting the virus in crowded places and hence, the business suffered huge losses in sales. To allay their fears,



Photo Source: <https://vneconomicstimes.com/article/business-spotlight/tanmy-celebrates-50th-anniversary>



Photo Source: <http://intracom.com.vn/tin-tuc/tin-tuc-intracom/startup-dalatfoodie-nhan-von-dau-tu-shark-viet-va-intracom-chinh-thuc-mo-cua-hang-tai-ha-noi.html>

Suong uploaded pictures of how employees kept the store clean and sanitized on her online Business Profile so customers felt safe when visiting the store. Through Business Profile, Suong was better able to engage her customers and fostered a stronger connection with them.

SPECIALTY COFFEE BUSINESS SON PACAMARA OFFERS ONLINE DELIVERY SERVICES

Located near a forest in Dalat, Nguyen Van Son started a coffee farm Son Pacamara to grow Arabica coffee. When international tourism came to a standstill, foreign tourists, who accounted for about 90 percent of his customers, disappeared. As foreign customers could no longer visit the store physically, Son decided to provide delivery and takeaway services so customers could continue enjoying their high-quality coffee within the confines of their homes. At the same time, Son also updated their Business Profile information on Business Profile to inform customers of these new services. This has not only allowed the business to continue engaging their regular customers, but also acquired new customers which gave Son the confidence that their business could continue thriving and weather future crises with the help of Business Profile.



Photo Source: <https://uplandsroast.com/the-uplands-roast-journal/2020/11/18/meet-son-nguyen-van-the-farmer-who-helped-us-find-our-path>

BENEFITS TO INTERNET USERS

The benefits to Internet users supported by Google’s applications come in the form of improved access to information, entertainment and enrichment, as well as increased productivity and convenience in the everyday lives of people living in Vietnam. In Vietnam, the use of Google tools such as Google Search and YouTube to learn digital skills has also been popular.

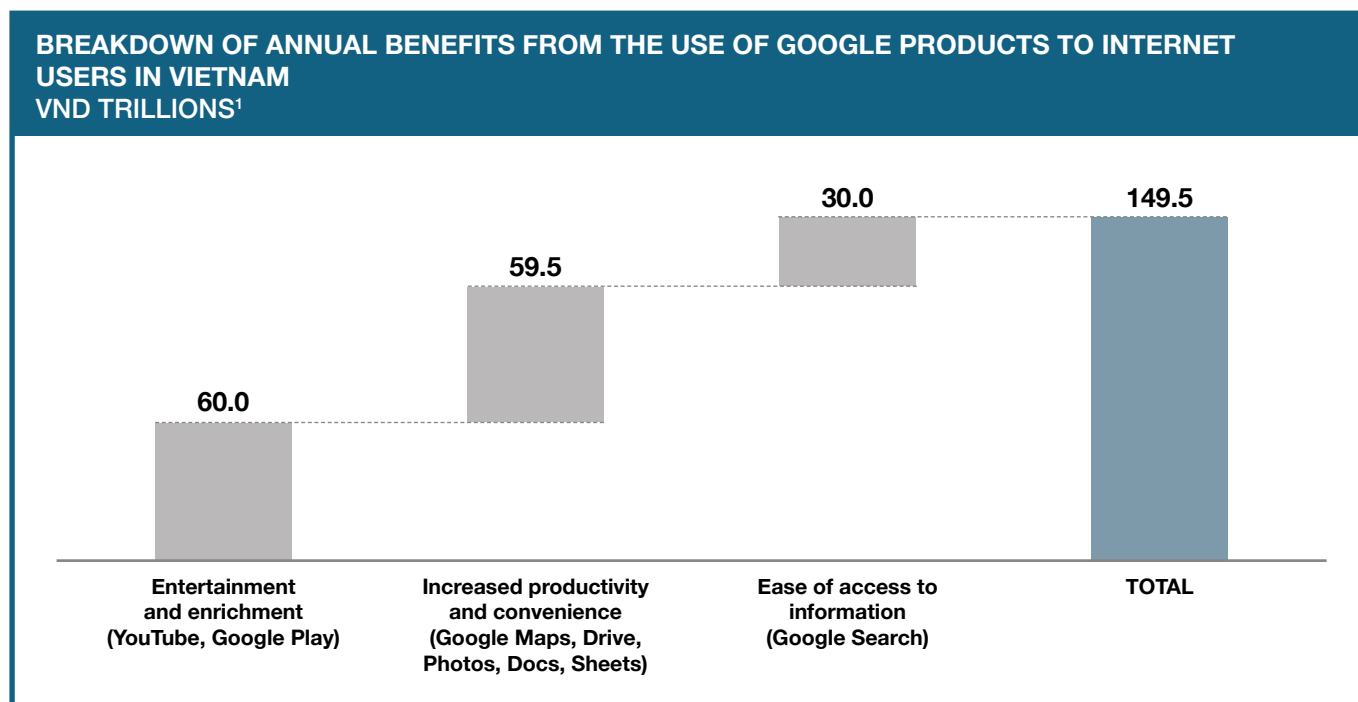
INTERNET USERS IN VIETNAM EXPERIENCE TOTAL ANNUAL BENEFITS WORTH VND149.5 TRILLION (USD6.4 BILLION)

The consumer benefits supported by Google are challenging to measure in monetary terms because individuals typically do not pay for the services, meaning there is no ready price proxy for the value they place on these services. 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 services – also known as consumer surplus. Taken together, the total value placed by Internet users on Google’s services (including Google Search, Google Play, YouTube, Google Maps, Drive, Photos, Docs and Sheets) – which takes into account their perceived functionality and ease of using these products – is estimated at VND149.5 trillion (USD6.4 billion) annually. This value includes three main categories of benefits provided by Google applications: ease of access to information (Google Search), entertainment and enrichment (YouTube and Google Play), and enhanced productivity and convenience (Google Maps, Drive, Photos, Docs and Sheets). Exhibit 8 provides a breakdown of the total consumer surplus by category.

EXHIBIT 8:

GOOGLE IS ESTIMATED TO SUPPORT A TOTAL VND149.5 TRILLION (USD6.4 BILLION) WORTH OF ANNUAL CONSUMER SURPLUS IN VIETNAM



1. Figures may not sum due to rounding.

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

SOURCE: AlphaBeta analysis

GOOGLE HELPS INTERNET USERS IN VIETNAM SAVE TIME AND GAIN ACCESS TO NEW SKILLS

Google provides benefits to Internet users in Vietnam 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 VND30 trillion (USD1.3 billion) (Exhibit 8). 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 Internet users in Vietnam an average of 115 hours per year.

By providing free access to information and learning resources, Google Search also helps Internet users in Vietnam acquire new knowledge and skills. An estimated 41 percent of Google Search users in Vietnam use

it for self-enrichment (e.g., seeking new knowledge, developing new skills).

GOOGLE’S SERVICES IMPROVE PRODUCTIVITY AND CONVENIENCE FOR INTERNET USERS IN VIETNAM

Google Maps brings about productivity in the public transport and driving journeys of Internet users in Vietnam through the service’s wayfinding and navigation feature, which optimizes 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 Internet users in Vietnam. 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 benefits to Internet users derived from productivity-enhancing tools of Google Maps, Drive, Photos, Docs, and Sheets are estimated at VND59.5 trillion (USD2.5 billion).

GOOGLE PROVIDES VARIOUS OPTIONS FOR ENTERTAINMENT AND ENRICHMENT

YouTube has presented substantial benefits to Internet users as a source of free entertainment as well as a channel for Internet users to learn new skills (e.g., online “how-to” videos) or gain new knowledge (e.g., online documentaries). According to AlphaBeta

research, over 40 percent of YouTube users in Vietnam say they use online video services to learn advanced digital skills such as coding, software programming, and mobile application and website development.¹⁷²

Google Play and **Android** have also brought a variety of benefits to Internet users in Vietnam. For example, Android enables Internet users to choose from over 3.5 million apps available on the Android ecosystem.¹⁷³ Meanwhile, **Google Play** is a convenient platform for Internet users to access a range of smartphone applications, as well as digital books, music and films.

Taken together, YouTube and Google Play bring an estimated annual consumer surplus of VND60 trillion (USD2.6 billion) to Internet users in Vietnam.¹⁷⁴

172. Google/AlphaBeta Google Economic Impact Report survey, n = 515. Percent represents use of online video services to learn advanced digital skills amongst Internet users in Vietnam for whom YouTube is their most frequently used online video service.

173. 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/>

174. Google/AlphaBeta Google Economic Impact Report survey, n = 515. The total consumer surplus represents the economic benefits to Internet users in Vietnam from using Google Play. See more details in Appendix B for the methodology.



BENEFITS TO BROADER SOCIETY

Beyond the benefits to businesses and Internet users, Google delivers benefits to the broader society in Vietnam that may not accrue directly to a specific company or person. In economics, these are often termed “spill-over benefits”.

These benefits might not appear in GDP measures today but consist of other objectives that are important to strengthening Vietnam’s economy over time.

These benefits are a result of the use of Google products or direct initiatives and strategic partnerships Google has engaged in Vietnam. Beyond the company’s contributions to each of the three pillars of action needed to

advance digital transformation (as outlined in Chapter 3.1), Google supports marginalized communities through partnerships with local non-profit organizations.

Google.org, Google’s philanthropic arm, has supported The Asia Foundation with a USD3.3-million grant to launch the “Go Digital ASEAN” program. Endorsed by the Association of Southeast Asian Nations’ Coordinating Committee on MSMEs, the “Go Digital ASEAN” program provides digital skills training to marginalized communities in Vietnam. To deliver this program in Vietnam, The Asia Foundation partnered with local organizations such as Vietnet ICT and Tinh

Thuong Microfinance Institution (TYM) to target women, underemployed youths, those with disabilities and MSME business owners who were affected by COVID-19. By tapping on TYM’s existing service delivery network, the program aims to deliver digital literacy training to 65,000 small business owners and underemployed youth in 13 provinces in the northern delta, highland and central parts of Vietnam.¹⁷⁵ The Asia Foundation also partnered with the Vietnam Farmer’s Union (VNFU) to deliver digital skills training to Vietnam’s agriculture community which is facing low productivity.¹⁷⁶ While most farmers already have Internet access at home and some even have their own smart devices, they did not necessarily know how to maximize the full potential of digital tools. Hence, the training programs aim to teach farmers how to find information on the Internet such as treating common ailments afflicting animals, using basic productivity tools, or navigating agricultural apps to compare crop prices without having to travel for miles which boosts their productivity.¹⁷⁷ The program also provides customized training and tools to help beneficiaries in villages and secondary cities succeed in the digital economy while cultivating online safety awareness to ensure a safe and secure digital footprint.¹⁷⁸

“Google for Nonprofits” is another key program that supports nonprofits in finding new donors and volunteers through three different offerings:

“Ad Grants”; “YouTube Nonprofit Program”; and “Google Workspace for Nonprofits”. Through “Ad Grants”, a program that provides in-kind advertising to eligible organizations, nonprofits can raise awareness of their social causes and engage donors who are looking to get involved with the organization. Eligible nonprofits receive in-kind advertising credits of up to USD10,000 monthly to create text-based ads and access tools to build effective campaigns that will display on Google Search when people look for information related to the non profit.¹⁷⁹

With more than two billion people across the globe visiting YouTube monthly, “YouTube Nonprofit Program” enables non-profits to reach a large audience to amplify their cause and fundraise.¹⁸⁰ In addition, “YouTube Creator Academy” offers lessons tailored to nonprofits to support beneficiaries in leveraging storytelling to capture viewers’ attention and activate supporters on YouTube.¹⁸¹ Additionally, Google Workspace does not only benefit for-profit businesses, organizations under “Google for Nonprofits” can also leverage cloud-based productivity tools under “Google Workspace for Nonprofits”. Particularly for nonprofits with cross-border projects, the productivity tools in Google Workspace enable nonprofits to coordinate volunteers and be more efficient in managing their day-to-day operations through real-time collaboration.

175. ASEAN (2020), “Go Digital ASEAN: Digital skills to address the economic impact of COVID-19” Project.

Available at: https://asean.org/storage/2020/06/Factsheet-Go-Digital-ASEAN-as-of-19-June-2020_final.pdf

176. Food and Agriculture Organization of the United Nations (2020), “Viet Nam at a glance”. Available at: <http://www.fao.org/vietnam/fao-in-viet-nam/viet-nam-at-a-glance/en/>

177. Google The Keyword (2017), “Bringing digital skills training to 30,000 farmers in Vietnam”.

Available at: <https://blog.google/around-the-globe/google-asia/bringing-digital-skills-training-30000-farmers-vietnam/>

178. The Asia Foundation (2020), Go Digital ASEAN: Digital skills to unlock new economic opportunities.

Available at: https://asiafoundation.org/wp-content/uploads/2020/04/Go-Digital-ASEAN_2020.pdf

179. Google for Nonprofits Help (2020), “About Google for Nonprofits”. Available at: https://support.google.com/nonprofits/answer/1614581?hl=en&ref_topic=3247288

180. YouTube (2021), “YouTube for Press”. Available at: <https://www.youtube.com/intl/en-GB/about/press/>

181. YouTube Creator Academy (2020), “Activate your nonprofit on YouTube”. Available at: <https://creatoracademy.youtube.com/page/course/nonprofits?hl=en>



APPENDIX: METHODOLOGY

A: SIZING THE ECONOMIC VALUE OF DIGITAL TECHNOLOGIES

This document provides the detailed methodology, assumptions and sources of information used to quantify the potential economic impact of digital technologies for Vietnam 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: ALIGN ON 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 sectors 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.¹⁸² 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, 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 utilized 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.¹⁸³ This

182. 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>

183. 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.

was guided by the individual industry’s relevance for digital technologies (based on past research quantifying the potential industry benefits of these digital technologies in Vietnam).¹⁸⁴

- Prioritizing the sectors based on their importance for GDP, proxied by the sector’s share of national GDP. Each selected sector must represent more than 1.5 percent of the national GDP.

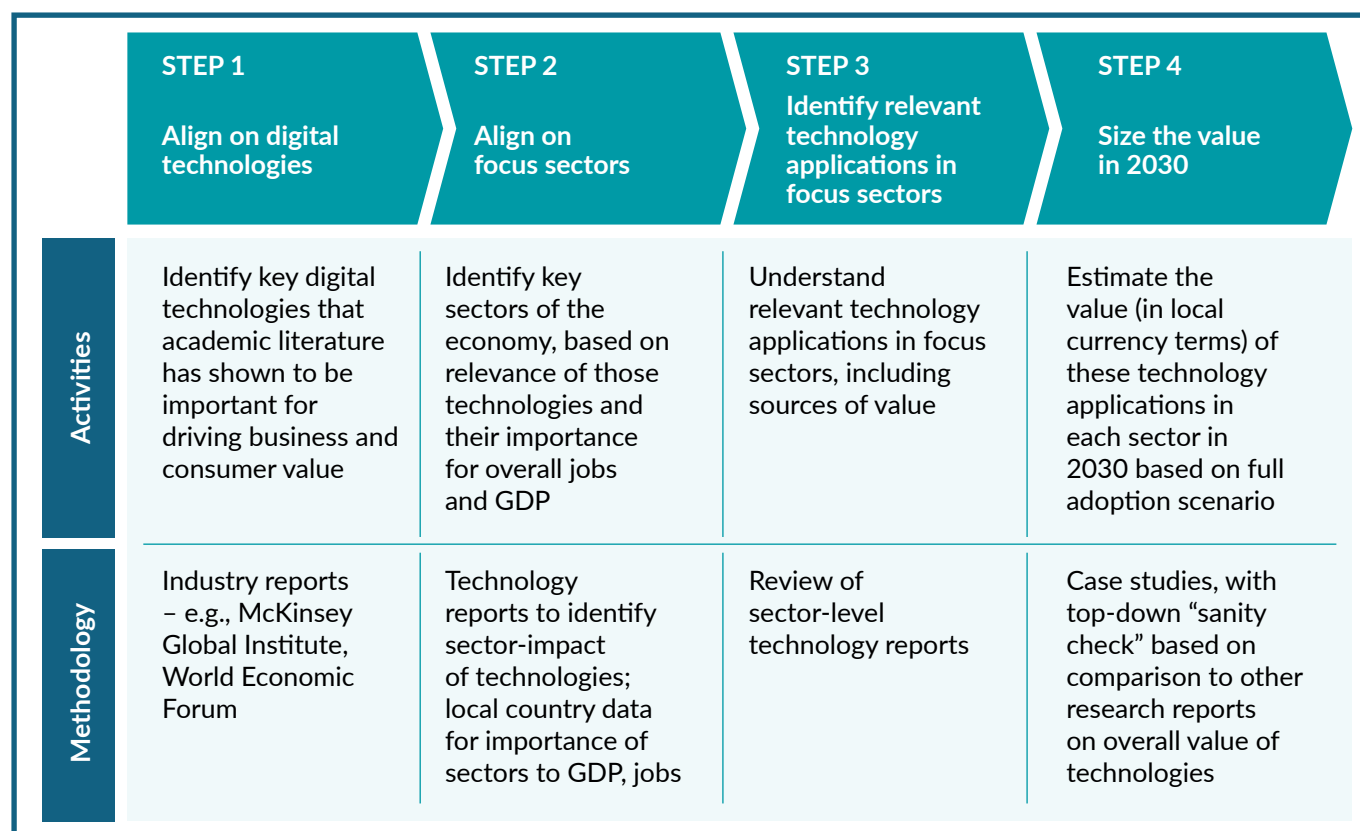
The ICT industry classification was excluded due to its value-added to the economy being almost entirely driven by technology and most of the value from digital technologies in this sector would have been captured in other sectors as an input to production.

Based on these steps, ten sectors were selected.¹⁸⁵ 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; Resources (including mining and oil & gas); 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

**EXHIBIT A1:
A FOUR-STEP METHODOLOGY WAS USED TO UNDERSTAND HOW DIGITAL TECHNOLOGIES COULD TRANSFORM ECONOMIC DEVELOPMENT**



184. 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/MGI%20SE%20Asia_Executive%20summary_November%202014.pdf); and McKinsey Global Institute (2014), *India’s tech 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/mgi%20india%20tech_executive%20summary_december%202014.pdf).

185. In Vietnam, all ten sectors have fulfilled the criterion in Step 2.

literature for each of the eight focus technologies. These technology applications included tangible drivers 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 analyzed 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 analyzed. 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 modeled 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.**

APPENDIX A2: SPECIFIC APPROACHES, ASSUMPTIONS AND SOURCES

Table 1 summarizes 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	<ul style="list-style-type: none"> World Bank GDP statistics International Monetary Fund (IMF) Real GDP growth estimates General Statistics Office of Vietnam
Population	<ul style="list-style-type: none"> United Nations Department of Economic and Social Affairs Population datasets
Labour Force	<ul style="list-style-type: none"> International Labour Organization (ILO) World Bank Labor Force statistics General Statistics Office of Vietnam
Wage	<ul style="list-style-type: none"> General Statistics Office of Vietnam
Exchange rates	<ul style="list-style-type: none"> OFX

AGRICULTURE AND FOOD

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. PRECISION FARMING TECHNOLOGIES		PRODUCTIVITY GAINS/COST SAVINGS
Data-driven optimization 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. Mimosatek (2015) found that its precision management solution increased the farmers' yields by up to 25 percent. 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.	<ul style="list-style-type: none"> World Bank¹⁸⁶ Aspen Network of Development Entrepreneurs (2015)¹⁸⁷
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 ten percent to 15 percent of all food waste throughout the supply chain were recoverable from technology-enabled supply chain management. Country-level estimate was derived based on annual food waste from the supply chain which was assumed to grow at constant rates.	<ul style="list-style-type: none"> McKinsey Global Institute (2014)¹⁸⁸ Food and Land Use Coalition¹⁸⁹
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 ten percent to 15 percent of agricultural GDP. Country-level estimate was derived based on the country's agriculture sector GDP.	<ul style="list-style-type: none"> McKinsey Global Institute (2014)¹⁹⁰
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. Country-level estimate of food contamination losses was derived based on the relative share of global GDP.	<ul style="list-style-type: none"> Fast Company (2017)¹⁹¹ PricewaterhouseCoopers (2015)¹⁹² Food and Agriculture Organization of the United Nations¹⁹³

186. World Bank (2018). Available at: <https://blogs.worldbank.org/opendata/new-country-classifications>

187. Inclusive Business (2017), "Leveraging the Internet of Things: Precision agriculture in Vietnam."

Available at: <https://www.inclusivebusiness.net/ib-voices/leveraging-internet-things-precision-agriculture-vietnam>

188. McKinsey Global Institute (2014), Southeast Asia at the crossroads: Three paths to prosperity.

Available at: <https://www.mckinsey.com/featured-insights/asia-pacific/three-paths-to-sustained-economic-growth-in-southeast-asia>

189. Food and Land Use Coalition (2019), Reducing Food Loss and Waste.

Available at: <https://www.foodandlandusecoalition.org/wp-content/uploads/2019/09/Critical-Transitions-6-Reducing-Food-Loss-and-Waste.pdf>

190. McKinsey Global Institute (2014), "Southeast Asia at the crossroads: Three paths to prosperity".

Available at: <https://www.mckinsey.com/featured-insights/asia-pacific/three-paths-to-sustained-economic-growth-in-southeast-asia>

191. Fast Company (2017), "These high-tech sensors track exactly how fresh our produce is so we stop wasting food".

Available at: <https://www.fastcompany.com/40424163/these-high-tech-sensors-track-exactly-how-fresh-our-produce-is-so-we-stop-wasting-food>

192. PricewaterhouseCoopers (2015), Food fraud vulnerability assessment. Available at: <https://www.pwc.com/sg/en/industries/assets/food-fraud-vulnerability-assessment.pdf>

193. Food and Agriculture Organization of the United Nations (2002), "World agriculture 2030: Main findings".

Available at: <http://www.fao.org/english/newsroom/news/2002/7833-en.html>

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 labor, inventory, and real estate costs	Sized based on productivity gains from delivering goods digitally. McKinsey Global Institute (2013) estimated that productivity gains from selling goods through digital channels ranged from six percent to 15 percent, based on reduced labor requirements, inventory efficiencies and lower real estate costs. Country-level estimate was derived based on domestic e-commerce retail sales and operating costs (assuming constant growth rates).	<ul style="list-style-type: none"> McKinsey Global Institute (2013)¹⁹⁴
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. McKinsey Global Institute (2013) estimated that four 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. Country-level estimate was derived based on domestic retail sales.	<ul style="list-style-type: none"> McKinsey Global Institute (2013)¹⁹⁵
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 ten percent through AI. The Vulcan Post reported that each hotel verification procedure typically took ten 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. Country-level estimate was derived based on hotel revenue.	<ul style="list-style-type: none"> Colliers International (2018)¹⁹⁶ The Vulcan Post (2018)¹⁹⁷ Singapore Tourism Board (2019)¹⁹⁸
4. DATA ANALYTICS ON TRAVEL PATTERNS		INCREASED REVENUES
Use of big data analytics in predicting consumer behavior	Sized based on increased revenues from better targeted promotions to tourists. Boston Consulting Group (2020) estimated that brands experienced a revenue uplift of six to ten percent from integrating proprietary data to create personalized experiences. Country-level estimate was derived based on tourism revenue.	<ul style="list-style-type: none"> Boston Consulting Group (2020)¹⁹⁹

194. 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>

195. 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>

196. Colliers International (2018), "AI and automation to increase hotel revenues by 10%".

Available at: <https://www.hoteliermiddleeast.com/34362-ai-and-automation-to-increase-hotel-revenues-by-10>

197. The Vulcan Post (2018), "No Queues, No Forms: this S'pore Startup Lets You Quickly Check To Hotels With A Selfie".

Available at: <https://vulcanpost.com/704429/griip-digital-hotel-check-in-singapore/>

198. Singapore Tourism Board (2019), "Industry-wide initiatives to transform hotels for sustainable growth".

Available at: <https://www.stb.gov.sg/content/stb/en/media-centre/media-releases/industry-wide-initiatives-to-transform-hotels-for-sustainable-growth.html>

199. Boston Consulting Group (2020), "Bionic Revenue Management in Travel and Tourism".

Available at: <https://www.bcg.com/publications/2020/bionic-revenue-management-travel-tourism>

CONSUMER, RETAIL AND HOSPITALITY (CONT'D)

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
5. ONLINE F&B DELIVERY CHANNELS		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. Country-level estimate was derived based on domestic hospitality revenue.	<ul style="list-style-type: none"> The Straits Times (2017)²⁰⁰

EDUCATION AND TRAINING

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. E-CAREER CENTERS AND DIGITAL JOBS PLATFORMS		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 labor market characteristics, education and income levels and demographic trends. Country-level estimate was derived based on national employment rate, labor force and GDP per capita.	<ul style="list-style-type: none"> McKinsey Global Institute (2015)²⁰¹
2. PERSONALIZED LEARNING		GDP INCREMENTS
Use of digital technologies to provide personalized and remote learning opportunities for students	Sized based on increase in GDP from higher employment rate. McKinsey Global Institute (2018) estimated that personalized learning would increase 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 World Bank's definition. Country-level estimate was derived based on national employment rate, labor force and GDP per capita.	<ul style="list-style-type: none"> McKinsey Global Institute (2018)²⁰² World Bank²⁰³
3. ONLINE RETRAINING PROGRAMS		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 programs would increase employment rate by 0.1 percent in "high income" countries, and 0.3 percent in "middle-income" countries. Country-level estimate was derived based on national employment rate, labor force and GDP per capita.	<ul style="list-style-type: none"> McKinsey Global Institute (2018)²⁰⁴ World Bank²⁰⁵

200. The Straits Times (2017), "Delivery sales drive up eateries' revenues". Available at: <https://www.straitstimes.com/business/delivery-sales-drive-up-eateries-revenues>

201. McKinsey Global Institute (2015), A labour 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>

202. 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-liveable-future>

203. World Bank (2018). Available at: <https://blogs.worldbank.org/opendata/new-country-classifications>

204. 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-liveable-future>

205. World Bank (2018). Available at: <https://blogs.worldbank.org/opendata/new-country-classifications>

FINANCIAL SERVICES

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. BIG DATA ANALYTICS		INCREASED REVENUES
Increased lending to 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. Country-level estimate was derived based on annual total lending to SMEs.	<ul style="list-style-type: none"> McKinsey Global Institute (2014)²⁰⁶
2. 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. 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 World Bank's definition.	<ul style="list-style-type: none"> World Bank Global Findex Database²⁰⁷ McKinsey Global Institute (2014)²⁰⁸
3. 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 digitization 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 (2017) estimated that the potential savings from retail banking operational costs and risk costs ranged from 20 percent to 30 percent and ten percent to 30 percent, respectively. Country-level cost savings was derived based on domestic banking sector operating costs.	<ul style="list-style-type: none"> McKinsey Global Institute (2017)²⁰⁹
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. KPMG (2013) indicated that compliance expenditure contributed to ten percent of banks' operating costs on average. Country-level estimate of efficiency savings was derived based on domestic banking sector costs.	<ul style="list-style-type: none"> Juniper Research (2017)²¹⁰ KPMG (2013)²¹¹

206. McKinsey Global Institute (2014), *China's digital transformation: The Internet's impact on productivity and growth*.

Available at: <https://www.mckinsey.com/industries/high-tech/our-insights/chinas-digital-transformation>

207. World Bank Global Findex Database. Available at: <https://globalfindex.worldbank.org/>

208. McKinsey Global Institute (2014), *India's technology opportunity: Transforming work, empowering people*.

Available at: <https://www.mckinsey.com/industries/high-tech/our-insights/indias-tech-opportunity-transforming-work-empowering-people>

209. McKinsey Global Institute (2017), *Digital Australia: Seizing opportunities from the fourth industrial revolution*.

Available at: <https://www.mckinsey.com/featured-insights/asia-pacific/digital-australia-seizing-opportunity-from-the-fourth-industrial-revolution>

210. Juniper Research (2017), *How Reg Tech can save banks billions*.

Available at: <https://www.juniperresearch.com/document-library/white-papers/how-regtech-can-save-banks-billions>

211. KPMG (2013), *The cost of compliance*. Available at: <https://home.kpmg.com/content/dam/kpmg/pdf/2014/07/Cost-of-Compliance.pdf>

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. Brookings (2010) reported that government agencies experienced between 25 percent to 50 percent cost savings after moving to the cloud. Country-level estimate was derived based on government ICT expenditure and hardware costs.	<ul style="list-style-type: none"> • Brookings (2010)²¹²
2. GOVERNMENT 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. McKinsey Global Institute (2011) estimated that between 15 percent to 20 percent of operating expenditure was eliminated in Europe after moving to e-services. The study also reported that the addressable base for such a reduction was about 20 percent to 25 percent of government expenditure. Country-level estimate was derived based on government operating expenditure.	<ul style="list-style-type: none"> • McKinsey Global Institute (2011)²¹³
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 labor costs, reduced lead-time and a more streamlined process. Country-level estimate was derived based on public procurement volumes.	<ul style="list-style-type: none"> • Public Procurement Service²¹⁴
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. Country-level estimate was derived based on public procurement volumes.	<ul style="list-style-type: none"> • Bill & Melinda Gates Foundation and AlphaBeta (2018)²¹⁵

212. Brookings (2010), "Saving Money Through Cloud Computing". Available at: <https://www.brookings.edu/research/saving-money-through-cloud-computing/>

213. McKinsey Global Institute (2011), Big data: The next frontier for innovation, competition, and productivity.

Available at: <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/big-data-the-next-frontier-for-innovation>

214. Public Procurement Service (2012), e-Procurement Experience in Korea: Implementation and Impact.

Available at: <https://www.europarl.europa.eu/document/activities/cont/201207/20120710ATT48620/20120710ATT48620EN.pdf>

215. Bill & Melinda Gates Foundation and AlphaBeta (2018), Digital Innovation in Public Financial Management (PFM): Opportunities and implications for low-income countries.

Available at: <https://www.alphabeta.com/wp-content/uploads/2018/07/pfm-technology-paper-long-version.pdf>

GOVERNMENT (CONT'D)

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
5. DIGITIZATION 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 digitalizing government payments. Country-level estimate was derived based on the country's GDP.	<ul style="list-style-type: none"> International Monetary Fund (2017)²¹⁶
6. 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 five to ten percent of government transfer payments globally are improper payments that could be addressed by adopting data analytics. Country-level estimate was derived based on the country's GDP.	<ul style="list-style-type: none"> McKinsey & Company (2017)²¹⁷

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 ten percent to 20 percent savings for the healthcare system. 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.	<ul style="list-style-type: none"> McKinsey Global Institute (2013)²¹⁸ World Bank²¹⁹
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. Country-level estimate was derived based on relative national healthcare expenditure.	<ul style="list-style-type: none"> Goldman Sachs (2015)²²⁰

216. International Monetary Fund eLibrary (2017), Chapter 13: The Value of Digitalizing Government Payments in Developing Economics.

Available at: <https://www.elibrary.imf.org/downloadpdf/books/071/24304-9781484315224-en/24304-9781484315224-en-book.xml>

217. McKinsey & Company (2017), Government productivity: Unlocking the \$3.5 trillion opportunity.

Available at: <https://www.mckinsey.com/~/media/McKinsey/Industries/Public%20and%20Social%20Sector/Our%20Insights/The%20Opportunity%20in%20government%20productivity/Government-Productivity-Unlocking-the-3-5-Trillion-Opportunity-Full-report.pdf?shouldIndex=false>

218. 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>

219. World Bank statistics on current health expenditure. Available at: <https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS>

220. Goldman Sachs (2015), The digital revolution comes to US healthcare. Available at: https://www.wur.nl/upload_mm/0/f/3/8fe8684c-2a84-4965-9dce-50584aae48c/Internet%20of%20Things%205%20-%20Digital%20Revolution%20Comes%20to%20US%20Healthcare.pdf

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. Country-level estimate was derived based on national population sizes and GDP per capita.	<ul style="list-style-type: none"> • McKinsey Global Institute (2018)²²¹ • UN Population Division (2018)²²² • World Bank²²³
4. DETECTION OF COUNTERFEIT DRUGS		COST SAVINGS
Use of IoT and advanced analytics to detect counterfeit drugs	Sized based on cost savings from reduced counterfeit drugs in the country due to higher detection rates. EU IPO (2016) estimated that the annual cost of counterfeit 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. Country-level estimate on the national cost of counterfeit drugs was derived based on the country’s relative healthcare expenditure.	<ul style="list-style-type: none"> • EU Intellectual Property Office (2016)²²⁴ • McKinsey Global Institute (2013)²²⁵
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 one 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 World Bank’s definition. 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.	<ul style="list-style-type: none"> • McKinsey Global Institute (2018)²²⁶ • UN Population Division (2018)²²⁷ • World Bank²²⁸

221. 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-liveable-future>222. UN Population Division (2018). Available at: <https://esa.un.org/unpd/wpp/DataQuery/>223. World Bank (2018). Available at: <https://blogs.worldbank.org/opendata/new-country-classifications>224. EU Intellectual Property Office (2016), *The economic cost of IPR infringement in the pharmaceutical industry*.Available at: <https://euipo.europa.eu/ohimportal/en/web/observatory/ipr-infringement-pharmaceutical-sector>225. 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>226. 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-liveable-future>227. UN Population Division (2018). Available at: <https://esa.un.org/unpd/wpp/DataQuery/>228. World Bank (2018). Available at: <https://blogs.worldbank.org/opendata/new-country-classifications>

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 EHR was estimated based on India's share of the global healthcare expenditure. Country-level estimate was derived based on its relative national healthcare expenditure according to World Bank data and the global EHR market growth rates.	<ul style="list-style-type: none"> McKinsey Global Institute (2014)²²⁹ World Bank²³⁰ Transparency Market Research²³¹

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. Smart Energy Consumer Collaborative (2018) estimated five to ten percent energy could be saved from using smart grids. 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.	<ul style="list-style-type: none"> Smart Energy Consumer Collaborative²³² World Bank²³³ Business and Sustainable Development Commission (2017)²³⁴
2. 5D BIM AND PROJECT MANAGEMENT TECHNOLOGIES		COST SAVINGS
Use of integrated modeling 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. Country-level estimate was derived based on domestic construction sector costs.	<ul style="list-style-type: none"> McKinsey Global Institute (2013)²³⁵ Global Infrastructure Outlook²³⁶

229. 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/mgi%20india%20tech_executive%20summary_december%202014.pdf

230. World Bank statistics on current health expenditure. Available at: <https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS>

231. Transparency Market Research (2018), "Electronic Health Records Market". Available at: <https://www.transparencymarketresearch.com/electronic-health-records-market.html>

232. Smart Energy Consumer Collaborative. Available at: <http://www.whatissmartgrid.org/faqs/what-are-the-benefits-of-the-smart-grid>

233. World Bank statistics on electric power consumption. Available at: <https://data.worldbank.org/indicator/EG.USE.FLFC.KH.PC>

234. Business and Sustainable Development Commission (2017), *Valuing the SDG prize: Unlocking business opportunities to accelerate sustainable and inclusive growth*.

Available at: <http://businesscommission.org/our-work/valuing-the-sdg-prize-unlocking-business-opportunities-to-accelerate-sustainable-and-inclusive-growth>

235. McKinsey Global Institute (2013), *Infrastructure productivity: How to save \$1 trillion a year*.

Available at: <https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/infrastructure-productivity>

236. Global Infrastructure Outlook on forecasting infrastructure investment needs and gaps. Available at: <https://outlook.gihub.org/>

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 for 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/m ³ . Country-level estimate was derived based on the country’s average commuting time, population, GDP per capita and domestic water consumption.	<ul style="list-style-type: none"> • McKinsey Global Institute (2018)²³⁷ • World Bank²³⁸ • UNESCO-IHE (2011)²³⁹ • Business and Sustainable Development Commission (2017)²⁴⁰
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. 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/m ³ 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 two-degree pathway).	<ul style="list-style-type: none"> • McKinsey Global Institute (2018)²⁴¹ • IPCC²⁴² • World Bank²⁴³ • Business and Sustainable Development Commission (2017)²⁴⁴

237. 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-liveable-future>

238. World Bank (2018). Available at: <https://blogs.worldbank.org/opendata/new-country-classifications>

239. UNESCO-IHE (2011), *National Water Footprint Accounts*. Available at: <https://waterfootprint.org/media/downloads/Report50-NationalWaterFootprints-Vol1.pdf>

240. Business and Sustainable Development Commission (2017), *Valuing the SDG prize: Unlocking business opportunities to accelerate sustainable and inclusive growth*.

241. 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-liveable-future>

242. IPCC estimates on global greenhouse gas emissions. Available at: <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

243. World Bank (2018). Available at: <https://blogs.worldbank.org/opendata/new-country-classifications>

244. 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. 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 three percent increase in profit margin from big data analytics in manufacturing. Country-level estimate was derived based on domestic manufacturing sector GDP.	<ul style="list-style-type: none"> McKinsey Global Institute (2011)²⁴⁵
2. 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 customization. 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. Country-level estimate was derived based on the domestic manufacturing sector GDP as a share of the global figure.	<ul style="list-style-type: none"> McKinsey & Company (2017)²⁴⁶
3. 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 five percent savings in distribution and supply chain operating costs could amount to two percent to six percent of manufacturing sales. Country-level estimate was derived based on domestic manufacturing sector operating costs.	<ul style="list-style-type: none"> McKinsey Global Institute (2011)²⁴⁷
4. 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. World Economic Forum and AT Kearney (2017) estimated automation and robotics could improve production by 20 percent. Country-level estimate was derived based on domestic manufacturing sales.	<ul style="list-style-type: none"> World Economic Forum and AT Kearney (2017)²⁴⁸

245. 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>

246. 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>

247. 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>

248. World Economic Forum and AT Kearney (2017), *Technology and innovation for the future of production: Accelerating value creation*.

Available at: http://www3.weforum.org/docs/WEF_White_Paper_Technology_innovation_Future_of_Production_2017.pdf

RESOURCES

DESCRIPTION	SIZING ASSUMPTIONS	SOURCE
1. SMART EXPLORATION AND AUTOMATION IN MINING OPERATIONS		PRODUCTIVITY GAINS/COST SAVINGS
Use of big data to analyze geoscience and drilling data to locate probable deposits proactively and efficiently, and automate extraction and transport	Sized based on the potential global economic value of such technologies in mining. McKinsey & Company (2015) estimated big data to generate USD250 billion in economic value, based on an 80 percent adoption rate scenario. Country-level estimate was derived based on the country's relative share of global mining sector GDP, proxied by the country's share of global mineral rents.	<ul style="list-style-type: none"> McKinsey & Company (2015)²⁴⁹
2. PREDICTIVE SAFETY TECHNOLOGIES		PRODUCTIVITY GAINS/COST SAVINGS
Technologies that improve productivity and safety such as wearables with in-built sensors that monitor fatigue, location, atmosphere and vitals, and augmented reality interfaces that improve human-machine interaction	Sized based on the potential global economic value of such technologies in mining. McKinsey & Company (2015) estimated the economic value to be USD15 billion, based on a 100 percent adoption rate scenario. Country-level estimate was derived based on the country's relative share of global mining sector GDP, proxied by the country's share of global mineral rents.	<ul style="list-style-type: none"> McKinsey & Company (2015)²⁵⁰
3. PREDICTIVE MAINTENANCE TECHNOLOGIES		PRODUCTIVITY GAINS/COST SAVINGS
Use of remote operations centers and data-collecting sensors on mining equipment to improve failure anticipation, reduce unscheduled breakdowns and increase equipment life	Sized based on the potential global economic value of such technologies in mining. McKinsey & Company (2015) estimated the economic value to be USD105 billion, based on a 100 percent adoption rate scenario. Country-level estimate was derived based on the relative share of global mining sector GDP, proxied by the country's share of global mineral rents.	<ul style="list-style-type: none"> McKinsey & Company (2015)²⁵¹

249. McKinsey & Company (2015), *How digital innovation can improve mining productivity*.

Available at: <https://www.mckinsey.com/industries/metals-and-mining/our-insights/how-digital-innovation-can-improve-mining-productivity>

250. McKinsey & Company (2015), *How digital innovation can improve mining productivity*.

Available at: <https://www.mckinsey.com/industries/metals-and-mining/our-insights/how-digital-innovation-can-improve-mining-productivity>

251. McKinsey & Company (2015), *How digital innovation can improve mining productivity*.

Available at: <https://www.mckinsey.com/industries/metals-and-mining/our-insights/how-digital-innovation-can-improve-mining-productivity>

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. Country-level estimate was derived based on the average commuting time, population and GDP per capita.	<ul style="list-style-type: none"> McKinsey Global Institute (2018)²⁵² World Bank²⁵³
2. 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. Country-level estimate was derived based on logistics sector costs (based on indicated percentages of the country’s GDP).	<ul style="list-style-type: none"> Accenture and SIPG (2016)²⁵⁴ Council of Supply Chain Management Professionals (2013)²⁵⁵ World Bank (2016)²⁵⁶
3. 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. Country-level estimate was derived based on the number of cars, projected number of autonomous vehicles, annual fuel requirement, and cost of fuel.	<ul style="list-style-type: none"> McKinsey Global Institute (2013)²⁵⁷
4. 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 five percent. These benefits include reduced logistics costs, improved network design and management. Country-level estimate was derived based on the size of the land, sea and air transport sector.	<ul style="list-style-type: none"> AlphaBeta (2017)²⁵⁸

252. 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-liveable-future>

253. World Bank (2018). Available at: <https://blogs.worldbank.org/opendata/new-country-classifications>

254. 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

255. Council of Supply Chain Management Professionals (2013), *State of logistics report*.

Available at: <http://www.scdigest.com/assets/newsviews/13-06-20-2.php?cid=7168&ctype=content>

256. World Bank (2016), *Logistics performance index: Ranking by countries*. Available at: <https://lpi.worldbank.org/international/global>

257. 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>

258. 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

APPENDIX A3: ECONOMIC IMPACT OF COVID-19 RELEVANT TECHNOLOGY APPLICATIONS

To estimate the economic value of technology applications that could help businesses and organizations manage the economic impact of COVID-19, all the technology applications were assessed for their relevance to COVID-19 and the value from those relevant to COVID-19 was estimated.

Of the 43 technology applications, 23 were assessed to have the potential to manage the economic impacts of the pandemic through three channels. (see Exhibit 5 for more details)
These three channels are:

- **Customer interactions:** Facilitating customer interactions, transactions and marketing through digital platforms
- **Business operations:** Enabling the continuity of business operations amid remote working arrangements
- **Supply chain:** Reducing logistical bottlenecks amidst global and regional supply chain disruptions induced by the pandemic

Exhibit A2 shows the full list of these 23 COVID-19 relevant technology applications, grouped by their respective sectors and the specific channel through which they deliver COVID-19 relevant impact.



EXHIBIT A2:**OF THE 43 TECHNOLOGY APPLICATIONS SIZED, 23 HAVE THE POTENTIAL TO ALLOW BUSINESSES TO THRIVE DESPITE THE COVID-19 PANDEMIC THROUGH 3 CHANNELS**

CHANNEL	SECTOR	COVID-19 RELEVANT TECHNOLOGY APPLICATION/S
Customer interactions: Facilitating customer interactions, transactions and marketing through digital platforms	Consumer, retail and hospitality	1. Digital retail sales and marketing channels 2. Online F&B delivery channels
	Education and training	3. E-career centers and digital jobs platforms 4. Online retraining programs
	Financial services	5. Digital banking services
	Government	6. Digitization of government payments
	Health	7. Telehealth applications
Business operations: Enabling the continuity of business operations amid remote working arrangements	Agriculture and food	8. Precision farming technologies
	Consumer, retail and hospitality	9. IoT-enabled inventory management 10. Automation and AI customer service in hotels
	Government	11. Government e-services 12. E-procurement
	Health	13. Smart medical devices and wearables 14. Remote patient monitoring
	Infrastructure	15. Smart grids 16. 5D BIM and project management technologies 17. Predictive maintenance technologies
	Manufacturing	18. Big data analytics 19. Robotics and automation
	Resources	20. Smart exploration and automation in mining operations
Supply chain: Reducing logistical bottlenecks amidst global and regional supply chain disruptions induced by the pandemic	Agriculture & food	21. IoT-enabled supply chain management (food)
	Manufacturing	22. IoT-enabled supply chain management (manufacturing)
	Transport services	23. Smart ports

SOURCE: AlphaBeta analysis

B: SIZING GOOGLE'S ECONOMIC IMPACT IN VIETNAM

To estimate the **benefits to businesses**, the economic value generated by businesses that use Google's applications and services 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's applications and services included in this analysis of business benefits include Google Search, Google Ads, AdSense, YouTube and Google Play.

Estimating the **benefits to Internet users** supported by Google is a challenging task. This is because individuals typically do not have to pay for the Google's applications and services that they use. There are several established methodologies for estimating the benefits of free services, including consumer surplus based on the

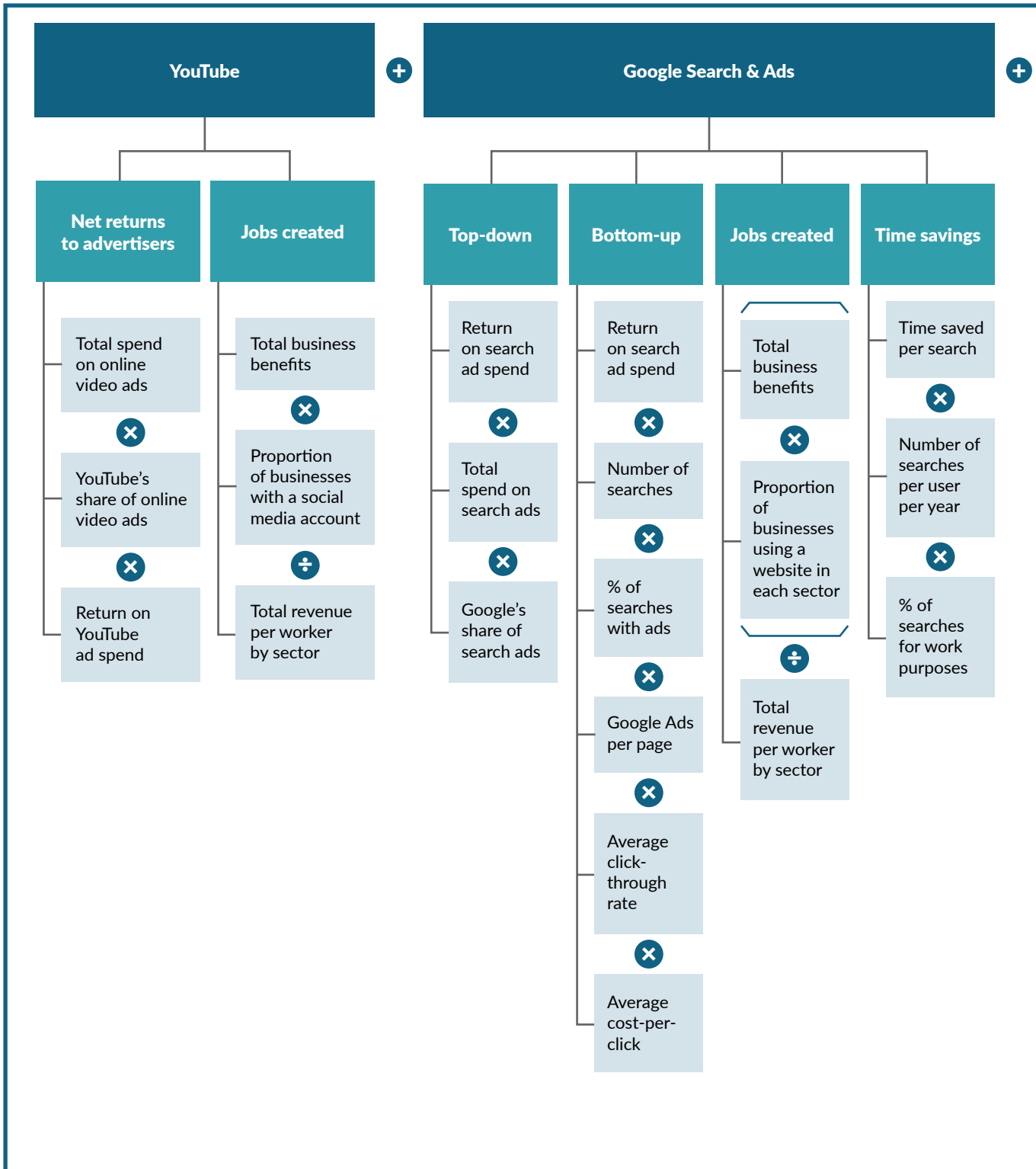
consumer's willingness to pay (how much an individual value a Google's application or service). Primary data used in the analysis was collected from a consumer survey of 515 Internet users in Vietnam. This sample size is statistically significant based on the country's online population, at a 95 percent 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 the country's Internet population based on demographic variables including age, income level, and the geographical location of respondents. The Google's applications and services included in this analysis of consumer benefits include Google Search, Google Maps, Google Play, YouTube, Google Drive, Photos, Docs, and Sheets.

BENEFITS TO BUSINESSES

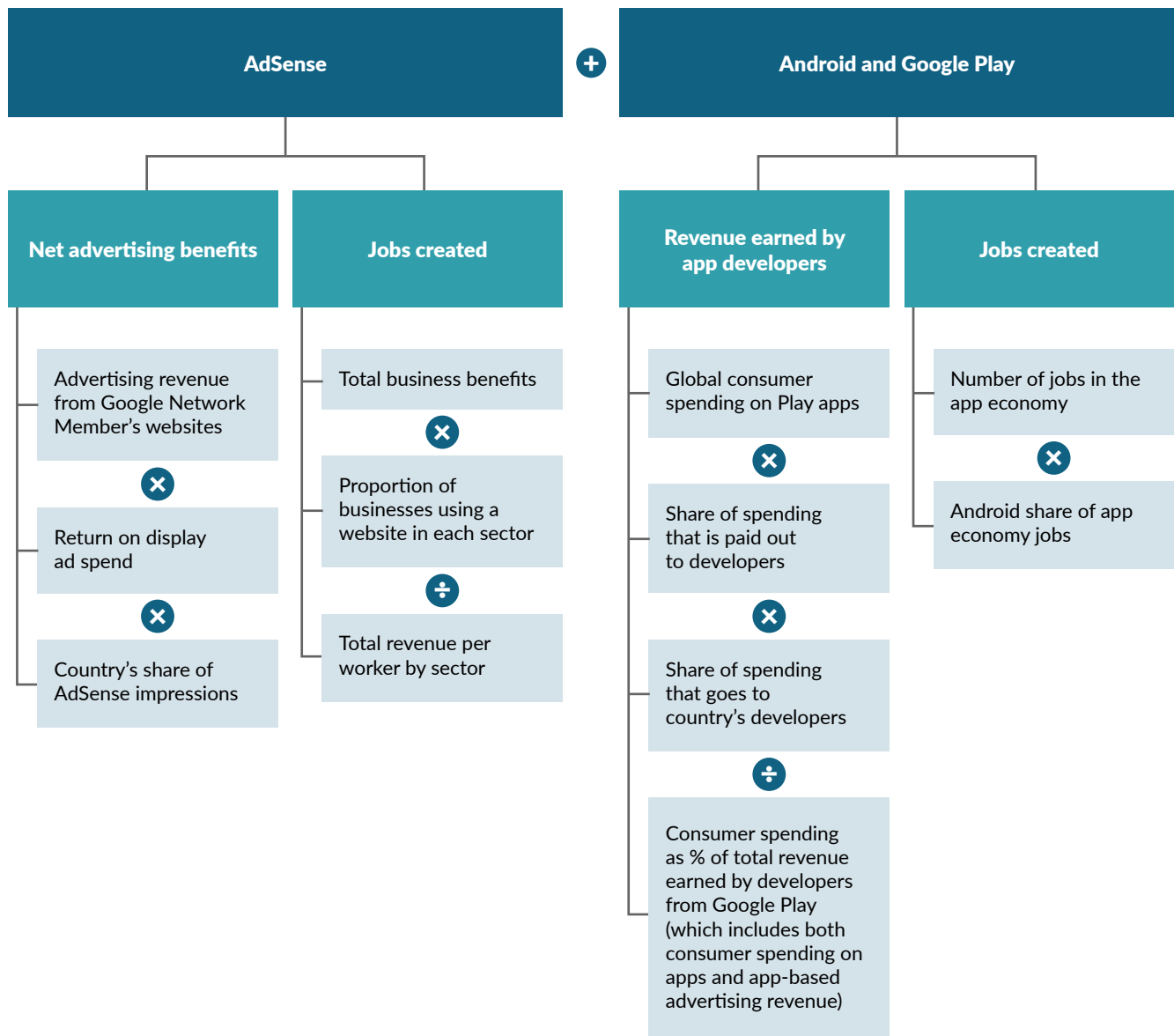


The business benefits supported by Google include the gross revenue, income or savings generated by businesses using Google products. These benefits do not include the flow-on economic effects generated, such as further purchases from their suppliers or the economic activity generated by the employees 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 Vietnam economy beyond what would be the case if Google did not exist but other companies like it did. Exhibit B1 summarizes the methodology used for sizing the business benefits of Google's products.

EXHIBIT B1: METHODOLOGY FOR SIZING BENEFITS TO BUSINESSES 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 South Korea and New Zealand 2021 reports.
SOURCE: AlphaBeta analysis



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 page views in the country, the proportion of these pages that display advertisements, the number of advertisements on each page, the average click-through rate (CTR), and the average cost-per-click (CPC).

To estimate the income generated by businesses paying for online advertising through Google a return on investment (ROI) ratio range of 3.4 to eight was applied, and both estimates were reported.²⁵⁹ 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 eight 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.²⁶⁰ 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.²⁶¹ In addition, we applied an ROI ratio that advertisers earn using display advertising, derived from academic literature.

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

GOOGLE PLAY

We estimated the revenue earned by the country's app developers from consumer spending on Google Play based on global consumer spending on Google Play, the share of the spending that is paid out to app developers, and the share of the spending that goes to the country's app developers. The revenue from consumer spending earned by the country's app developers 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 4 shows the inputs and sources used for estimating the business benefits of Google Play.

259. ROI reflects the net advertising benefits that businesses receive from online advertising (i.e. total revenue minus online advertising cost).

260. This refers to the increase in revenues and sales that can be directly attributed to advertising minus the related advertising expenditure.

261. 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.

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	<ul style="list-style-type: none"> Statista (2020)²⁶²
	Google Search's traffic share	<ul style="list-style-type: none"> StatCounter (2020)²⁶³
Bottom-up approach	Google Search traffic data	<ul style="list-style-type: none"> AlphaBeta Consumer Survey (2020)
	% pages that display advertisements	<ul style="list-style-type: none"> Varian (2009)²⁶⁴, Jansen & Spink (2009)²⁶⁵ Deloitte (2015)²⁶⁶
	Advertisements per page on average	<ul style="list-style-type: none"> Varian (2009)²⁶⁷, Jansen & Spink (2009)²⁶⁸ Deloitte (2015)²⁶⁹
	CTR for Search (Estimate)	<ul style="list-style-type: none"> Word Stream (2019)²⁷⁰ BannerTag (2019)²⁷¹
	Average CPC for Search (Estimate)	<ul style="list-style-type: none"> Word Stream (2018)²⁷² Adstage (2019)²⁷³
Both Methods	ROI ratio Lower and Upper Bound	<ul style="list-style-type: none"> Varian (2009)²⁷⁴, Jansen & Spink (2009)²⁷⁵ Deloitte (2015)²⁷⁶

262. Statista (2020), "Search advertising – Vietnam". Available at: <https://www.statista.com/outlook/219/127/search-advertising/vietnam>

263. StatCounter (2020), "Search engine market share Vietnam". Available at: <https://gs.statcounter.com/search-engine-market-share/all/viet-nam/#yearly-2019-2019-bar>

264. Varian, H. R. (2009), "Online Ad Auctions". *The American Economic Review*, Vol. 99, No. 2, pp. 430-434.

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265. 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.

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267. Varian, H. R. (2009), "Online Ad Auctions". *The American Economic Review*, Vol. 99, No. 2, pp. 430-434.

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268. 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.

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Available at: <https://www.wordstream.com/blog/ws/2010/04/26/good-click-through-rate>

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272. 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>

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Available at: <https://cdn2.hubspot.net/hubfs/4350015/Benchmark%20Report/Q3%202019%20Paid%20Media%20Benchmark%20Report.pdf>

274. Varian, H. R. (2009), "Online Ad Auctions". *The American Economic Review*, Vol. 99, No. 2, pp. 430-434.

Available at: <https://www.aeaweb.org/articles?id=10.1257/aer.99.2.430>

275. 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.

Available at: <https://pennstate.pure.elsevier.com/en/publications/investigating-customer-click-through-behaviour-with-integrated-sp>

276. Deloitte (2015), Google's Economic Impact United Kingdom. Available at: <https://drive.google.com/file/d/0B9xmiQ1MUCjpNXBJZExHY1NqQIU/view>

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	<ul style="list-style-type: none"> Alphabet (2019)²⁷⁷
	ROI ratio	<ul style="list-style-type: none"> Gupta et al. (2015)²⁷⁸
	Country share of global impressions on AdSense	<ul style="list-style-type: none"> DoubleClick (2012)²⁷⁹ Internet World Stats (2019)²⁸⁰ We Are Social & Hootsuite (2020)²⁸¹

TABLE 4: INPUTS AND SOURCES FOR CALCULATING BUSINESS BENEFITS OF GOOGLE PLAY

METRIC	SOURCE
Global consumer spending on Google Play	<ul style="list-style-type: none"> Sensor Tower (2020)²⁸²
Share of the spending that is paid out to app developers	<ul style="list-style-type: none"> Google (2020)²⁸³
Share of the spending that goes to the country's app developers	<ul style="list-style-type: none"> Caribou Digital (2016)²⁸⁴
Consumer spending as % of total revenue earned by developers from Google Play (which includes both consumer spending on apps and app-based advertising revenue)	<ul style="list-style-type: none"> Appota/ AdSota (2017)²⁸⁵

277. Alphabet (2019). Form 10-K for fiscal year ended December 31, 2019 - Submission to US SEC.

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278. Gupta, S., Pauwels, K., & Kireyev, P. (2015). Do display ads influence search? Attribution and dynamics in online advertising. *International Journal of Research in Marketing*.

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GOOGLE SEARCH FOR EMPLOYEES

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.

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

JOB IMPACT FROM GOOGLE ADS, ADSENSE AND YOUTUBE

We estimated the number of jobs that are supported by Google's business benefits (i.e., increased revenue through Google Ads, AdSense and YouTube) based on the breakdown of business benefits by sector and the revenue per worker in each sector. The breakdown of business benefits by sector was calculated based on the average of the following two metrics: 1) share of businesses using websites (to proxy for the use of Google Ads as well as AdSense) or the share of businesses with a social media account (to proxy for the use of YouTube) by sector; and 2) revenues of businesses in each sector. This average share is then divided by the respective revenue per worker figures

for each sector to obtain the number of jobs created. The share of businesses using websites and the share of businesses with a social media account were proxied with website usage and social media adoption among businesses in the Philippines, which has a similar economic development level as Vietnam.

EMPLOYMENT IMPACT FROM ANDROID ECOSYSTEM

Our estimate of employment supported by Android is based on the methodology developed by Mandel (2017).²⁸⁶ Their approach employs data on job postings from indeed.com to size employment in the app economy (see reference for details). The methodology distinguishes between direct, indirect and spillover jobs within the app economy, each accounting for one-third of total jobs in the app economy.

- **Direct jobs:** These are "tech-related" jobs dedicated to building and maintaining apps, (e.g. app developers)
- **Indirect jobs:** These are "non-tech-related" jobs such as HR, marketing, and sales within app companies
- **Spillover jobs:** These are jobs created outside of the app industry due to spillover effects such as app companies' suppliers

The number of jobs in Vietnam's app economy is estimated based on the country's app intensity multiplied by the total number of employed workers in the country. Table 8 shows the inputs and sources used for estimating the number of jobs created through the Android ecosystem.

286. Mandel (2017), *US App Economy*. Available at: https://www.progressivepolicy.org/wp-content/uploads/2017/05/PP1_USAppEconomy.pdf



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

METRIC	SOURCE
Time saved per search	<ul style="list-style-type: none"> • Varian (2014)²⁸⁷ • Chen et al. (2014)²⁸⁸
Average daily searches per worker	<ul style="list-style-type: none"> • AlphaBeta Consumer Survey (2020)
% of searches for work purposes	<ul style="list-style-type: none"> • AlphaBeta Consumer Survey (2020)

TABLE 6: INPUTS AND SOURCES FOR CALCULATING BUSINESS BENEFITS OF YOUTUBE

METRIC	SOURCE
Total video advertising spend in country	<ul style="list-style-type: none"> • Statista (2019)²⁸⁹
YouTube’s market share	<ul style="list-style-type: none"> • AlphaBeta Consumer Survey (2020)
YouTube ROI ratio	<ul style="list-style-type: none"> • Business Insider (2014)²⁹⁰

287. 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>

288. 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. Available at: <http://download.springer.com/static/pdf/906/art%253A10.1007%252Fs10683-013-9381-9.pdf?originUrl=http%3A%2F%2Flink.springer.com%2Farticle%2F10.1007%2Fs10683-013-9381-9&token2=exp=1458798858~acl=%2Fstatic%2Fpdf%2F906%2Fart%25253A10.1007%25252Fs10683-013-9381-9.pdf>

289. Statista (2020), “Video advertising – Vietnam”. Available at: <https://www.statista.com/outlook/218/127/video-advertising/vietnam>

290. Business Insider Singapore (2016), “Google attacks TV”.

Available at: <http://www.businessinsider.sg/youtube-ads-have-better-roi-than-tv-according-to-google-2016-4/?r=US&IR=T#ml.3ZFqo0vlab2xq2.97>



TABLE 7: INPUTS AND SOURCES FOR CALCULATING JOB IMPACT

APPROACH	METRIC	SOURCE
Revenue per worker by sector	Number of employees in Vietnam by sector	<ul style="list-style-type: none"> General Statistics Office of Vietnam (2019)²⁹¹
	Total revenue by sector	<ul style="list-style-type: none"> General Statistics Office of Vietnam (2019)²⁹²
Breakdown of business benefits for Google Search and Ads, AdSense as well as YouTube	Businesses using a website from each sector as % of total	<ul style="list-style-type: none"> Philippine Statistics Authority (2017)²⁹³
	Businesses with a social media account as % of total	

TABLE 8: INPUTS AND SOURCES FOR CALCULATING ANDROID'S IMPACT ON EMPLOYMENT

ESTIMATION	METRIC	SOURCE
App employment supported by Android	Number of jobs in the app economy	<ul style="list-style-type: none"> AlphaBeta (2017)²⁹⁴ General Statistics Office of Vietnam (2019)²⁹⁵
	Ratio of direct to indirect and spillover jobs	<ul style="list-style-type: none"> Mandel (2017)²⁹⁶
	Android share of app economy jobs	<ul style="list-style-type: none"> Mandel (2017)²⁹⁷

291. General Statistics Office of Vietnam (2019), Statistical Yearbook of Viet Nam.

Available at: <https://www.gso.gov.vn/wp-content/uploads/2020/09/Nien-giam-thong-ke-day-du-2019.pdf>

292. General Statistics Office of Vietnam (2019), Statistical Yearbook of Viet Nam.

Available at: <https://www.gso.gov.vn/wp-content/uploads/2020/09/Nien-giam-thong-ke-day-du-2019.pdf>

293. Philippine Statistics Authority (2017), 2017 Survey on Information and Communication Technology.

Available at: https://psa.gov.ph/sites/default/files/2017%20SICT%20Publication_signed.pdf

294. AlphaBeta (2017), Digital Nation: Policy Levers for Investment and Growth. Available at: https://alphabeta.com/wp-content/uploads/2017/05/DigiNations_FA.pdf

295. General Statistics Office of Vietnam (2019), Statistical Yearbook of Viet Nam.

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296. Mandel (2017), US App Economy. Available at: http://www.progressivepolicy.org/wp-content/uploads/2017/05/PPI_USAppEconomy.pdf

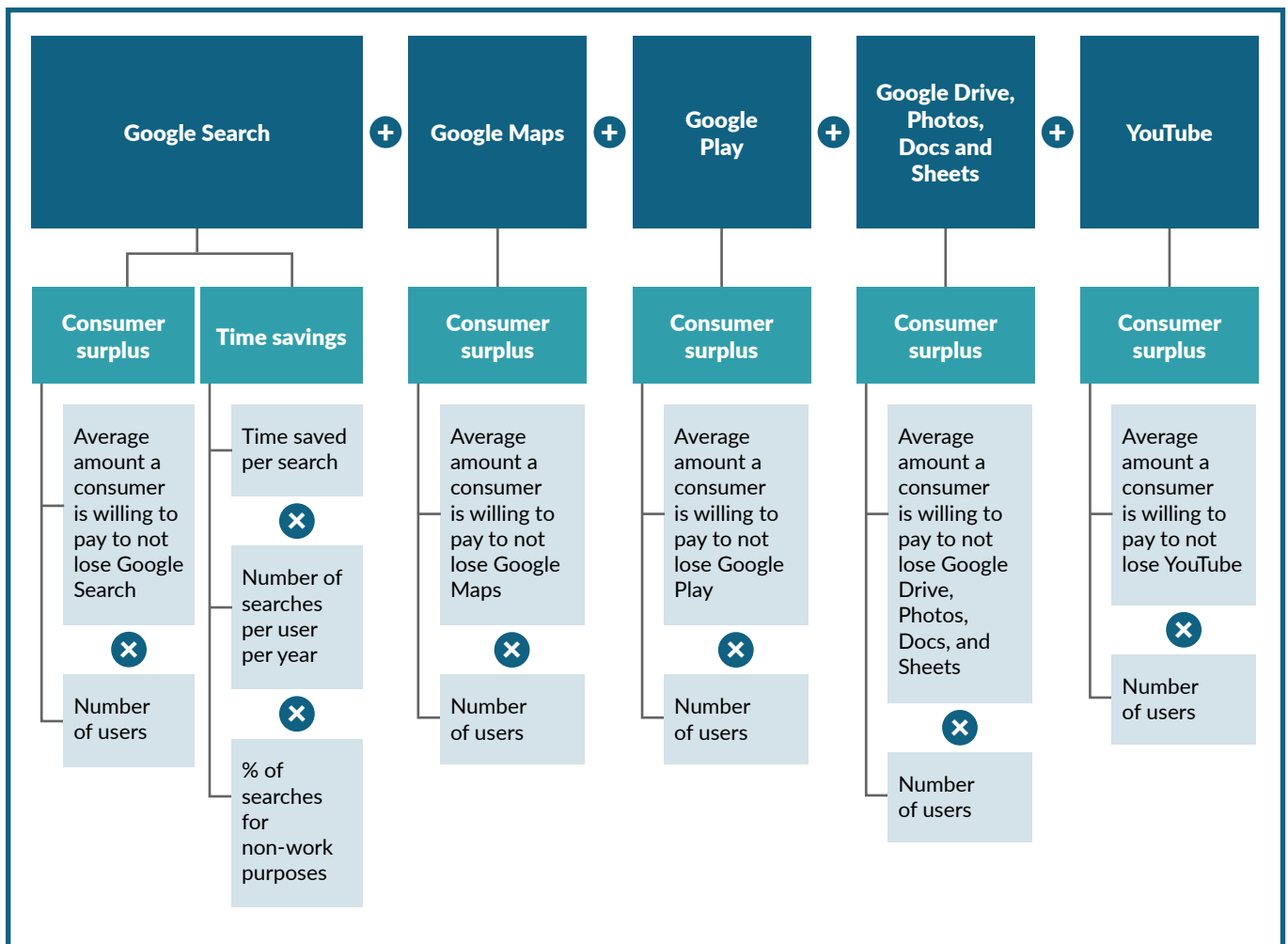
297. Mandel (2018), The App Economy in Vietnam, 2017. Available at: http://www.progressivepolicy.org/wp-content/uploads/2018/01/PPI_VietnamAppEconomy_2018.pdf

BENEFITS TO INTERNET USERS

The benefits to Internet users 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 services – also known as consumer surplus. We also calculated the time savings accrued to Internet users from their use of Google Search (which increases the efficiency of information gathering). Exhibit B2 summarizes the methodology used for sizing consumer surplus and time savings of relevant products.

EXHIBIT B2: METHODOLOGY FOR SIZING BENEFITS TO INTERNET USERS 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 Internet users 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.²⁹⁸ This study found that a search that takes 21 minutes in the library takes seven 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 9 shows the inputs and sources used for calculating the benefits of Google Search to Internet users.

GOOGLE MAPS

We sized the benefits of Google Maps to Internet users using willingness to pay, where Internet users were asked to value their favorite online maps service. We also estimated the time saved by using Maps for personal trips.

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 10 shows the inputs and sources used

for calculating the benefits of Google Maps to Internet users.

GOOGLE PLAY

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

Table 11 shows the inputs and sources used for calculating the benefits of Google Play to Internet users.

GOOGLE DRIVE, PHOTOS, DOCS, AND SHEETS

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

Table 12 shows the inputs and sources used for calculating the benefits of Google Drive, Photos, Docs, and Sheets to Internet users.

YOUTUBE

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

The share of YouTube users in the country who have made use of YouTube to learn advanced digital skills (e.g., coding and software programming, use of specialized statistical software, online marketing, website development, smartphone application development) was also estimated using the consumer survey.

Table 13 shows the inputs and sources used for calculating the benefits of YouTube to Internet users.

298. 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. Available at: <http://download.springer.com/static/pdf/906/art%253A10.1007%252Fs10683-013-9381-9.pdf?originUrl=http%3A%2F%2Flink.springer.com%2Farticle%2F10.1007%2Fs10683-013-9381-9&token2=exp=1458798858~acl=%2Fstatic%2Fpdf%2F906%2Fart%25253A10.1007%25252Fs10683-013-938>

TABLE 9: INPUTS AND SOURCES FOR CALCULATING BENEFITS OF GOOGLE SEARCH TO INTERNET USERS

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that Internet users value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• We Are Social & Hootsuite (2020) ²⁹⁹
	Google Search users as % of OP	• AlphaBeta Consumer Survey (2020)
Time saved per user	Time saved per search	• Varian (Presentation 2014) ³⁰⁰ • Chen et al. (2014) ³⁰¹
	Average daily searches per user	• AlphaBeta Consumer Survey (2020)
	% of searches for non-work purposes	• AlphaBeta Consumer Survey (2020)
No of Google Search users who have made use of Google Search to learn basic / advanced digital skills	% of Google Search users in country who made use of Google Search to learn basic / advanced digital skills	• AlphaBeta Consumer Survey (2020)
	Online population (OP)	• We Are Social & Hootsuite (2020) ³⁰²
	Google Search users as % of OP	• AlphaBeta Consumer Survey (2020)

TABLE 10: INPUTS AND SOURCES FOR CALCULATING BENEFITS OF GOOGLE MAPS TO INTERNET USERS

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that Internet users value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• We Are Social & Hootsuite (2020) ³⁰³
	Google Map users as % of OP	• AlphaBeta Consumer Survey (2020)

299. We Are Social & Hootsuite (2020), *Digital in Vietnam*. Available at: <https://datareportal.com/digital-in-vietnam>

300. 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>301. 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. Available at: <https://link.springer.com/article/10.1007/s10683-013-9381-9>302. We Are Social & Hootsuite (2020), *Digital in Vietnam*. Available at: <https://datareportal.com/digital-in-vietnam>303. We Are Social & Hootsuite (2020), *Digital in Vietnam*. Available at: <https://datareportal.com/digital-in-vietnam>

TABLE 11: INPUTS AND SOURCES FOR CALCULATING BENEFITS OF GOOGLE PLAY TO INTERNET USERS

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that Internet users value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• We Are Social & Hootsuite (2020) ³⁰⁴
	Google Play users as % of OP	• AlphaBeta Consumer Survey (2020)

TABLE 12: INPUTS AND SOURCES FOR CALCULATING BENEFITS OF GOOGLE DRIVE, PHOTOS, DOCS, AND SHEETS TO INTERNET USERS

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that Internet users value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• We Are Social & Hootsuite (2020) ³⁰⁵
	Users of Google Drive, Photos, Docs, and Sheets as % of OP	• AlphaBeta Consumer Survey (2020)

TABLE 13: INPUTS AND SOURCES FOR CALCULATING BENEFITS OF YOUTUBE TO INTERNET USERS

ESTIMATION	METRIC	SOURCE
Consumer surplus	Amount that Internet users value product per year (WTP)	• AlphaBeta Consumer Survey (2020)
	Online Population (OP)	• Internet World Stats (2019) ³⁰⁶
	YouTube users as % of OP	• AlphaBeta Consumer Survey (2020)

304. We Are Social & Hootsuite (2020), Digital in Vietnam. Available at: <https://datareportal.com/digital-in-vietnam>

305. We Are Social & Hootsuite (2020), Digital in Vietnam. Available at: <https://datareportal.com/digital-in-vietnam>

306. Internet World Stats (2019). Available at: <https://www.internetworldstats.com/stats6.htm>



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The amounts in this report are estimated in both Vietnamese dong (VND) and US dollars (USD). The conversion is based on the average exchange rate in 2020, sourced from the IMF Country Database, which was 1 USD = 23,243.6 VND.



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AlphaBeta is a strategy and economic advisory business serving clients across Asia and globally. We work with the public sector, corporations, NGOs, not-for-profits and investors to identify opportunities and develop strategies to grow, improve service delivery, support economic prosperity and generate tangible impact.

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