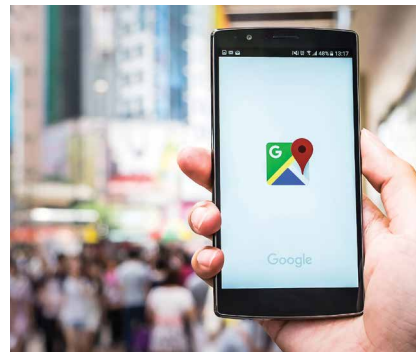
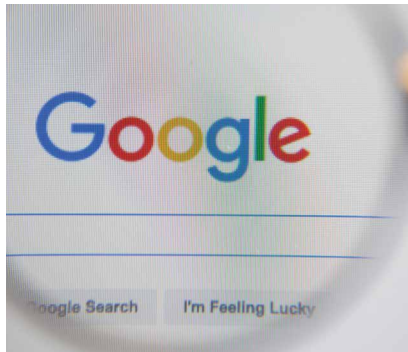


GOOGLE ECONOMIC IMPACT SINGAPORE 2015

PUBLISHED IN 2017



alphaBeta
strategy x economics

Important Notice on Contents – Estimations and Reporting

This report has been prepared by AlphaBeta for Google. All information in this report is derived or estimated by AlphaBeta analysis using both proprietary and publicly available information. Google has not supplied any additional data, nor does it endorse any estimates made in the report.

Where information has been obtained from third party sources and proprietary research, this is clearly referenced in the footnotes. Unless otherwise stated, the estimates in this report refer to annual benefits based on the latest available figures, thus of 2015.

The amounts in this report are estimated in both Singapore dollars and US dollars. The conversion is based on the average exchange rate in 2015, sourced from X-Rates.com, which was 1 USD = 1.37 SGD.

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Estimated economic impact on Singapore from Google products



BUSINESS BENEFITS

Google supports between

\$300 million to \$750 million

in annual direct business benefits



More than

3,500

Singaporean companies use **G Suite** to increase efficiency and productivity



CONSUMER BENEFITS

Google supports more than

\$2.4 billion

in annual consumer benefits



Google Maps reduces driving travel time in Singapore by

10% on average and drivers save almost

5 hours a year on the roads



Google Search users value the product on average at over

\$190

per year



SOCIETAL BENEFITS

Google has several talent and skills training programmes; for instance, **Squared Data & Analytics Program** has been established to equip college graduates and early career professionals with data analytics skills and develop young talents for Singapore's growing digital economy



Google Cultural Institute partners with local museums to curate over

2,900 artworks on its platform, allowing online users to view Singaporean art and heritage with ease



*Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015. The analysis is confined to sizing the benefits of Google's core products and does not include an estimation of the broader economic impact of Google's Android operating system, nor the products of Alphabet, which is the parent company of Google.

EXECUTIVE SUMMARY

Digital technologies have become indispensable for countries to prosper and grow in the internet age. Yet policymakers are often imperfectly informed on how to accurately measure the benefits of digital technologies for an economy. Knowing the value of digital products and services is a first step to harnessing them more effectively. This report helps to close the existing knowledge gap by assessing the economic impact of Google's digital technologies in Singapore.

An analysis of third-party industry data, supported by AlphaBeta's proprietary consumer research and big data techniques, as well as an extensive literature review, indicate that Google's digital technologies have significant benefits for Singapore's businesses, consumers, and society at large. For example, the average commuter saves more than five hours of travel time each year when using Google Maps on public transport or while driving.

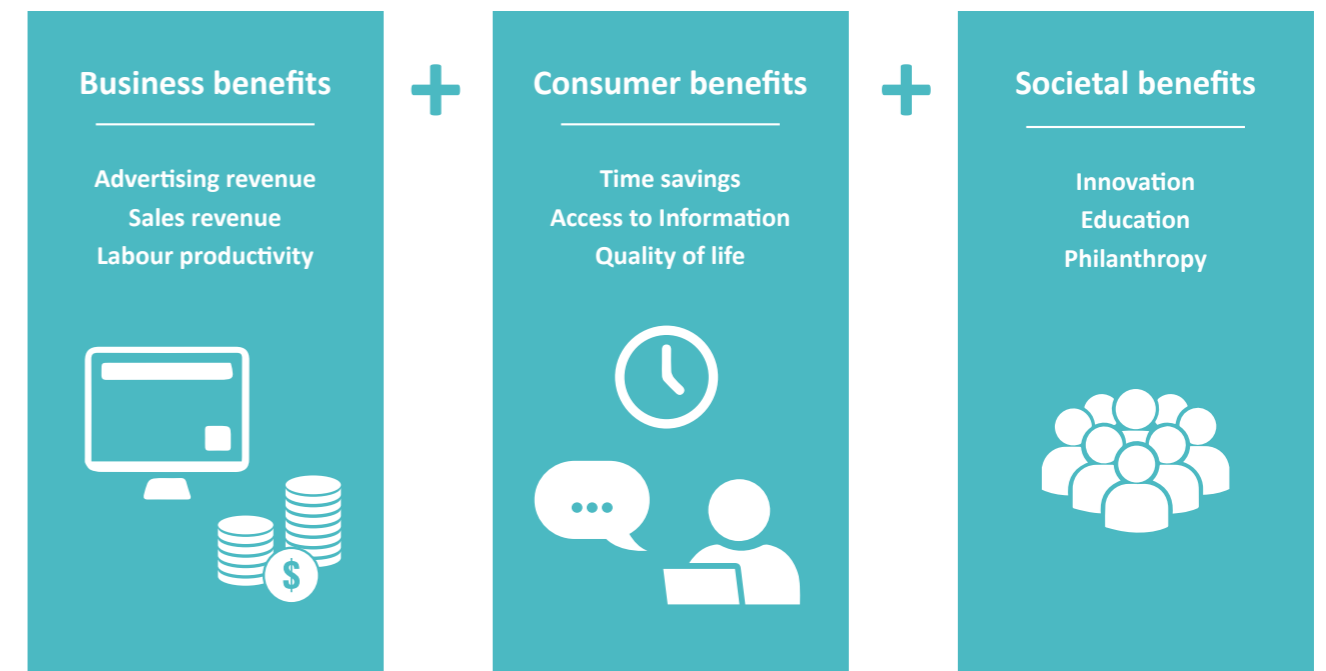
In total, Google's digital technologies generated additional revenue and productivity gains worth between S\$300 million and S\$750 million for businesses in Singapore in 2015. Meanwhile, the total benefits from these technologies for Singaporean consumers amounted to more than S\$2.4 billion in 2015. That is more than a third of what Singaporeans spent on household equipment (such as vacuums, fridges etc.) that year.¹ In addition, society at large is estimated to have benefited significantly from various Google initiatives, such as the "Go Global" programme, as well as the use of Google products in not-for-profit organisations.

It is difficult to measure the entire economic impact of Google services with traditional metrics, such as gross domestic product (GDP), as they only capture a fraction of total returns. For instance, traditional economic accounting methods measure advertising spends but fail to accredit the returns in terms of net advertising benefits that businesses receive from using AdWords and AdSense to these products.² Likewise, economic output measures such as GDP record only transactional values, but fail to account for the benefits consumers derive from finding answers with free services such as Google Search or from saving travel time through Google Maps.

This report addresses these limitations. It aims to measure how Google's core digital products have impacted businesses, consumers, and the wider society of Singapore in 2015 (Exhibit 1 and Exhibit 2).³

EXHIBIT 1

Google's total economic impact in Singapore was analysed across three distinct segments



The digital economy in the Singapore context

Singapore's economic prosperity has increased significantly over the past decades. In just half a century, the country's GDP per capita has surpassed that of wealthy nations such as Germany and Australia, rising from S\$685 in 1965 to roughly S\$73,000 in 2015.⁴ Singapore's growth over the second half of the last century has been largely driven by Singapore's strategic location and strong institutions taking full advantage of the world trade flows and being heavily export oriented. With the world economy slowing, the country needs to look

for opportunities of future growth.

The fast-growing digital economy can support the next phase of Singapore's growth. The country has created an active community of local and foreign technology companies such as Google. With its modern infrastructure, a large pool of talent and strong investments in R&D, Singapore is, therefore, well-positioned to make the transition from trading hub to digital innovation hub. The Smart Nation Initiative, launched in 2014, aims to support this transition with a variety of measures such as Launchpad@OneNorth to support startups and Code@SG to increase the supply of coders for the digital economy.⁵

¹ Data obtained from Department of Statistics Singapore: <http://www.singstat.gov.sg/statistics/visualising-data/infographics/retail>

² "Net advertising benefit" refers to the sales revenue that can be directly attributed to advertising, minus the related advertising expenditure.

³ The analysis is confined to Google's core digital products. It does not measure the broader economic impact of Google's Android operating system or any products of its parent company Alphabet. It is impossible to aggregate the consumer benefits, business benefits and societal benefits into one, as different methodological concepts were used to produce each figure. The Appendix provides a detailed breakdown of the methodologies employed for the different benefit groups.

⁴ GDP figures obtained from the World Bank <http://data.worldbank.org/> and Statista (2017), "The 20 countries with the largest gross domestic product (GDP) per capita in 2016. Available at: <https://www.statista.com/statistics/270180/countries-with-the-largest-gross-domestic-product-gdp-per-capita/>

⁵ The Singaporean Government's "Smart Nation" agenda, launched in 2014, aim to support this transition. Initiatives include targeted support for startups (such as "JTC Launchpad @ one-north") and programs to increase the number of tech-savvy workers (such as "Code@SG"). For more information see the Smart Nation Singapore website: <http://www.smartnation.sg/about-smart-nation/milestones>.

Our analysis shows how digital products such as Google’s can play a significant role in this transition.

Specifically, the analysis shows the following:

Business benefits

The digital economy is fast becoming the backbone of Singapore’s economy and it is particularly important for the nation’s many small and medium-sized enterprises (SMEs). They represent 99 per cent of Singaporean firms in 2015.⁶ Yet many of them are traditional businesses whose business models have seen little change over the years.⁷ To ensure they remain relevant in the digital age, these businesses, like the country, are undergoing a transition. They can no longer solely depend on the domestic market for growth and need to target consumers beyond Singapore’s geographical boundaries. This is a challenge, as most SMEs lack the resources or networks to expand.⁸

Digital products, such as Google AdWords, AdSense, YouTube, and G Suite, can create new growth opportunities for SMEs. They can help businesses reach new customers, increase advertising revenues, lower IT costs, and improve their workflow by allowing employees to collaborate more efficiently.

Some examples of business benefits generated by Google’s digital technologies are the following:

- Google’s online advertising tools allow SMEs to better target potential customers. This helps lower the barriers of entry and level the playing field for more than 75,000 SMEs in Singapore⁹, that can be found online via Google Search, allowing them to compete with more established

companies and expand their customer reach, even beyond the domestic market.¹⁰

- G Suite —a suite of cloud-based products and services that aid communication, document sharing and collaboration, and document storage— allows employees to work remotely and collaborate in the cloud, which improves workplace productivity. Cloud storage functions as low-cost server space, which reduces the need for physical space and expensive hardware.
- Online content creators, such as bloggers or YouTube creators, can generate revenues from their websites and videos through digital tools such as Google AdSense and YouTube.

Together, it is estimated that Google’s digital products and services have helped Singaporean businesses generate total benefits worth S\$300 to S\$750 million in 2015.¹¹ To put this number into perspective, the combined revenue of the largest 1,000 companies in Singapore in 2016 was S\$3 trillion.¹²

Consumer benefits

Google makes a significant contribution to the lives of Singaporeans. This applies to all demographic groups in Singapore, including seniors aged 55 years and above, many of which are web-savvy.¹³ However, the bulk of these benefits is not reflected in official GDP statistics. For example:

- Many Singaporeans use Google Search to browse news and quickly find out more about and current affairs, such as the Trans-Pacific Partnership Agreement and the 2016 United States presidential elections.¹⁴ It is estimated that Google

Search saves the average Singaporean user an estimated 20 minutes per day by providing fast access to information. This amounts to a saving of more than five days each year—equivalent to annual consumer benefits worth over S\$800 million.

- Google technology also helps Singaporeans get to their destination faster. Using Google Maps navigation is estimated to save Singaporeans on average more than five hours of travel time per year on buses and trains and an equal amount of time when driving in their own car.¹⁵
- Survey data indicates that more than 3.5 million Singaporeans spend over 60 minutes on average consuming content, ranging from entertainment to educational videos, on YouTube.com each day.¹⁶

Together, it is estimated that Google’s digital products provide more than S\$2.4 billion in annual benefits to Singaporean consumers.

Societal benefits

Beyond the benefits to businesses and individuals, Google delivers benefits to the wider Singaporean society that may not accrue directly to a specific company or person. In economics, these are often called “spill-over benefits”. These benefits might not appear in GDP measures today, but they affect other objectives we care about and will strengthen Singapore’s economy over time.

A common challenge for countries looking to develop the digital economy is the lack of candidates with suitable skills. Google has several talent and skills training programmes

aimed at equipping more Singaporeans for the digital economy. These initiatives will help build Singapore’s digital talent pool and increase Singapore’s competitiveness as a business and technology hub. For example:

- Google collaborated with the Info-communications Media Development Authority of Singapore (IMDA) to launch the “**Squared Data & Analytics Programme**” to develop young analytics talents for the growing digital economy. The programme, currently in its fourth year, addresses Singapore’s need for approximately 2,500 more data analysts by 2020 by producing 25 fresh data analytic graduates or early career professionals each year.¹⁷ These candidates undergo training modules in data analytics by experts and are given industry opportunities to have hands-on learning.¹⁸
- Google, in collaboration with the Economic Development Board, has launched the training programme “**Digitize**”, which aims to increase Singapore’s pool of young, local, skilled digital talent.¹⁹

⁶ SingStat (2017). <http://www.tablebuilder.singstat.gov.sg/publicfacing/mainMenu.action>

⁷ The Business Times (2016), “Singapore SMEs slow to adopt business model innovation to gain edge”. Available at: <http://www.businesstimes.com.sg/sme/singapore-smes-slow-to-adopt-business-model-innovation-to-gain-edge>

⁸ Reported by The Business Times, July 12, 2016 - <http://www.businesstimes.com.sg/sme/the-growth-challenges-facing-singapores-smes>

⁹ Over 80 per cent of SMEs are local firms.

¹⁰ Conservative estimate derived from information obtained from SingStat, 2017 - <http://www.tablebuilder.singstat.gov.sg/publicfacing/createDataTable.action> and IDA (2013) Annual Survey on Infocomm Usage by Enterprises for 2012 IDA Singapore. This estimate is obtained by considering number of local SMEs, percentage of SMEs with web presence, and share of Google Search in Singapore.

¹¹ The range in calculated business benefits reflects different estimation methodologies. See Box 1 and the Appendix for further details on the methodology.

¹² Reported by Channel News Asia, February 25, 2016 - <http://www.channelnewsasia.com/news/business/average-profit-of-singapore-s-top-smes-fell-9-1-last-year-rankin-8182898>

¹³ Reported by The Straits Times, November 4, 2014 - <http://www.straitstimes.com/singapore/majority-of-singapore-seniors-are-web-savvy-says-global-study>

¹⁴ Both search terms dominated search queries in November 2016. See Google Trends - <https://www.google.com.sg/trends/explore?date=2015-11-14%202016-12-14&geo=SG&q=trans%20pacific%20partnership> and <https://www.google.com.sg/trends/explore?date=2015-11-14%202016-12-14&geo=US&q=US%20president%20elections>

¹⁵ Number of commuters is based on data from the AlphaBeta consumer survey. See Box 7 for further information on the approach for estimating time savings from Google Maps.

¹⁶ YouTube user number is based on data from the AlphaBeta consumer survey and internet population data. Average length of YouTube usage based on data from the AlphaBeta consumer survey





¹⁷ Reported by Channel NewsAsia, January 27, 2016 - <http://www.channelnewsasia.com/news/business/singapore/ida-partners-google-to-2464036.html>

¹⁸ Google Singapore, Squared Data & Analytics Program - <https://sites.google.com/site/squareddataandanalytics/the-program>

¹⁹ Digitize - <http://www.digitizeacademy.com/#home>

EXHIBIT 2

Examples of benefits supported by Google in Singapore

	BUSINESS BENEFITS	CONSUMER BENEFITS	SOCIETAL BENEFITS
<p>GOOGLE SEARCH & ADWORDS</p> 	<ul style="list-style-type: none"> AdWords supported between S\$250 - 600 million in net advertising benefits for Singaporean companies Over 75,000 SMEs in Singapore are able to leverage on Google's products to compete digitally 	<ul style="list-style-type: none"> Online users are saving 20 minutes a day through Google Search 	<ul style="list-style-type: none"> Singapore is the first country in Southeast Asia and the fourth in Asia Pacific to get Google's Street View in 2009. This allows users to view Singapore landmarks online with ease
<p>GOOGLE MAPS</p> 	<ul style="list-style-type: none"> Google Indoor Maps enables customers to virtually view retail shops in shopping malls like Paragon, boosting retailers' online presence 	<ul style="list-style-type: none"> Google Maps means more than 2.5 million Singaporean commuters are spending over 5 hours less on public transport on average a year 	<ul style="list-style-type: none"> Google has provided Ad Grants in Singapore, benefitting non-profit organisations like the Singapore International Foundation Google Cultural Institute commits resources to support the cultural industry in Singapore, curating over 2,900 Singaporean artworks online and allowing internet users to take virtual tours of museums like Singapore Art Museum
<p>YOUTUBE & ADSENSE</p> 	<ul style="list-style-type: none"> Advertisers earned more than S\$100 million in net advertising benefits via AdSense or YouTube advertisements 	<ul style="list-style-type: none"> Singapore's online population spend on average more than 60 minutes a day watching YouTube 	<ul style="list-style-type: none"> Google has several talent and skills training programmes such as the "Squared Data & Analytics Program" and "Digitize" to build up local talents
<p>G SUITE</p> 	<ul style="list-style-type: none"> Over 3,500 Singaporean businesses are estimated to be using G Suite to collaborate and communicate 	<ul style="list-style-type: none"> Singaporeans value Gmail at over S\$180 per user per year 	<ul style="list-style-type: none"> Google invests heavily in a new APAC office and two data centres in Singapore, creating over 1,000 jobs
<p>GOOGLE</p> 	<p>S\$300m - S\$750m</p>	<p>>S\$2.4b</p>	<p>Benefits are significant but difficult to quantify</p>

Source: Data in the Exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology.



BUSINESS BENEFITS

USING GOOGLE
PRODUCTS TO EXPAND
AND REACH NEW
AUDIENCES

Estimated business benefits to Singapore from Google products*



Google supports between

\$S\$300 million to \$S\$750 million

in annual direct business benefits



Advertisers earn over

\$S\$100 million

in annual net advertising benefits via displaying advertisements on websites or videos

via **YouTube** or **AdSense**



More than

20 billion Google Searches

are made by Singaporean users



Over

90%

of local Singaporean YouTube content views originate from abroad



Google Search and AdWords help over

75,000 SMEs

in Singapore to be found online and better reach customers



*Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.



BUSINESS BENEFITS

Online platforms such as Google AdWords can unlock new sales opportunities for small and medium-sized businesses with less than 20 employees that comprise 99 per cent of companies in Singapore.²⁰ Typically, small firms lack the scale and resources to run large marketing campaigns on television, radio or in newspapers. Many also struggle to tap into distribution channels controlled by larger industry players. However, online search advertising has become a viable channel for SMEs to expand their reach and market their products to a wider audience.

It is estimated that businesses can generate a return of up to eight times their advertising expenditure when marketing their products through Google AdWords in conjunction with search engine optimisation (see the Appendix for details on the calculation and assumptions).²¹

Other Google services, including G Suite and YouTube, provide additional opportunities for business growth in Singapore. Research shows that advertising on Google’s video platform YouTube generates a higher return on investment than TV advertising.²² Not surprisingly, the number of entrepreneurs creating their own YouTube channels to publish and make money with branded content has soared in recent years. Across the Asia-Pacific region, YouTube uploads are increasing by 100 per cent year on year, with Singapore now ranking as “a hotbed of YouTube growth”.²³

²⁰ Information obtained from Profile of Enterprises in Singapore, 2016, SingStat - https://www.singstat.gov.sg/docs/default-source/default-document-library/statistics/visualising_data/profile-of-enterprises-2015.pdf

²¹ Based on estimates by Varian (2009), Jansen & Spink (2009), and Deloitte Google’s Economic Impact UK (2015). See the Appendix for underlying assumptions.

²² Google (2016), “YouTube challenges TV on advertising ROI”. Available at: <https://www.thinkwithgoogle.com/nordics/research-study/youtube-challenges-tv-on-advertising-roi/>.

²³ According to an interview with Joanna Flint, Google Managing Director Asia-Pacific, on Vrzone: <http://vrzone.com/articles/clicknetwork-first-singapore-youtube-channel-hit-gold/123494.html/2>.

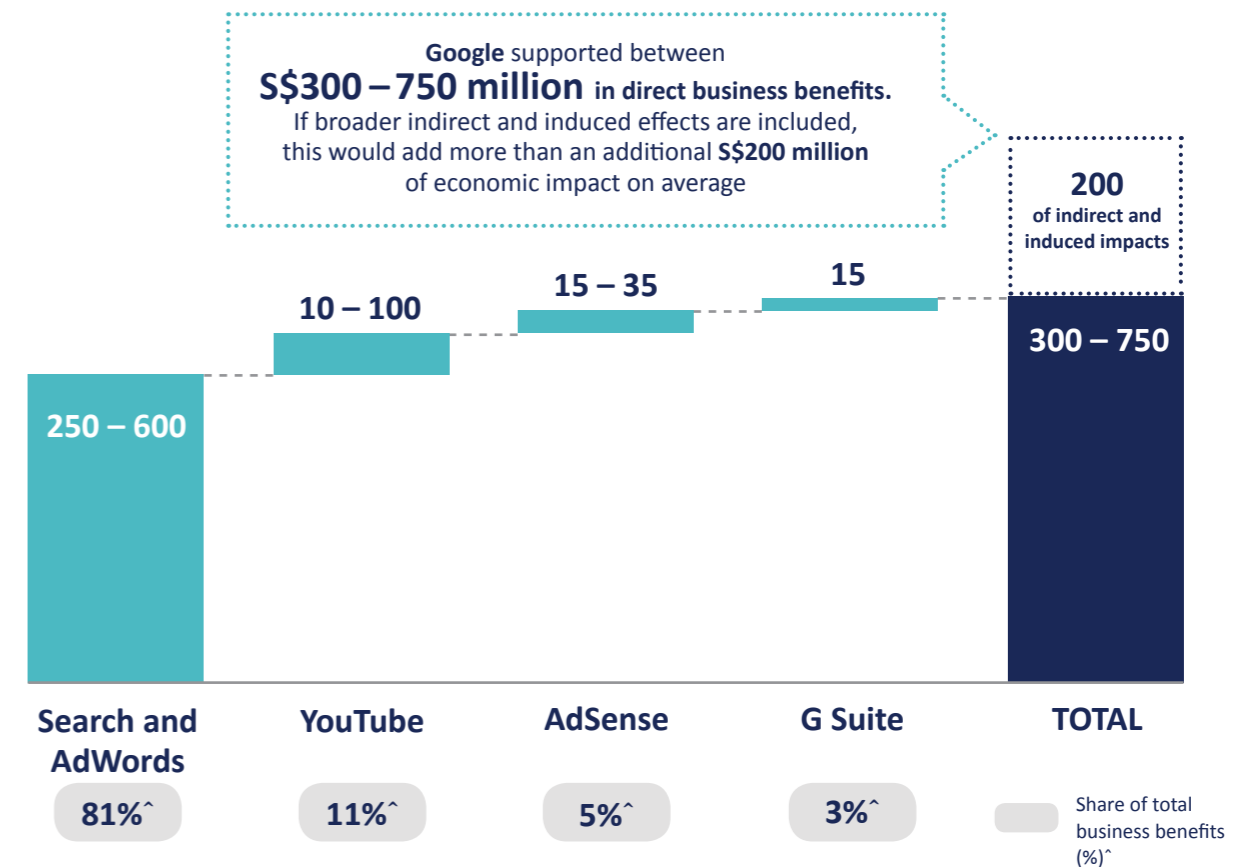
G Suite—a suite of cloud-based products and services that aid communication, document sharing and collaboration, and document storage—is also beneficial for businesses, as it can foster worker collaboration and productivity.²⁴

Together, these digital services are estimated to have produced benefits worth S\$300 million to S\$750 million to businesses in Singapore in

2015 (Exhibit 3). While these benefits are not equivalent to GDP contributions, they can directly boost a company’s revenue and economic activity in Singapore. Business benefits would be even higher, increasing by an estimated S\$200 million, if secondary economic effects are included (see Box 1 and the Appendix for details).

EXHIBIT 3

Value of business benefits supported by Google Singapore, 2015 S\$ millions*



*Rounded down to nearest S\$5 million.

[^]Based on range of averages. May not sum to 100% due to rounding.

Source: Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology.

²⁴ G Suite is a range of applications that includes Gmail, Google Drive, Docs, Hangouts, Sheets, Slides, Forms, Calendar, and Sites. Information obtained from Forrester Consulting (2015) The Total Economic Impact of Google Apps for Work Forrester Research Inc.

BOX 1 Calculating business benefits

When measuring the impact Google’s digital services have on businesses, economists consider the economic impact on the direct level.

Direct benefits include all immediate gross economic activity generated by businesses through the use of Google products, typically measured by revenue, income or savings. We proxy this “gross economic activity” by calculating the revenues and net advertising benefits of Singaporean businesses and advertisers using Google products.²⁵ This does not include any activity that may have been displaced by Google, neither does it include the incremental impact of Google on the Singapore economy beyond what would be the case if Google didn’t exist but other companies like it did. The hypothetical scenarios required to calculate truly incremental benefits of Google are highly speculative and beyond the scope of this study.

The calculation is restricted to benefits derived by Google’s business-related digital products and services. To provide objective and conservative estimates and to avoid double counting, the business benefit calculation does not measure the potential increase in worker productivity through consumer-related Google products other than G Suite. While excluded in the calculation of business benefits, it can be assumed that digital products such as Google Search and Google Maps help employees save time and be more productive when doing research.

The business benefits of each digital product or service, except AdSense, were calculated separately, using both a top-down and a bottom-up approach (Exhibit 4). The results were then added up for each product category. To reflect the two different calculation

methods, final estimates are range estimates, not point estimates (see the Appendix for further details).

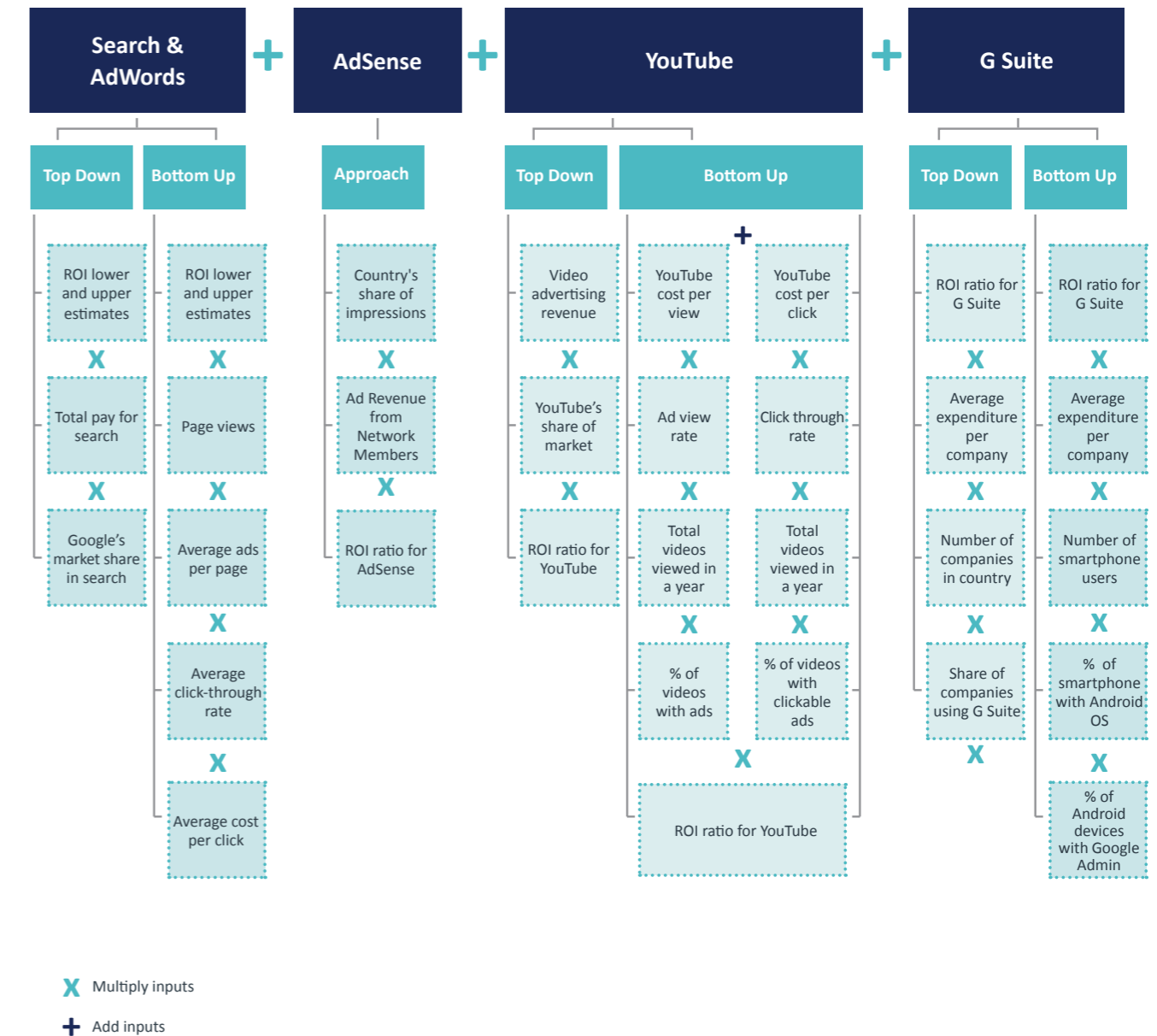
The result: Google supported an estimated S\$300 million to S\$750 million in direct business benefits in 2015. Google Search and AdWords generated the bulk of business benefits, producing net advertising benefits worth between S\$250 million and S\$600 million. AdSense contributed another S\$15 million to S\$35 million and YouTube delivered up to S\$100 million worth of benefits.

Due to limited data availability and uncertainties about data quality, this report only measures the direct effects of Google’s digital services. However, Google products can also generate indirect benefits for businesses. These are the positive flow-on effects that ripple through the economy. For example, a business might find that sales have gone up since it started using Google’s online advertising platform. It might now decide to contract another firm to supply more raw materials for its production line. The revenue generated by the contractor would count as an indirect benefit. Finally, there are also induced effects, which occur when factoring in the consumer spending of employees in businesses benefiting from Google technology.

While not included in the reported benefits, this report estimates the potential indirect and induced effects of Google products on businesses by conservatively multiplying the value of direct effects by 1.6—in line with in line with the current academic consensus. As a result, broader indirect and induced effects of Google’s digital products and services are estimated to have added an additional S\$200 million of business benefits in 2015.

EXHIBIT 4

Methodology for calculating business benefits



The following sections discuss the various sources of business benefits, as illustrated in Exhibit 3, in detail.

²⁵ Net advertising benefits refers to the increase in revenues and sales that can be directly attributed to advertising minus the related advertising expenditure.

Estimated business benefits from Google Search and AdWords

In Singapore during 2015:*



Free and paid Search support between **\$250 million** to **\$600 million** in annual net advertising benefits through increased sales and revenues



Users make more than **20 billion** searches annually



Over **50%** of usage is on mobile



*Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.

Search and AdWords: Viable marketing channel for SMEs

Google's search engine has become a popular platform for Singaporean businesses to widen their customer reach. They can use the search-result pages for free or paid advertising—either by engaging free search-result optimisation, i.e. improving their ranking on search results, or by paying for keyword-specific adverts that appear on top of search results.

Their potential audience is large. In Singapore, internet users performed over 20 billion queries on "Google Search" in 2015.²⁶ Many of these were found to be business-relevant and related to information on shops, restaurants, or travel destinations.²⁷

Small businesses are encouraged to use "Google My Business", a service that helps them increase their customer exposure by placing information across various Google products, in particular, Google Search, Maps and Google+. A more specialised digital service that helps retailers improve their online presence is "Google Indoor Maps", which allows consumers to zoom in and out of a building's floor plan and locate individual shops, for example in a mall. Potential customers can virtually view retail shops in malls like the Paragon on Singapore's Orchard Road. This allows brick and mortar retailers to boost their online presence.²⁸

Google's free and paid search services supported between \$250 million and \$600 million in net advertising benefits in the Singaporean economy in 2015 (see Box 1 and the Appendix for details on the calculation).²⁹

²⁶ Estimates based on data from AlphaBeta consumer survey.

²⁷ Reported by Business 2 Community, June 21, 2012 - <http://www.business2community.com/travel-leisure/the-many-features-and-benefits-of-google-maps-0201550#XX2oxpkUPoF21uGY.97>

²⁸ More information on the service on: <https://www.google.com/maps/about/partners/indoormaps/>

²⁹ The net advertising benefits represent the total revenue received from advertisers minus the online advertising cost.



Estimated business benefits from Google AdSense

In Singapore:*

AdSense supports between **\$15 million** to **\$350 million** in annual net advertising benefits for advertising



AdSense: Supporting local online content creation

Google's online advertising service AdSense helps online content publishers monetise their work through adverts targeted to their content and audience, as well as help businesses target potential customers. AdSense places text, image, video, or interactive adverts on publisher's sites and lets them generate revenue in this way.

Many small businesses in Singapore, including individual content creators such as bloggers, use AdSense to make money from hosting advertisements on their sites. A lot of these advertisements are for local firms using digital marketing tools to gain new customers, both in their own country and abroad (see Box 2 for case study examples).

It is estimated that AdSense has helped businesses advertising in Singapore generate net advertising benefits worth between \$15 million and \$35 million in 2015 (see the Appendix for details on the calculation).³⁰

* Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.

³⁰ Net advertising benefits based on a return-on-investment (ROI) ratio of 0.24, which implies that companies earn \$124 in return. For every \$100 spent by advertisers online, they receive a revenue of \$124.

BOX 2

How Singaporean companies benefit from Google's digital marketing tools

Singapore is home to many traditional small and medium-sized businesses that have so far responded slowly to the changing customer behaviour in the digital age.³¹ To remain profitable and ensure they continue to reach customers, these businesses must invest in a strong online presence. Many also find that they can no longer depend on the domestic market for growth. Yet many SMEs in Singapore lack the resources and networks to expand globally.³²

Digital products (such as Google AdWords, AdSense, and YouTube) can help businesses reach new customers and grow in a cost-effective way.

One local traditional firm that has recently overhauled its marketing strategy with the help of digital products is Wufang Singapore, a local martial arts school established in 2004 by local celebrity Vincent Ng.³³ Constrained by a modest marketing budget, Wufang struggled for years to create brand awareness and reach new customers. As a result, the



Wufang Singapore

company relied heavily on referrals and free publicity in newspapers and other traditional print media. When Wufang realised that digital technology offers a cost-effective way to reach potential customers, mostly teenagers and their parents, the school created a mobile-friendly website and launched a YouTube advertisement campaign. "Our YouTube video has seen phenomenal success," said Wufang founder Vincent Ng. "In just three weeks, it was watched more than 80,000 times. We knew we have reached the right target audience based on the reports by Google Analytics. Enquiries have increased by 300 per cent which is amazing," said Ng, who followed up on his breakthrough success with more YouTube videos and targeted advertising on Google Search.³⁴

Another SME that has benefitted from Google AdWords is Swee Lee Music Company. The firm, established in 1946, is currently Asia's leading online retailer and distributor of musical instruments. Swee Lee Music Company used digital advertising tools to increase its presence overseas. Instead of setting up physical stores in new markets, Swee Lee gained traction and new sales via its online store—and the help of Google services such as AdWords and YouTube. Google AdWords turned out to be particularly effective for Swee Lee. "Via Google AdWords, online sales have grown to be about 15 per cent of our local revenue. Online traffic has increased 300 per cent coming from Malaysia and Indonesia," said Beverly Tang, Swee Lee's marketing executive.³⁵

Gain City, Singapore's largest local air-conditioning retailer with a 35-year history and around 800 employees across 10 stores, has also experienced a sales boom thanks to digital marketing.³⁶ The company, which has been using digital advertising for a few years, recently ramped up its marketing efforts to cater for a growing number of e-commerce consumers and to attract new customers. In late 2016, Gain City launched various new advertising campaigns on Google's digital platforms. The result: more people visit its website and enquire online. More importantly, however, Gain City's revenues have surged. "We've seen great results on digital, with a four-fold increase in our online revenue," said Kenny Teo, managing director at Gain City. Mr. Teo said more customers are now purchasing expensive household items such as air-conditioners and washing machines online, which were traditionally only sold in physical stores.³⁷

Even businesses whose sales typically rely on face-to-face interactions can benefit from online marketing. Hai Sia Seafood is a traditional fish retailer, established in 1976, located at Jurong port.³⁸ But its managers have recognised that they needed to be online to grow in today's increasingly digitalised world and are now considered digital pioneers in the local seafood scene. Focussed on increasing online sales and attracting new customers for the firm's daily fish market tours, Hai Sia Seafood ran AdWords and YouTube campaigns to improve its brand awareness. Its inaugural YouTube video was viewed more than 200,000 times within the first month and boosted the firm's customer numbers. Today, five times more people click on Hai Sia Seafood's website



Swee Lee Music Company



Gain City

on average and 20 times more people book its seafood tour than before the YouTube campaign. "Google helped us realise we don't need big bucks if we know how to properly utilise digital marketing via the right marketing assets," said Ang Junting, Hai Sia Seafood's deputy director.³⁹

Local technology startup 9 Degrees Freedom says Google's digital marketing tools are a key reason for its recent export success. The startup has developed a sensor for tennis rackets that promises to improve a tennis player's performance through real-time tracking and data analytics.⁴⁰ As a startup, 9 Degrees Freedom doesn't have the resources for big marketing campaigns, so it resorted to Google's suite of marketing tools like YouTube and AdWords to introduce its novel product into a niche market. The firm launched a video campaign showing the tennis sensor in action. It also optimised its website for targeted keywords on Google Search, as well as AdWords to bid on certain keywords, to attract tennis players around the world. As a result, 9 Degrees Freedom could expand quickly in overseas markets and compete with global tech firms. Its tennis sensor is now sold in about a dozen countries.⁴¹

³¹ Reported by The Business Times, September 20, 2016 - <http://www.businesstimes.com.sg/sme/singapore-smes-slow-to-adopt-business-model-innovation-to-gain-edge>

³² Reported by The Business Times, July 12, 2016 - <http://www.businesstimes.com.sg/sme/the-growth-challenges-facing-singapores-smes>

³³ Information obtained from Wufang Singapore, February 9, 2017 - <http://wufangsingapore.com/about-us>

³⁴ Information obtained from Google Singapore, November 8, 2016 - <https://www.youtube.com/watch?v=TzbAlnUr6ew>

³⁵ Go Global, SG SMEs Success Story, Swee Lee - <https://www.youtube.com/watch?v=3nsmSiot8A>

³⁶ Information obtained from Gain City, May 23, 2017 - <https://www.gaincity.com/general/about-us>

³⁷ Reported by The Business Times, April 19, 2017 - <http://www.businesstimes.com.sg/sme/singapore-budget-2017/google-to-help-train-1000-sme-business-leaders-in-singapore>

³⁸ Information from Hai Sia Seafood, February 9, 2017 - <http://haisia.com.sg/our-beginnings/>

³⁹ Information obtained from Google Singapore, November 8, 2016 - <https://www.youtube.com/watch?v=obeODIT2RGw>

⁴⁰ Reported by The Straits Times, December 18, 2015 - <http://www.straitstimes.com/singapore/ace-the-tennis-game-with-qlipp>

⁴¹ Information obtained from Go Global - SG SMEs Success Story - Qlipp, November 19, 2016 - <https://www.youtube.com/watch?v=IEOadYZbsQ>

Estimated business benefits from YouTube

In Singapore during 2015:*



YouTube supports between **S\$10 million to S\$100 million** in annual business benefits for advertisers



More than **45%** of YouTube videos are watched on mobile devices



Over **90%** of local Singaporean YouTube content views originate from abroad



* Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.

YouTube: Creating new content and jobs

YouTube has become a popular marketing tool for businesses. Advertisers can tap into the - often large - audiences gathered by YouTube creators, many of them are one-person enterprises that earn advertising dollars on the video platform by letting ads play before and during their videos, or by posting branded content.⁴²

These content creators benefit from a growing consumer preference to watch videos online, rather than on TV. About three out of five people in Singapore spend more than an hour per day

watching videos on YouTube—from cooking tutorials to music videos.⁴³ Research also finds that Singaporeans of all ages and across all income classes are some of the most open to video content from brands, with 40 per cent of internet users watching this on a weekly basis.⁴⁴

We estimate that businesses earned between S\$10 million and S\$100 million through digital video advertising in Singapore in 2015. This figure relates to net advertising benefits and does not attempt to measure any potential benefits for the wider society from making cultural content more readily available online (see the Appendix for details on the calculation).

YouTube can also help content creators overcome market barriers, develop a global profile, and become better-known among more than 1 billion users worldwide.⁴⁵ More than 90 per cent of local Singaporean YouTube content views originated from abroad, making YouTube a very successful export channel for local and cultural content.⁴⁶

Amid signs that YouTube is becoming a catalyst for careers in the digital economy, the IMDA, a Singaporean government body, is encouraging young people to make content creation their

business. It recently partnered with digital media firm Maker Studios to teach 30 local content creators how to create compelling YouTube videos and build their brands.⁴⁷ The business activity spurred by YouTube will likely increase in the future, as more people choose to make a living with content creation.

Box 3 provides statistics of successful Singaporean YouTube artists and Box 4 highlights how YouTube has benefitted retail and tourism businesses in Singapore.

BOX 3

Examples of Singaporean content creators on YouTube⁴⁸



Channel: Clicknetwork
Genre: How-to
Subscribers: > 1 million



Channel: Oddbods – Official Channel
Genre: Film
Subscribers: > 935,000



Channel: Wah!Banana
Detail: Comedy
Subscribers: > 775,000

⁴² Branded content, also known as branded entertainment, is a form of advertising that uses specifically created content to promote a brand, which in return funds the content creation. See: <https://creatoracademy.youtube.com/page/lesson/branded-content>

⁴³ The absolute YouTube user number in Singapore is 3.5 million, which is derived from the AlphaBeta consumer survey and internet population data. Average length of YouTube usage based on data from the AlphaBeta consumer survey.

⁴⁴ According to a 2017 study by Kantar TNS, it is estimated that roughly 4.1 million people in Singapore watch YouTube at least once a month. more internet users in Singapore are now watching online video content (76 per cent) than traditional TV (67 per cent). One in three (29 per cent) say online content they most watch is produced by “people like me” or celebrities. Singaporeans are also some of the most open to video content from brands, with 40 per cent of connected consumers watching this on a weekly basis. See: <http://sea.kantar.com/tech/digital/2017/consumers-in-singapore-prefer-online-videos-to-tv/>

⁴⁵ Number of worldwide YouTube users reported by YouTube. See: www.youtube.com/yt/press/statistics.html.

⁴⁶ This number is estimated using web traffic data from SocialBlade.com, industry interviews, and reporting by Today, April 5, 2017 - <http://www.todayonline.com/entertainment/92-viewers-spore-youtube-channels-are-abroad>

⁴⁷ Reported by Marketing, May 22, 2015 - <http://www.marketing-interactive.com/mda-trains-local-online-content-creators-go-global/>

⁴⁸ Subscriber numbers from SocialBlade.com, accurate as of 18th of August 2017.

BOX 4

How YouTube has helped boost the retail and tourism sectors in Singapore

As one of the most popular video-sharing platforms in the world, YouTube offers businesses in Singapore an opportunity to expand their global reach, and engage and attract customers worldwide.⁴⁹

Take toy retailer Toys”R”Us Singapore, for example. A series of YouTube videos posted by the company in 2014 has been viewed more than 50 million times globally, resulting in higher numbers of visitors in the company’s stores online and on land.⁵⁰ Nescafé Singapore also made use of YouTube advertising campaigns, launching a video called Creating Friendships that depicts how a simple cup of coffee can create new ties amongst neighbours in today’s urbanised Singapore. The video went viral, attracting over 200,000 views on YouTube.⁵¹ Meanwhile, a series of online commercials by local DBS Bank was ranked among the ten most successful YouTube ad campaigns in Singapore in the second half of 2016.⁵² The bank had launched a mini-series, called Sparks, which aimed at raising brand awareness and disrupting stereotypes in banking. The episodes garnered over two million views on YouTube and led to more than 510,000 online engagements across key markets for DBS.⁵³

YouTube has also become the medium of choice to promote Singapore as a tourist destination. The Singapore Tourism Board (STB) uses YouTube actively to increase

the number of international visitors. Its 2015 tourism campaign Singapore Invites encouraged locals to share personal stories of Singapore for the chance to win a reunion with friends or family from around the world.⁵⁴ STB uploaded numerous videos on YouTube of people who, after years of living apart, reconnected in Singapore due to the campaign. One such showed how a Singaporean, Daphne, and her Scandinavian friend, Sindri, reconnected after 9 years.⁵⁵ The clip garnered over 204,000 views.



Nescafé Singapore



The Singapore Tourism Board

⁴⁹ Statista - <https://www.statista.com/statistics/483583/youtube-penetration-regions/>

⁵⁰ Reported by Campaign Asia, June 2, 2015 - <http://www.campaignasia.com/article/top-1000-2015-top-25-brand-moments-on-social-media/398048>

⁵¹ Reported by Campaign Asia, June 2, 2015 - <http://www.campaignasia.com/article/top-1000-2015-top-25-brand-moments-on-social-media/398048>

⁵² YouTube Ads Leaderboard ranking, based on viewership. See: Digital Market Asia, February 17, 2017 - <http://www.digitalmarket.asia/2017/02/which-youtube-ads-did-singaporeans-love-in-h2-2016/>

⁵³ See DBS, 2017 - https://www.youtube.com/playlist?list=PLfOzdEXVHj7_eIZf-M9JY2I03UkyJGgQX and Marketing, August 22, 2016 - <http://www.marketing-interactive.com/dbs-hopes-new-mini-series-will-challenge-perception-banking/>

⁵⁴ Information obtained from Ministry of Communications and Information, October 18, 2015 - <https://www.gov.sg/news/content/the-sunday-times--share-a-slice-of-singapore-invite-guests-from-abroad>

⁵⁵ Reported by Mumbrella Asia, October 22, 2015 - <http://www.mumbrella.asia/2015/10/stb-asks-singapore-lovers-to-invite-friends-overseas-to-visit-in-campaign-to-show-islands-human-side/>

Estimated business benefits from G Suite

In Singapore during 2015:*



Over **3,500** Singaporean companies are utilizing **G Suite** to collaborate



G Suite supports over **\$S15 million** of annual business benefits for companies all over Singapore



* Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.

G Suite: Boosting labour productivity through technology

Businesses can improve their productivity of their workers when using the cloud computing digital services platform G Suite.

G Suite is a cloud-based business service offered by Google that allows employees to collaborate anywhere, anytime—as long as they have an internet connection. This is particularly beneficial for companies with employees who work remotely. Having the same access to project documents on the field as in the office, and being able to communicate with colleagues in the same way, can boost labour productivity. G Suite’s web-

conferencing and data storage features can also help a company save costs, as these services reduce the need to invest in sophisticated hardware or server space.⁵⁶

It is estimated that G Suite supported more than \$S15 million in business benefits in Singapore in 2015. These benefits are likely to increase in the near future, as the cloud computing market in Singapore is forecast to be \$S1.4 billion by 2017, according to the IDC.⁵⁷

Box 5 explores how Google’s cloud services such as G Suite and Google Cloud Platform (+GCP) – Google’s cloud computing solution - have benefitted local companies in Singapore.

⁵⁶ Reported by American Express, October 3, 2011 - <https://www.americanexpress.com/us/small-business/openforum/articles/6-ways-cloud-computing-helps-businesses-save-time-and-money/> and Entrepreneurs’ Digest, November 8, 2016 - <http://www.articles.asme.org.sg/single-post/2016/11/08/How-cloud-solutions-can-help-SMEs>

⁵⁷ Reported by Channel News Asia, August, 20, 2015 - <http://www.channelnewsasia.com/news/business/cloud-computing-set-to-become-integral-part-of-smart-nation-shif-8224156>

BOX 5

Singaporean companies benefitting from Google's cloud services

Rapid improvements in cloud computing have led to a proliferation of cloud-based services, such as Windows Azure, G Suite, Google Cloud Platform (+GCP), and Amazon Web Services, which are becoming increasingly affordable for businesses, particularly smaller ones.⁵⁸

Various studies have considered the benefits of cloud services. A study of 1,300 American and British organisations by the Manchester Business School showed that the new services led to lower IT costs in two-thirds of the surveyed companies and helped more than half of small businesses surveyed to improve their staffing. 58 per cent of SMEs agreed that the cloud helped level the playing field against larger competitors.⁵⁹ Other studies, including by IT service company Computer Economics and by Forrester Consulting, support these findings. Computer Economics concluded that cloud computing saved on average over 15 per cent in IT spending through a reduction in hardware and IT personnel costs.⁶⁰

What drives these benefits? G Suite allows employees to collaborate and share files in real-time. This can save an average employee up to two hours of work time per week.⁶¹ The growing use of web-conferencing services, such as Google Hangouts, also lowers the need for businesses to invest in traditional telephone lines and specialised conferencing systems.⁶²

This is the case for Singaporean companies as well. In Singapore alone, the cloud computing market is estimated to grow to about S\$1.4 billion by 2017, placing the nation as one of the largest markets in Southeast Asia.⁶³

Businesses also use cloud services to improve their customer ties. For example, digital marketplace Carousell recently migrated to +GCP to support its expanding global business in the region and increase the security of its IT infrastructure. It also found that +GCP improved the customer experience of Carousell's marketplace. "We received compliments from users that they were experiencing faster server responses and fewer server errors," said Victor Neo, who leads two engineering teams at Carousell. Mr. Neo said the firm's response time fell from 200 milliseconds to about 60 milliseconds per request.⁶⁴ Carousell also used +GCP machine-learning services for its data analytics and to create new user features.

Internet service provider MyRepublic says cloud-based services have spurred the growth of its business by lowering IT costs and making the firm more competitive against larger players. "In 2011, MyRepublic was a startup and budget had always been an issue," said Eugene Yeo, Chief Information Officer of MyRepublic. "For a company in the telecommunication space, running a traditional

operations support system/business support system, managing even a small-scale IT infrastructure, will already cost more than S\$15 million, which is nearly impossible for small firms to afford. Leveraging cloud computing platforms, startups require less capital and help to compete with larger firms."⁶⁵ MyRepublic today has operations in Singapore, New Zealand, Australia, and Indonesia. The company has currently more than 200,000 broadband subscribers and accounts for roughly 5 per cent of the broadband market in Singapore.⁶⁶

MyRepublic says its employees use G Suite daily, particularly apps such as Hangouts, Calendar, and Gmail.⁶⁷ The company says the cloud-based programs have led to cost savings, greater work mobility, and boosted workplace efficiency. They also allowed the company to reduce the manpower needed for overseas expansions. For instance, the marketing and IT teams in Singapore now work remotely with teams in New Zealand, Australia, and Indonesia. "This reduces the need to have large teams abroad and avoid duplication of labour," said Mr. Yeo.⁶⁸

Marketing communications agency Quirk noticed that its business productivity has increased since introducing G Suite. Its employees use G Suite and other Google applications to stay connected while working on a tight client schedule. Communicating via Gmail, storing design drafts on Google Drive, and organising client meetings with Google Calendar have helped Quirk become a more efficient design firm.



Google Hangouts



Carousell



MyRepublic

⁵⁸ Reported by Mashable, October 27, 2012 - <http://mashable.com/2012/10/26/cloud-history/#pgfzhS5u2Gq3>

⁵⁹ Manchester Business School (2013) Cloud Computing Research The University of Manchester.

⁶⁰ Computer Economics (2014): <http://www.computereconomics.com/article.cfm?id=1932>. See also: Forrester Consulting (2015), The Total Economic Impact of Google Apps for Work Forrester Research Inc.

⁶¹ Forrester Consulting (2015) The Total Economic Impact of Google Apps for Work Forrester Research Inc.

⁶² Forrester Consulting (2015) The Total Economic Impact of Google Apps for Work Forrester Research Inc.

⁶³ Reported by Channel NewsAsia, August 20, 2015 - <http://www.channelnewsasia.com/news/business/cloud-computing-set-to-become-integral-part-of-smart-nation-shif-8224156>

⁶⁴ Interview with Mr. Victor Neo from Carousell.

⁶⁵ Interview with Mr. Eugene Yeo from MyRepublic.

⁶⁶ Reported by e27, February 18, 2016 - <https://e27.co/myrepublic-track-hit-300k-subscribers-may-close-us14m-funding-round-soon-20160218/>

⁶⁷ Interview with Mr. Eugene Yeo from MyRepublic.

⁶⁸ Interview with Mr. Eugene Yeo from MyRepublic.

CONSUMER BENEFITS

USING GOOGLE
PRODUCTS TO SAVE
TIME AND IMPROVE
THE QUALITY OF LIFE

Estimated consumer benefits to Singapore from Google products



Google supports more than

S\$2.4 billion

in annual consumer benefits



Google Search saves Singaporean users over



5 days a year

Google Maps can reduce public transport travel time in Singapore by more than **10%** on average, saving users over

5 hours a year commuting



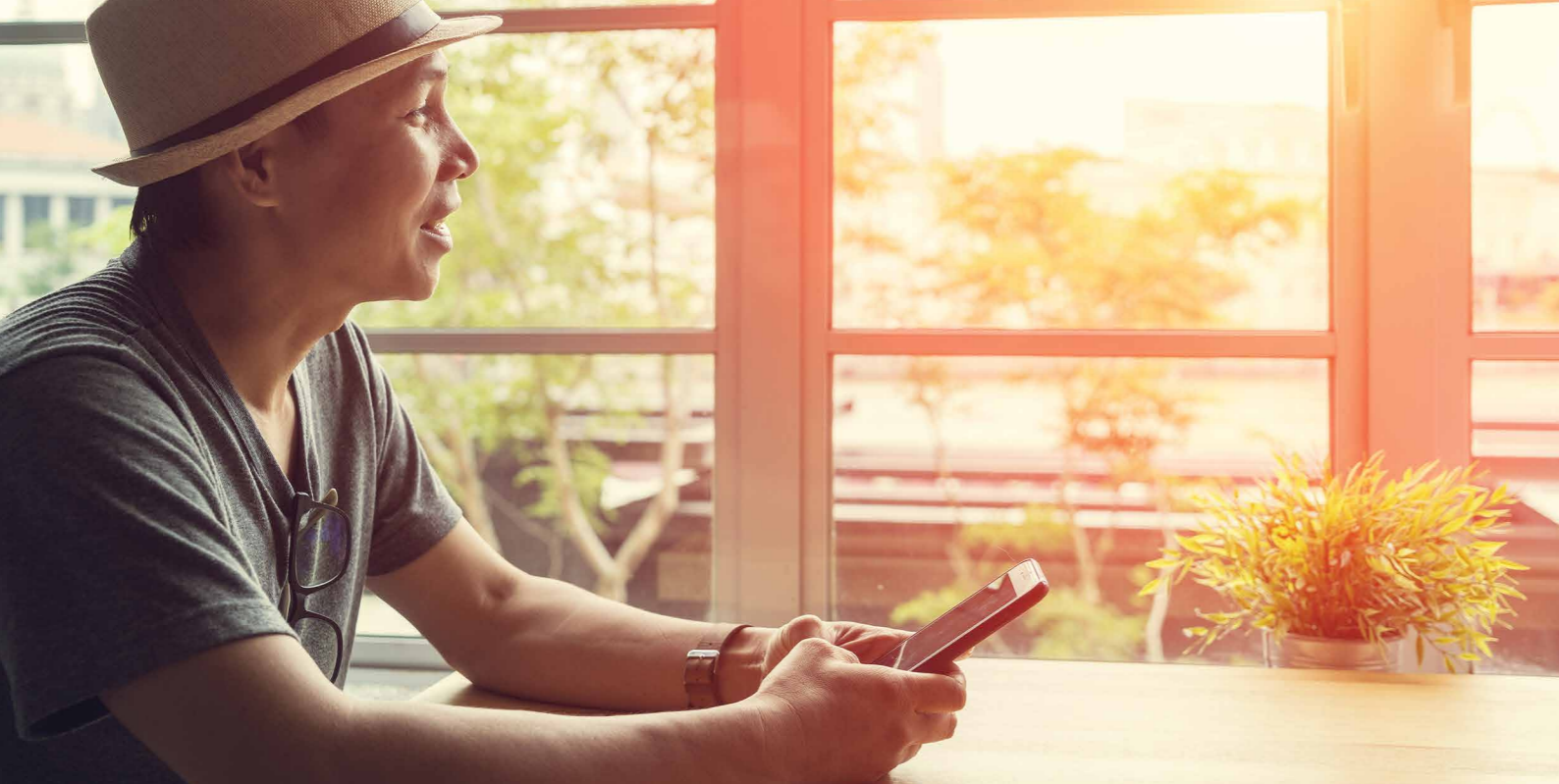
On average, Singaporean users value YouTube at more than

S\$185

a year per user



* Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.



CONSUMER BENEFITS

Google's core business model relies on providing its services to a large and expanding group of consumers and connecting them to businesses. More than 4 million people use Google Search for work and leisure in Singapore.⁶⁹ More than 3.5 million Singaporean watch videos on YouTube.⁷⁰ More than 2.5 million Singaporeans rely on Google Maps to navigate through traffic and approximately 2 million Singaporeans communicate via Gmail.⁷¹

As Google provides most of its consumer products free of charge, the consumption of these services is not captured by traditional national accounting methods. Yet consumers receive large benefits from using these products, the value of which goes unmeasured. This report poses an essential question: what economic benefits do Google's products bring to consumers?

While difficult to track using conventional economic metrics, these benefits can be estimated using alternative accounting tools. Based on responses from an extensive AlphaBeta survey among internet users in Singapore and other third-party data, this report finds that the consumer benefits generated by Google's digital services are significant. They likely exceed S\$2.4 billion each year. These benefits include greater convenience, time savings, and increased access to information, which allows consumers to make better-informed choices.

The search engine Google Search generates roughly one-third (32 per cent) of all consumer benefits (Exhibit 5), while the online video platform YouTube contributes 27 per cent. Google Maps is estimated to be similarly beneficial to consumers, generating one-quarter of all benefits. Gmail makes the smallest contribution, accounting for 15 per cent of all benefits.

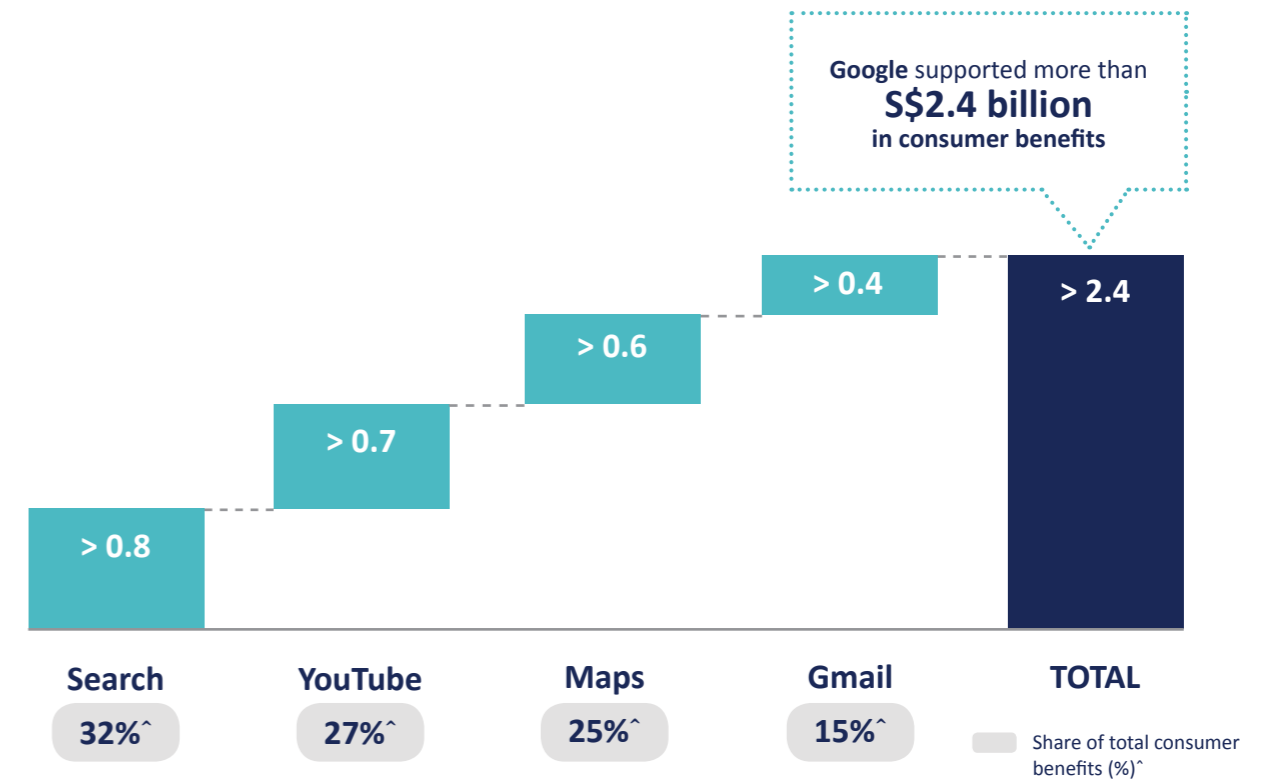
⁶⁹ Google Search user number is based on data from the AlphaBeta consumer survey and internet population data.

⁷⁰ YouTube user number is based on data from the AlphaBeta consumer survey and internet population data.

⁷¹ Number of drivers is based on data from the AlphaBeta consumer survey. The estimates relating to Gmail are computed by AlphaBeta based on data from the AlphaBeta consumer survey and on reporting by techcrunch.com, March 28, 2015 - <http://techcrunch.com/2015/05/28/gmail-now-has-900m-active-users-75-on-mobile/?ncid=rss> and the Email Statistics Report, 2014-2018 by The Radicati Group - <http://www.radicati.com/wp/wp-content/uploads/2014/01/Email-Statistics-Report-2014-2018-Executive-Summary.pdf>

EXHIBIT 5

Value of consumer benefits supported by Google in Singapore
S\$ billions*



*Rounded down to nearest S\$100 million. May not sum to 100% due to rounding.

[^]May not sum to 100% due to rounding.

Source: Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology.

BOX 6

Calculating consumer benefits

This report estimates the consumer benefits of the Google services Search, Maps, YouTube, and Gmail in Singapore, and it uses a novel approach to do so.

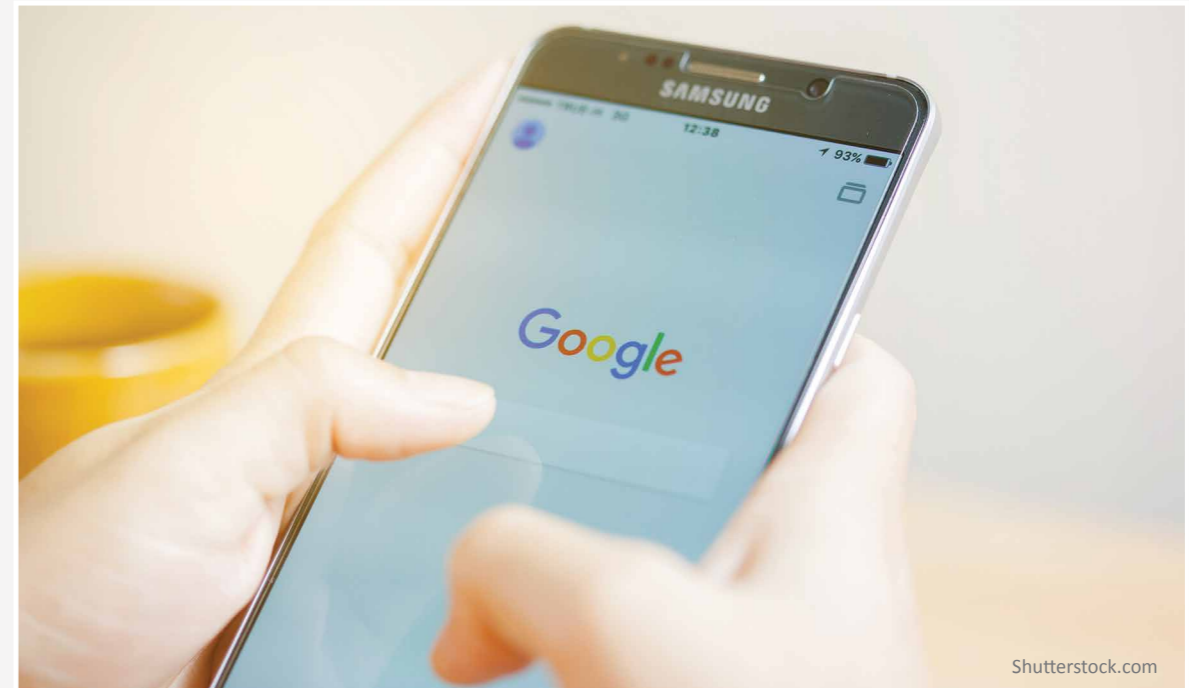
In economic terms, the benefit a product or service provides to consumers is measured through consumer surplus. Typically, the consumer surplus is calculated by observing how customers adjust consumption levels in response to price changes. But this poses a problem when trying to estimate the consumer benefits supported by Google. For one, services, such as Google Search, Maps, YouTube, and Gmail are free to users and no behavioural changes can be observed in response to changes in price. Further, exact consumption levels of the services are hard to observe.

There are several alternative methodologies for estimating the consumer benefits of free services. This report employs a “Willingness to Pay” (WTP) approach and a “Value of Time” (VOT) approach to verify the initial results. Together, these approaches allow us to generate robust estimates of the total consumer benefits of Google services in Singapore. The analysis is based on unique and first-of-its-kind data gathered by AlphaBeta, as well as publicly sourced data. A consumer survey of over 400 respondents was conducted amongst the Singaporean online population, and thousands of driving and public transport trips were simulated on Google Maps (see Exhibit 6 and the Appendix for details on the calculation method).

- Willingness to Pay (WTP).** This method estimates consumer benefits by eliciting how much individuals are prepared to pay for specific products and services. The most straightforward way of obtaining this information is simply to ask consumers. However, this method has drawbacks. For example, individuals often struggle to quantify the value a product or service holds to them. This uncertainty is increased when the product or service in question is free. Further, individuals are prone to overestimate their willingness to pay, especially in hypothetical scenarios. Framing can amplify these uncertainties and potential biases. However, measures can be taken to improve the robustness of estimates. In AlphaBeta’s consumer survey, participants were confronted with the following scenario: they were offered a monthly cash discount on their internet or mobile phone bill if they were willing to permanently forgo their preferred free online search, maps, video, or email service. This meant rather than a willingness to pay, a willingness to accept was elicited, which recent research has shown to be less prone to biases induced by framing. To deal with potential uncertainty about the nominal size of their valuations, subjects were provided with a “discount menu” from which they could choose a valuation, as well as an outside option for them to provide their own valuation.

- Value of Time (VOT).** This method estimates consumer benefits by calculating how much time an individual is saving by using a good or service. To place a value on an individual’s time, wages are commonly used as a measure of opportunity cost. While there is common consensus amongst economists that leisure time is valued more highly than time spent working, it is relatively robust estimate of the marginal value of leisure time. However, this means that our estimates of VOT are deliberately conservative as a higher value associated with leisure would

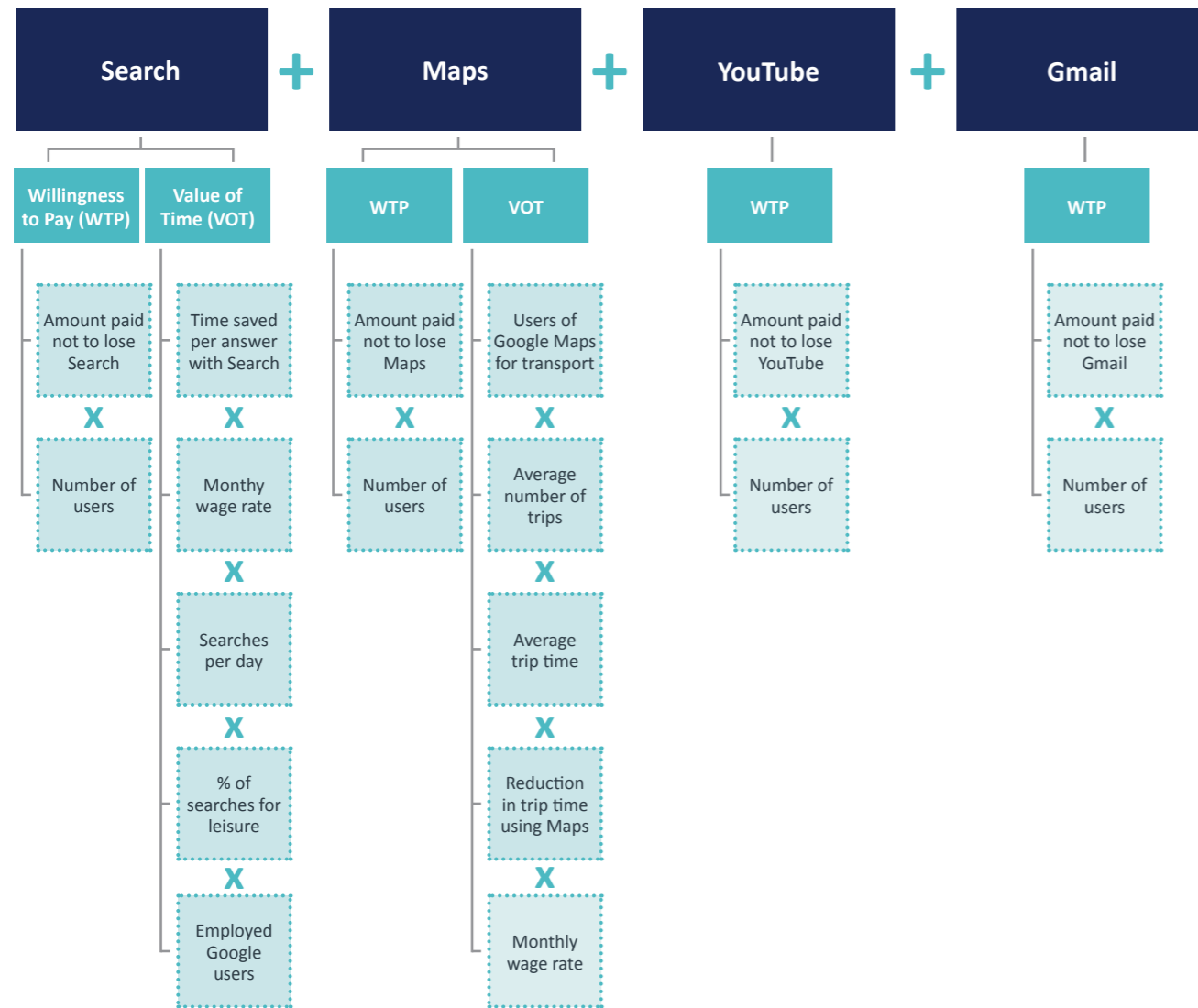
increase the benefits estimated in this report. To be further conservative, the analysis only calculated the VOT for the share of the population currently employed. This conservative approach, combined with the fact that time savings are only one aspect of the benefits that Google’s products bring to consumers, means that this approach likely underestimates the value derived by consumers from Google’s products. As such, the WTP approach is preferred and we use the VOT approach as a secondary verification of the results for selected products.



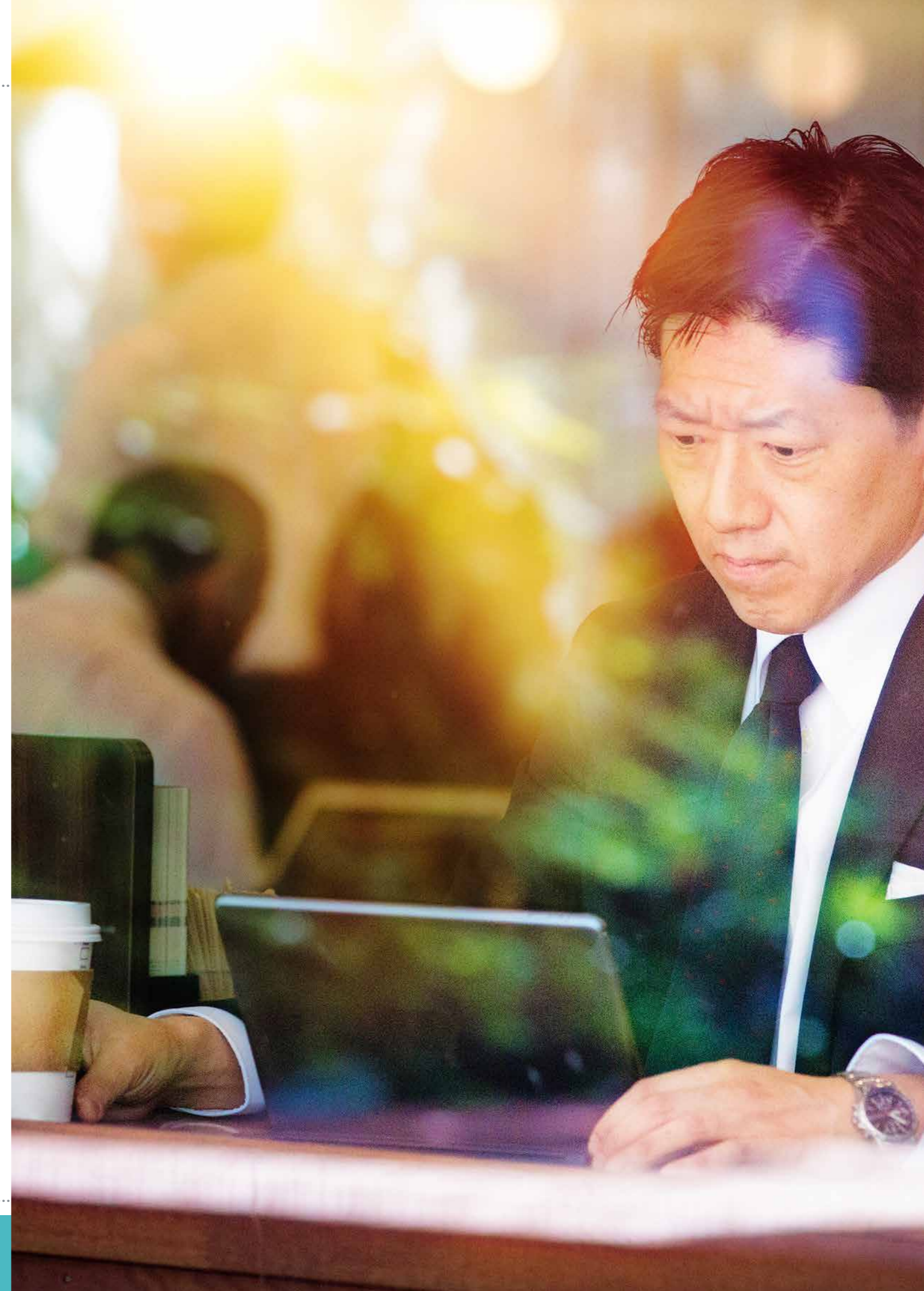
Shutterstock.com

EXHIBIT 6

Methodology for calculating consumer benefits of Google



X Multiply inputs





CONSUMER BENEFITS

Google Search: Getting answers; saving time

Our survey among internet users in Singapore reveals that more than 4 million Singaporeans, or more than 70 per cent of the entire population, use Google Search amongst other search engines.⁷³ These consumers can find all sorts of answers on Google Search, from information on haze pollution levels to the passing of Singapore's founding Prime Minister Lee Kuan Yew.⁷⁴ On average, they would rather pay S\$190 or more per year than to use an alternative search engine.

Based on these responses, total consumer benefits from Google Search are estimated to have exceeded S\$800 million in 2015. They include the value from time savings and productivity gains that occur as consumers can access information faster.

It is estimated that consumers in Singapore saved an average of 20 minutes per day on average—or more than 5 days per year—because Google Search provided them with crucial information that allowed people to be more efficient in their day-to-day life.⁷⁵ They can get more done during their day and have more time to pursue other interests. For example, using Google Search instead of traditional search methods at the library enables consumers to find answers three times faster.⁷⁶ Hence, the associated time savings enable Singaporeans, especially the working population, to be more labour productive (i.e. more output in the same given time) and have more time to pursue other interests. For instance, this daily time savings account for roughly half of an average Singaporean work commute, allowing him or her to get more sleep before work.⁷⁷ The Appendix provides further details on the calculations related to productivity and time savings.

⁷³ Google Search user number is based on data from the AlphaBeta consumer survey and internet population data.

⁷⁴ Reported by Vulcan Post, 2016 - <https://vulcanpost.com/488501/singapore-google-search-2015/>

⁷⁵ See Appendix for details on Methodology.

⁷⁶ Chen et al. (2014), *A day without a search engine: an experimental study of online and offline search*, Experimental Economics.

⁷⁷ Reported by Enterprise Innovation, 2012 - <https://www.enterpriseinnovation.net/article/singapore-workers-beat-commuting-woes>

Estimated consumer benefits from Google Search

In Singapore during 2015:*



Google Search supports over **S\$800 million** in annual consumer benefits



Google Search users are saving **20 mins a day** and more than **5 days** over the year



More than **55%** of searches are made for leisure



Over **4 million Google Search** users make more than **5 searches** on average per day



Valued by online users at over **S\$190** on average a year



*Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.

Estimated consumer benefits from maps

In Singapore during 2015:*



Google Maps supports over **S\$600 million** in annual consumer benefits



More than **3.5 million** users in Singapore



Singaporeans value Google Maps at over **S\$170** a year



Google Maps reduces driving times in Singapore by **10%** on average, which means users save close to **5 hours** a year driving



Google Maps reduces public transport travel times in Singapore by more than **10%** on average, which means users spend over **5 hours** less a year on trains and buses



*Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.



Maps: Optimising travel routes on roads and public transport

Google Maps provides a variety of consumer benefits. Singaporeans use the navigation service to find local businesses and landmark buildings. They also use it to plan their trips and find the fastest or more convenient route in heavy traffic. Google Indoor Maps, lets users access the floor plan of large buildings. Consumers can zoom in and out of malls to quickly locate individual stores, which can save them time during a shopping trip.⁷⁸

The time savings gained from Google Maps and Indoor Maps improve the quality of life for consumers. They are more productive and can ultimately use their time more efficiently.

Singaporean consumers receive Google's mapping services for free, but survey results show that the average user values Google Maps at over S\$170 a year. Google Maps likely supported total consumer benefits worth more than S\$600 million in Singapore in 2015.

The total benefit figure is derived from several

individual consumer benefits, of which time savings are a key one. An analysis of thousands of standard trips and survey data (see Box 7 for further details) suggests that Google Maps enabled Singaporeans to realise time savings worth more than S\$75 million in 2015 due to more efficient travel—both by car and on public transport.

In detail, the analysis found that drivers on average reach their destination 10 per cent faster—saving 5 hours of travel time per year—using Google Maps. 2.5 million commuters using the service on buses and trains were found to cut their travel time by 13 per cent on average—roughly 7 hours per year.

To put this time-saving in perspective, the new public transport train line scheduled to be ready by 2030, the Cross Island Line, is projected to save commuters more than 30 minutes per trip and has been estimated to cost over S\$40 billion.⁷⁹ The proposed integrated North-South Corridor, to be ready by 2026, will shave residents' travelling times by up to 30 minutes on average and cost more than S\$7 billion.⁸⁰ While the time savings from Google Maps is less than these public projects, Google Maps is free of charge.

⁷⁸ Reported by e27, February 19, 2013 - <https://e27.co/indoor-google-maps-for-android-now-available-in-singapore/>

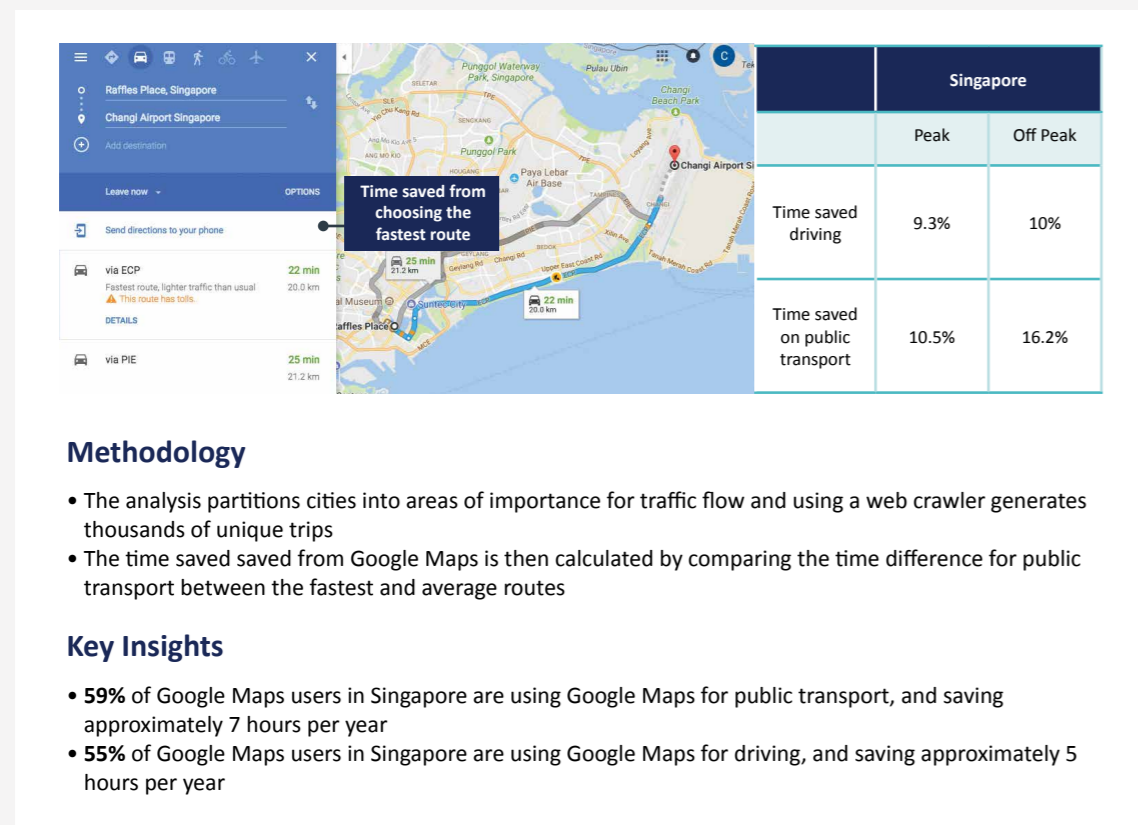
⁷⁹ Information obtained from reporting by The Straits Times, February 24, 2016 - <http://www.straitstimes.com/singapore/transport/extra-2bn-for-cross-island-line-to-skirt-nature-reserve-likely-to-be-fraction-of> and Channel NewsAsia, March 7, 2016 - <http://www.channelnewsasia.com/news/singapore/cross-island-line-could/2577450.html>

⁸⁰ Reported by The Straits Times, April 29, 2016 - <http://www.straitstimes.com/singapore/transport/integrated-north-south-corridor-to-be-ready-in-2026>

BOX 7

Calculating time saved from using Google Maps

To calculate the time savings from using Google Maps, an algorithm was created to simulate 2,753 trips by car and 2,369 trips by bus or train in Singapore. Time savings were calculated by measuring the difference between the travel time of an optimal trip suggested by Google Maps and the average travel time across all other routes presented. The result is a conservative estimate of the time saved on the optimal route.



Methodology

- The analysis partitions cities into areas of importance for traffic flow and using a web crawler generates thousands of unique trips
- The time saved saved from Google Maps is then calculated by comparing the time difference for public transport between the fastest and average routes

Key Insights

- 59% of Google Maps users in Singapore are using Google Maps for public transport, and saving approximately 7 hours per year
- 55% of Google Maps users in Singapore are using Google Maps for driving, and saving approximately 5 hours per year

In a second step, the travel habits and use of Google Maps of over 400 Singaporean consumers were evaluated. Survey respondents were found to use Google Maps on average once per week when driving and once per week on public transport. Asked about the duration of these trips, commuters indicated that they typically spend more than 25 minutes in the car trip and close to 30 minutes on public transport. In a final step, these survey findings were combined with the data results from the trip simulation to calculate the total travel time savings related to the use of Google Maps.



YouTube: Content for everyone; by everyone

More than 3.5 million Singaporeans, or more than 60 per cent of the total population, spend more than an hour per day on Google's online video platform YouTube.⁸¹ Singaporeans watch videos on for entertainment (when watching music videos or comedy), to learn new skills (for example, through tutorials) or generally expand their knowledge (for example, when watching documentaries).

As the service is provided for free, measuring consumer benefits go unrecorded. Yet according to the analysis, YouTube supported benefits worth over S\$650 million for Singaporean consumers in

2015. It is derived from the value Singaporeans attach to YouTube and its wealth of local and international content.

On average, Singaporeans surveyed said they would rather have access to YouTube than receive an annual discount of more than S\$185 on their internet bills (as indicated by our consumer survey). This finding implies that they are willing to pay up to this amount per year to access YouTube, but instead, the service is provided to them for free. The Appendix provides further details on the calculation.

To put this benefit into perspective, S\$185 is almost enough to cover two months of public transport expenses for the average Singaporean commuter.⁸²

Estimated consumer benefits from YouTube in Singapore during 2015:*



YouTube supports over **S\$650 million** in annual consumer benefits



YouTube is the favourite platform for online video for over **3.5 million** Singaporeans



YouTube valued at more than **S\$185** a year per user



Singaporean users consume over **60 minutes** of YouTube a day on average



*Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.

⁸¹ YouTube user number is based on data from the AlphaBeta consumer survey and internet population data. Average length of YouTube usage based on data from the AlphaBeta consumer survey.
⁸² Reported by The Straits Times, June 29, 2014 - <http://www.lexisnexis.com.libproxy1.nus.edu.sg/ap/academic/>. The estimated average public transport cost per commuter works out to be around S\$98 per month.

Gmail: Simple, convenient communication for leisure and work

Google's email service Gmail helps Singaporeans communicate with friends, family, colleagues, and others. Today, Gmail is the provider of choice for around 2 million people in Singapore, meaning almost every 3rd person in the country uses Google's email service. More than 60 per cent of

Gmail users in Singapore use the service for leisure.⁸³

Gmail is estimated to have generated more than S\$350 million in benefits to Singaporean consumers in 2015.

Specifically, the survey revealed that Gmail users in Singapore value the service at over S\$180 a year, yet they are provided with the service for free. This is more than Singaporeans typically pay for a basic telephone landline subscription, which costs around S\$171 per year.⁸⁴

Estimated consumer benefits from Gmail in Singapore during 2015:*



Gmail supports more than **S\$350 million** in annual consumer benefits



Email provider of choice for **2 million** Singaporean users



Valued by Singaporeans at **S\$180 a year** per user



Used mostly for leisure, with more than **60%** of Gmails sent for leisure



*Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology. Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.

⁸³ These estimates are computed by AlphaBeta based on data from the AlphaBeta consumer survey.
⁸⁴ Information obtained from Singtel, January 23, 2017 - <https://www.singtel.com/personal/i/phones-plans/telephone-services/home-line>. To derive our estimate, we took the subscription charge for 3 months of S\$29 and scaled it up to a yearly figure and added the one-time activation charge of S\$54.

SOCIETAL BENEFITS

USING GOOGLE
PRODUCTS TO
INNOVATE AND
CREATE JOBS

Estimated societal benefits to Singapore from Google products



Google Cultural Institute

partners with local
museums to curate over

2,900

artworks on its platform,
allowing online users to view
Singaporean art and heritage
with ease



Squared Data & Analytics Program, one of Google's

talent and skills training
programmes, has been established
to equip college graduates and
early career professionals with data
analytics skills and develop young
talents for Singapore's growing
digital economy



*Data in exhibit is estimated by AlphaBeta using a range of original and third party sources. See Appendix for detailed methodology.
Unless otherwise stated, these estimates refer to annual benefits based on the latest available figures, thus of 2015.



SOCIETAL BENEFITS

Societal benefits are more difficult to calculate than benefits to businesses and consumers. Often their impact only shows up in metrics over the longer term. Sometimes several metrics are required to measure such benefits. For example: Which metric should be used to measure human capital development? How do you measure innovation?

Despite these challenges, many of Google's digital services make crucial contributions to Singapore's society and economy, and these contributions can be observed and described. The following sections will illustrate the societal benefits of Google products and services in detail.

Human capital development

Singaporean businesses rely on skilled workers to be productive and grow. Google services can support them by providing innovative tools for teachers and coaches working in the country's education sector.

For example, Google's digital products and services can be used to enhance the quality of education. Services such as Google Search and Google Maps are available free of charge and can make classroom learning more interesting and effective. Google for Education, a program providing free productivity software tools (G Suite for Education), assignment software and low-cost computing hardware to educators, contributes to both the quality and accessibility of information in the education system. In addition to free online products, Google for Education has specific features to foster greater collaboration and communication in classrooms.⁸⁵ In partnership with the Ministry of Education, Google's G Suite for Education is now available to more than 30,000 teachers across 350 local schools.⁸⁶

Google offers various other free digital platforms to assist Singaporeans with self-learning. Being able to learn and acquire new skills throughout life is considered one of the most essential assets

workers need to have to remain employable. In this context, YouTube has become a go-to training source. Singaporeans can find a wide range of educational content on the video platform, from classes teaching communication skills to tutorials on "Do-It-Yourself" (DIY) home renovations.

For example, due to the slowdown in global economic activity, more than 9,000 residents lost their jobs in Singapore in 2015, 71 per cent of which were professionals, managers, executives, and technicians (PMETs).⁸⁷ The increased retrenchment of these white-collar employees in recent years highlights the need for PMETs to seek continuous learning and acquisition of transferable skills to remain employable. Google aids in this area by providing numerous free platforms for content and knowledge acquisition: PMETs can undergo classes on numerous topics (e.g. how to be a better communicator) on YouTube for instance.

Specific talent and training programmes complement Google's open educational content on YouTube and elsewhere. The company has committed substantial resources to specific initiatives such as "Go Global" (see Box 8), "Digitize" and "Squared Data & Analytics Programme", which are designed to improve the digital skills of Singaporeans. A bigger pool of skilled

digital talent would help Singapore grow its digital economy.⁸⁸ For example, "Digitize", launched by Google in partnership with Singapore's Economic Development Board and recruitment firm Xpand Group, prepares young people for a career in Singapore's digital marketing industry.

Google's "Squared Data & Analytics Programme", launched in 2014 in collaboration with government agency IMDA, is training young Singaporeans to become data analysts—a sought-after occupation in the digital age. It is estimated that Singapore needs around 2,500 more data analysts by 2020, and the Google programme has set out to help meet this demand and bolster the country's digital talent pipeline.⁸⁹ Participants undergo training in data analytics and receive opportunities for hands-on learning in selected firms.⁹⁰

⁸⁵ Google for Education - <https://www.google.com/edu/products/productivity-tools/classroom/>

⁸⁶ Reported by enterpriseinnovation.net, April 27, 2015 - <http://www.enterpriseinnovation.net/article/singapores-tech-classrooms-where-students-can-be-teachers-1941192842>

⁸⁷ Reported by The Straits Times, April 21, 2016 - <http://www.straitstimes.com/singapore/manpower/pmets-hard-hit-amid-rise-in-layoffs-last-year>

⁸⁸ Digitize - <http://www.digitizeacademy.com/#home>

⁸⁹ Reported by Channel NewsAsia, January 27, 2015 - <http://www.channelnewsasia.com/news/business/singapore/ida-partners-google-to/2464036.html>

⁹⁰ Google Singapore, Squared Data & Analytics Program - <https://sites.google.com/site/squareddataandanalytics/the-program>

BOX 8

How Google’s skills training programmes benefit Singaporeans

SMEs represented 99 per cent of Singaporean enterprises in 2015 and are a major driver of the domestic economy.⁹¹ Yet, many small and medium-sized businesses in Singapore currently lack the skills to overhaul their operations and become ready for the digital age. The Singaporean government is helping SMEs go digital with initiatives such as the “Smart Nation” plan.⁹² Google has been complementing this effort with a suite of training programmes.

In 2015, Google launched “Go Global”, an initiative designed to help local SMEs increase their global presence and exportability. The programme was set up in collaboration with key partners from industry and government—including Spring Singapore, a government agency supporting startups and industry

development, and local banking corporation United Overseas Bank.⁹³ The programme encourages small businesses to use Google’s digital platforms and networks to expand their customer reach locally and abroad. It offers workshops, training materials, educational videos, and general support.⁹⁴ Since 2015, the programme has helped 1,000 SMEs to get online and export their goods and services.^{95 96} In addition, the “Go Global” programme has created 90 training materials to equip SMEs with the knowledge to leverage the digital economy. As a result, traditional SMEs have signalled a greater willingness and ability to use digital tools for their sales strategy. For example, some have recently created mobile-friendly websites, integrated e-commerce features and started running YouTube advertising campaigns to unlock export markets and reach new customers abroad.

One SME that has benefitted from the “Go Global” programme is Ascent Solutions, a local cargo security firm that uses tracking technology to make freight transports more secure. With more than 5 years’ experience in the cargo business, Ascent Solutions used the “Go Global” programme to overhaul its digital presence and spur its global expansion plans. After consultations with the “Go Global” team, Ascent revisited its marketing strategies and

ran various digital advertising campaigns. These campaigns led to an increase of 500 per cent in lead generation, with close to 300 potential customers from 50 emerging markets in less than three months.⁹⁷ As a result, Ascent needs less staff on the ground to manage its overseas expansion and can focus instead on servicing its clients.

Another local SME that has benefited from the programme is Traditional Chinese Medicine (TCM) manufacturer Poli Medical, which was founded in 1971.⁹⁸ The programme was the firm’s first attempt at digital marketing to reach new audiences and build brand awareness for its products. Despite initial resistance to changes in its marketing strategy (which relied heavily on traditional media), the firm decided to run a digital advertising campaign. The result: a notable increase in brand awareness, which allowed Poli Medical to enter new markets such as Cambodia and Myanmar.⁹⁹

As these SMEs expand both in Singapore and new markets, there are positive spillover effects on the entire Singapore economy. These SMEs will have the abilities and resources to hire more locals to aid their growing operations, hence spurring local employment and economic activities across industries. In addition, employees involved in planning and executing the digital campaigns (marketing department staff and management level individuals) have broadened their digital knowledge, which they could later use in other areas of the digital economy.



Ascent Solutions



Poli Medical



Go Global

⁹¹ Profile of enterprises in Singapore, SingStat 2015 - https://www.singstat.gov.sg/docs/default-source/default-document-library/statistics/visualising_data/profile-of-enterprises-2015.pdf

⁹² Reported by Spring Singapore, August 3, 2015 - <https://www.spring.gov.sg/Inspiring-Success/Enterprise-Stories/Pages/Setting-the-standard-worldwide-intelligent-city-Smart-Nation.aspx>

⁹³ Reported by Today, November 26, 2015 - <http://www.todayonline.com/business/smes-get-google-help-go-global>

⁹⁴ Go Global - <https://goglobal.withgoogle.com/about-us/#faq-heading>

⁹⁵ Reported by The Straits Times, November 27, 2015 - <http://www.straitstimes.com/business/new-scheme-to-help-smes-go-global-online>

⁹⁶ Reported by The Business Times, November 11, 2016 - <http://www.businesstimes.com.sg/technology/3000-disadvantaged-kids-to-get-free-coding-lessons-from-google>

⁹⁷ Information obtained from Google Singapore, November 19, 2016 - <https://www.youtube.com/watch?v=aVa6pHNdf3I&feature=youtu.be>

⁹⁸ Information obtained from Poli Medical, February 9, 2017 - <http://www.polimedical.com.sg/>

⁹⁹ Information obtained from Channel NewsAsia, November 10, 2016 - <http://www.channelnewsasia.com/news/singapore/google-moves-to-new-office-in-singapore-to-house-growing-team/3277064.html>

Increased local innovation

Google is creating significant additional benefits for Singapore’s wider economy by contributing to the country’s digital “ecosystem” with various initiatives. An industry ecosystem typically comprises of all the firms, government agencies, education and research organisations that together enable growth and innovation to occur.

When Singapore celebrated 50 years since independence in 2015, Google ran a “Doodle 4 Google” competition in collaboration with local organisations, which encouraged young people to participate in “coding camps” and deepen their digital skills.¹⁰⁰

Coding skills were also the focus of another project, “Code in the Community”, which Google co-hosts with four local community groups (the Chinese Development Assistance Council, Singapore Indian Development Association, the Eurasian Association and the Yayasan Mendaki). The initiative, which started earlier this year, comprises of coding classes for 3,000 students from low-income families in Singapore.¹⁰¹ The classes seek to increase students’ exposure to technology and encourage them to choose a career in the digital economy.

Supporting not-for-profits

Google’s digital products and services help not-for-profit organisations operate more efficiently. Google provides not-for-profit organisations with several in-kind benefits, including “Ad Grants” and “Apps for Not-for-profits”. The company’s program “Ad Grants” provides free AdWords credit for non-profit organisations. Advertising through Google enables not-for-profit organisations to broaden their reach and awareness of their cause and to attract donors. “Apps for Not-for-profits” provides not-for-profit organisations with free access to the G Suite range of cloud-based products, such as Google Docs, Drive, and Gmail. These digital tools can improve workplace productivity and lower IT costs (see Chapter 2 for details). Box 9 highlights an example of a local not-for-profit organisation that has benefitted from Google’s digital tools.

BOX 9

How Google has helped local not-for-profits extend their reach

Singapore International Foundation is one local organisation that has benefitted from Ad Grants and Google’s suite of marketing tools. Its programme “Our Better World”, an online platform full of stories about people in Asia who have helped others in need, uses digital technology and the magic of storytelling to inspire people to do good.¹⁰² To achieve its goal, “Our Better World” needed to create greater awareness globally, increase its website traffic, and encourage more people to participate. Google’s Ad Grant has enabled the marketing team to better connect people to meaningful projects using AdWords. For example, in the recent Play-for-Good futsal tournament held to raise funds in support of the Singapore Cerebral Palsy football team, a third of the teams that



participated in the event were enticed to do so by the event’s AdWords campaign. Since using Ad Grant, the Singapore International Foundation noticed that search queries for its “Our Better World” website increased by 70 per cent, that more people visited its website and also spent 20 per cent more time on the website.¹⁰³



¹⁰⁰ Reported by SG50, August 2015 - <https://www.sg/en/SG50/WhatsOn/2015/Google%20Shophouse.aspx?Past=Yes>

¹⁰¹ For more information, see: <http://www.codeinthecommunity.com/curriculum>

¹⁰² Singapore International Foundation, Our Better World - <http://www.sif.org.sg/our-work/obw/obw/about>

¹⁰³ Google Ad Grants, Singapore International Foundation - <https://www.google.com/grants/success-stories/singapore-international.html>

Investment and job creation in Singapore

Google has established its new Asia-Pacific headquarters in Singapore and has expanded its workforce from 24 in 2007 to over 1,000 employees currently.¹⁰⁴ It is also hiring a team of software engineers here to reach even more internet users, especially in the Asia-Pacific region. This underpins Singapore's central location and significant talent pool of skilled workers.

Google's investments in the nation have contributed to Singapore's economic activity and will continue to raise Singapore's global profile and potentially draw more multinational companies into the region. For example, Google has built a S\$165 million facility in Jurong in 2013 and pledged a further S\$404 million for a second data centre in Jurong, to be completed this year.¹⁰⁵ The current centre has supported data management related jobs, such as Linux system administrators and data management technicians.

Cultural and other societal benefits

Many wider societal benefits are emanating from Google's presence in Singapore. For example, Google's data centre in Jurong funds local community initiatives committed to various causes such as raising computer science literacy, improving the environment, and providing access to the internet.¹⁰⁶

Google Cultural Institute, a not-for-profit initiative that partners with cultural organisations to bring the world's cultural heritage online, has also been active in Singapore. It is working with various local museums, including the National Gallery Singapore, to display over 2,900 artefacts and artworks online on its Google Arts and Culture platform.¹⁰⁷ This can inspire more people in Singapore and abroad to

enjoy and learn about Singapore's art, heritage, and culture.

YouTube has become a popular tool for government agencies in Singapore to educate the public and increase awareness of various societal issues. For instance, the Singapore Police Force maintains its own YouTube channel, with over 20 million views, to educate citizens about how to prevent crime, be vigilant, and understand terrorism threats. The social media platform can also help local police appeal for public information on suspects or unsolved crimes.¹⁰⁸ As more people are connected via the internet, YouTube will become an increasingly effective platform for Singaporeans to learn more about all sorts of societal issues from online fraud schemes to flu prevention.¹⁰⁹

The celebrations marking 50 years of independence in Singapore were accompanied by a series of Google initiatives that raised awareness of Singapore's culture and history. Google set up a "Google Shophouse" to highlight the digital projects that Google has developed for Singapore such as the "Singapore Time Walk App", built in collaboration with the Ministry of Culture, Community and Youth, the National Heritage Board, and the Urban Redevelopment Authority. The app made history come alive by telling users more about historic sites in an interactive way.

¹⁰⁴ Reported by CNBC, November 10, 2016 - <http://www.cnbc.com/2016/11/10/googles-new-apac-headquarters-in-singapore-is-a-blend-of-office-building-and-tech-campus.html>

¹⁰⁵ Reported by Today, October 22, 2014 - <http://www.todayonline.com/tech/google-upgrading-spore-data-centre-greater-energy-efficiency>

¹⁰⁶ Google Data Centers, Singapore Community Outreach - <https://www.google.com.sg/about/datacenters/inside/locations/singapore/community-outreach.html>

¹⁰⁷ Google Arts & Culture - <https://www.google.com/culturalinstitute/beta/entity/m06t2t>

¹⁰⁸ Singapore Police Force YouTube Channel - <https://www.youtube.com/user/SpfCommunityOutreach/videos>

¹⁰⁹ Reported by Open Gov, February 11, 2014 - <http://www.opengovasia.com/articles/exclusive-singapore-police-social-media-use-part-1>



Pagodas II, Pago-Pago Series

Latiff Mohidin 1964

From the collection of National Gallery Singapore

Details

Title: Pagodas II, Pago-Pago Series

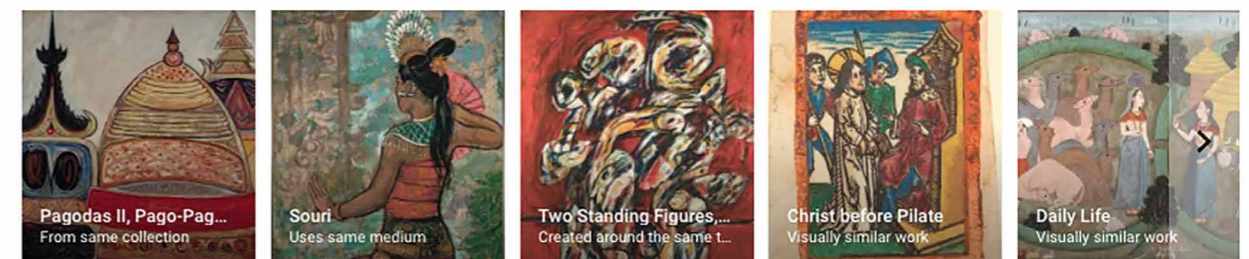
Creator: Latiff Mohidin

Date: 1964

Physical Dimensions: w99.2 x h99.4 cm

Type: Oil on canvas

Recommended



APPENDIX A – Detailed Methodology

Summary

This report describes the total economic impact of Google in Singapore during 2015 as comprised of three components: business benefits, consumer benefits, and societal benefits. These are gross benefits, some of which can be quantified and others of which can be described in qualitative terms. While each of these benefits is additional, the concepts are distinct. The amounts were initially quantified in US dollars and then converted to local currency based on the average exchange rate in 2015.¹¹⁰

To estimate the business benefits, we calculated the activity generated by businesses that use Google services to drive sales and income. Services that businesses and individuals use to generate income include Search and AdWords, AdSense, YouTube, and G Suite.

Estimating the consumer benefits supported by Google is a challenging task. This is because individuals typically do not pay for the Google services that they use, including Search, Maps, Gmail, and YouTube. There are several established methodologies for estimating the benefits of free services, including “Willingness to Pay” (how much an individual values Google products?) and “Value of Time” (how much time did an individual save by using a Google product?). This study uses the former as the primary estimation approach while using the latter as a secondary verification method. The research includes a first-of-its-kind consumer survey amongst the Singaporean online population as well as big data gathering methods to determine the value of time saved by using Google Maps for driving and public transport.

Finally, Google supports benefits for the broader society through its various initiatives and not-for-profit operations. We used a combination of quantitative and qualitative analysis to create a snapshot of these broader benefits.

Methodology and Data: Business benefits

The business benefits supported by Google are calculated by considering the revenues and net advertising benefits of Singaporean businesses and advertisers using Google products.¹¹¹ These benefits proxy for the “gross economic activity” generated by Google, meaning the gross revenue, income or savings generated by businesses through the use of Google products. This gross economic activity does not measure 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. Gross economic activity also does not account for activity that may have been displaced by Google and the methodology does not attempt to estimate the incremental impact of Google on the Singapore economy beyond what would be the case if Google didn’t exist but other companies like it did. Such hypothetical scenarios required to calculate truly incremental benefits of Google are highly speculative and beyond the scope of this study.

For the calculation of business benefits of each product (except AdSense), we employed a top down and bottom up approach. To reflect both approaches, we report our estimates as ranges, rather than point estimates.

Search and AdWords

The business benefits of Search and AdWords are derived from sales that originated or were driven by Google searches. The benefits are 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 Singapore and the proportion of this space that Google represents. The bottom up approach estimated the number of page views in Singapore, the proportion of pages with advertisements, the

number of advertisements per page and the average click-through rate.

To estimate the income generated by businesses paying for online advertising through Google, a return on investment (ROI) ratio range of 3.4 – 8 was applied, and both estimates were reported.¹¹² 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 US\$2 in revenue for every US\$1 spent on advertising. This finding was published in the American Economic Review in 2009.
- Businesses also receive free clicks because of unpaid 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 assumes 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 assumes their value at 70 per cent of paid clicks.
- Because of these assumptions, an ROI ratio of 8 is estimated. This ROI ratio is taken as an upper bound. To derive a lower bound, we build on the academic findings detailed in the Google UK Economic Impact Study to set a lower bound of 3.4.

We report the ranges of these estimates.

Table 1: Inputs and sources for calculating business benefits of Search and AdWords

Estimation	Metric	Source
Top down approach	Total market expenditure on search advertising	• Statista (2015)
	Google Search’s traffic share	• StatCounter Global Statistics (2015)
Bottom up approach	Google Search traffic data	• Stats Counter Global (for Android market share), Google (2015) • Nielsen online data • Industry expert interviews
	Percentage of pages that display advertisements	• Varian (2009), Jansen & Spink (2009) • Deloitte UK Econ. Impact Study
	Advertisements per page on average	• Varian (2009), Jansen & Spick (2009) • Deloitte UK Econ. Impact Study
	CTR for Search, Desktop (Estimate)	• Google Display Benchmark Tool for AdSense (03/2016) • Marin Research (2014)
	CTR for Search, Mobile (Estimate)	• GDBT for AdSense (03/2016) • Marin Research (2014)
	Average CPC for Search (Estimate)	• Word Stream (2015) • Marin Research (2014)
Both methods	ROI ratios Lower and Upper Bound	• Varian (2009), Jansen & Spick (2009) • Deloitte UK Econ. Impact Study
	Percentage of Android devices in country	• e27 (2015)

¹¹⁰ Average exchange rate for 2015 was 1 USD = 1.37 SGD. Information sourced from X-Rates.com.

¹¹¹ Net advertising benefits refers to the increase in revenues and sales that can be directly attributed to advertising minus the related advertising expenditure.

¹¹² ROI reflects the net advertising benefits that businesses receive from online advertising (i.e. total revenue minus online advertising cost).

AdSense

The direct business benefits from Google AdSense are estimated as the additional net advertising benefits generated by businesses placing advertisements on websites created by Singaporean online content creators such as writers and bloggers. We estimated these profits using Google’s published global advertising revenue from Google network’s websites and multiplied this by

Singapore’s share of global AdSense impressions.¹¹³ We proxied Singapore’s share of impressions by taking into consideration the shares of global impressions, digital advertising spends and online populations of similar countries such as Hong Kong and Taiwan. In addition, we applied an ROI ratio of 0.24, of the return that advertisers make using online advertising, derived from academic literature.^{114 115} We reported a range of values.

Table 2: Inputs and sources for calculating business benefits of AdSense

Estimation	Metric	Source
Global impressions	Countries (Hong Kong and Taiwan) share of global impressions on AdSense	• DoubleClick (2013)
	Advertising spend of countries	• Statista (2015) • CENS (2015)
	Internet users in countries	• Statista (2015) • Internet Live Stats (2015)
Advertiser net benefits	Advertising revenue from Google Network Member’s websites	• Google Annual Report (2015)
	ROI ratio from AdSense	• Gupta et al. (2015)

YouTube

The estimate of business benefits of YouTube to digital video advertisers uses two methods to establish a range. First, the top-down method uses the total online video advertising spend in Singapore and YouTube’s share of that space.

Second, the bottom up method employs estimates for YouTube’s ads’ cost per view, the view rate of advertising, the total videos viewed in a year and the proportion of videos with advertising. Each estimate is then multiplied with upper and lower bound ROI ratios (0.91 – 1.79) to find out the full economic impact YouTube has on Singapore.^{116 117}

Table 3: Inputs and sources for calculating business benefits of YouTube

Estimation	Metric	Source	
Top down approach	Total market revenue from digital video advertising	• Statista (2015) • Zenith Optimedia (2015)	
	YouTube’s traffic share of streaming	• Statista (2015)	
Bottom up approach	YouTube traffic data	• Stats Counter Global (for Android market share) • Nielsen online data • Industry expert interviews	
	Percentage of videos with viewable ads	• Deloitte UK Econ. Impact Study (2014)	
	YouTube CPV (Estimate)	• Deloitte UK Econ. Impact Study (2014) • Gray (2012) • Word Stream (2015) • Marin Research (2014)	
	Percentage of videos with clickable ads	• Whatsadvertising (2015)	
	YouTube CTR	• Gray (2012)	
	YouTube CPC (Estimate)	• Whatsadvertising (2015) • Word Stream (2015) • Marin Research (2014)	
	Both methods	YouTube ROI ratio	• Think Box (2011,2014) • Business Insider (2016)
		Percentage of video views from abroad	• Social Blade • Industry Interviews • Today (2017)
		Percentage of Android devices in country	• e27 (2015)

¹¹³ Google Inc. (2015). Form 10-K for fiscal year ended December 31, 2015, Submission to US SEC. - https://abc.xyz/investor/pdf/20151231_alphabet_10K.pdf

¹¹⁴ ROI ratio based on Gupta et al. (2015), Do display ads influence search? Attribution and dynamics in online advertising, International Journal of Research in Marketing.

¹¹⁵ An ROI ratio of 0.24 implies that for every \$100 spent by advertisers online, they receive a revenue of \$124.

¹¹⁶ YouTube ROI ratio derived from reporting by Business Insider Singapore, April 20, 2016 - <http://www.businessinsider.sg/youtube-ads-have-better-roi-than-tv-according-to-google-2016-4/?r=US&IR=T#mL3ZFqo0vlab2xq2.97> and Think Box (2015) A Year in TV 2014 Annual Review, Think Box.

¹¹⁷ That is, every dollar of advertising expenditure leads to between \$1.91 and \$2.79 of revenue for businesses.

G Suite

We estimated the direct benefits of Google G Suite in two ways. The top-down approach took the number of businesses in Singapore and the share of Singaporean businesses using G Suite.¹¹⁸ For the bottom up approach, we used the active downloads for the Google Admin App on Android (assuming each business using G Suite had one account on average). These numbers were multiplied by the average expenditure on G Suite per company. More

than an estimated 3,500 companies have utilised G Suite in Singapore.¹¹⁹ It is important to stress that this is likely a significant underestimate of the number of businesses using G Suite as it excludes businesses using these tools but which have not installed the Admin App on their phone. To get to a benefits figure, we took the average of the two approaches and multiplied by the annual ROI ratio. A recent study has estimated that G Suite offers an ROI ratio of 2.04.¹²⁰

Table 4 : Inputs and sources for calculating business benefits of G Suite

Estimation	Metric	Source
Top down approach	Number of companies in country	• SingStat (2015)
	Share of companies in country using G Suite	• eMarketer (2015)
Bottom up approach	Number of smartphone users	• Statista (2015)
	Percentage of smartphones with Android operating system	• e27 (2015)
	Percentage of Android devices with Google Admin installed	• Google Play Store • Industry expert interviews
Both methods	ROI for G Suite	• Forrester Consulting (2015)
	Average expenditure per company	• SingStat (2015) • Google G Suite (2015)

Methodology and Data: Consumer benefits

Consumer surplus is usually calculated by observing how customers respond to price changes. For example, if customers reduce their consumption rapidly in response to price increases, that may be an indication that they do not value the product much higher than its current price and are not deriving much benefit from it. The consumer benefits supported by Google are challenging to measure and calculate because individuals typically don't pay for the services, such as Search, YouTube, Maps, and Gmail.

In the absence of price indicators, there are several established methodologies for estimating the consumer benefits of free services:

- **Willingness to Pay:** This method estimates benefits by asking individuals how much they value specific products.
- **Value of Time:** This method estimates benefits by calculating how much time an individual saved by using a good or service.

This study uses the former, including the latter as a secondary verification method for time saved through Google Search and Google Maps for driving and public transport trips.

¹¹⁸ Share of businesses using G Suite is based on reporting by Computer World, February 16, 2016 - <http://cw.com.hk/news/5-hk-companies-use-either-office-365-or-google-apps-email> . Number of businesses is estimated from SingStat - https://www.singstat.gov.sg/docs/default-source/default-document-library/statistics/visualising_data/profile-of-enterprises-2015.pdf. Gmail acts a proxy for G Suite.

¹¹⁹ Number of firms using G Suite is estimated based on Google Admin installs and Android smartphone penetration.

¹²⁰ Forrester Consulting (2015) *The Total Economic Impact of Google Apps for Work* Forrester Research Inc. This implies that every dollar of expenditure leads to \$3.04 of business benefits (in terms of reduced costs or higher revenue).

Google Search

The benefits of Google Search to Singaporean consumers were primarily estimated using a “Willingness to Pay” approach. This method employed data from a consumer survey of Singaporean internet users conducted by AlphaBeta. The survey found that more than 4 million Singaporeans preferred Google Search to any other search engine (of course, many of these users also use other sites to search online).¹²¹ The data also revealed Google Search users would rather pay over S\$190 a year on average than to use an alternative search engine. This valuation was then scaled up to the entire Google Search user base.

As a secondary verification of the results, we calculated the time saved compared with offline methods. To calculate this, we applied estimates of time saved from an international study that measured the time taken to conduct a search online versus a search at the library.¹²² This study found

that a search that takes 21 minutes in the library takes only 7 minutes online.

We accounted for the fact that people now ask more questions due to the ease of online search by using original data from the AlphaBeta consumer survey. In 2015, Singapore had more than 4 million Google Search users, who conducted approximately 5 searches every day on average.¹²³

Over half of these were conducted for leisure rather than work purposes. This translated to increased labour productivity if the searches were work-related and time saved for leisure related searches. While it is true that Google Search makes workers more productive by freeing up time, we only used searches made for leisure in our calculation as the benefits of time saved at work are captured implicitly in workers’ incomes and firms’ profits. However, the impact of these productivity gains is likely to be large.

The time saved from using Google Search was multiplied by the average national wage rate.

Table 5: Inputs and sources for calculating consumer benefits of Google Search

Estimation	Metric	Source
WTP for Google Search	Amount that consumers value product per year	• AlphaBeta Consumer Survey
Value of time saved using Google Search	Time saved per search	• Varian (Presentation 2014) • Chen et al. (2014)
	Average daily searches per user	• AlphaBeta Consumer Survey
	Percentage searches made for leisure	• AlphaBeta Consumer Survey
	Monthly wage rate	• International Labour Organisation (ILO) (2014)
Both methods	Online Population (OP)	• Statista (2015)
	Google search users as percentage of OP	• AlphaBeta Consumer Survey
	Percentage of Android devices in country	• e27 (2015)

¹²¹ Google Search user number is based on data from the AlphaBeta consumer survey and internet population data.
¹²² Chen et al. (2014), *A day without a search engine: an experimental study of online and offline search*, Experimental Economics.
¹²³ Number of searches based on data from the AlphaBeta consumer survey.

Google Maps

We estimated the benefits of Google Maps to consumers using the “Willingness to Pay” method, where consumers are asked to value their favourite online maps service. Second, we used the “Value of Time” method to separately estimate the time saved by using Maps for driving and public transport.

Estimating the benefit of using Google Maps from navigation was challenging because there are not well-established figures on how often we use a tool like Google Maps to help us plan a trip. There also are not well-established figures on how much time a trip optimisation saves an individual. Data needed to calculate the benefits of Google Maps was collected as part of the AlphaBeta consumer survey. The survey was conducted amongst over 400 respondents with key demographic data including age, gender, geography, and income, respective of the countries online population.

The AlphaBeta consumer survey provided the proportion of the online population using Google Maps for transport. Respondents were asked on how many trips, in the past two weeks, they had used Google Maps to plan or navigate their journey. The survey recorded the average number of trips per week and the average length per trip.

We estimated the value of time saved the following way. Using data collected by AlphaBeta from 2,753 driving and 2,369 public transport trips across popular routes in Singapore, time-saving was based on the difference between the optimal trip on Google Maps and the average of the multiple trip options presented by Maps (i.e. a conservative estimate of the time saved by taking the optimal route). The average percentage time saved per trip was estimated and the average time difference between using and not using Google maps calculated.

Table 6: Inputs and sources for calculating consumer benefits of Google Maps

Estimation	Metric	Source
WTP for Google Maps	Amount that consumers value product at	• AlphaBeta Consumer Survey
	Google Maps users as percentage of OP	• AlphaBeta Consumer Survey
Value of time saved using Google Maps on public transport	Percentage of time saved per trip on average	• AlphaBeta Google Maps Study
	Trips per week	• AlphaBeta Consumer Survey
	Average trip time	• AlphaBeta Consumer Survey
	Maps users, public transport, percentage of OP	• AlphaBeta Consumer Survey
Value of time saved using Google Maps while driving	Percentage of time saved per trip on average	• AlphaBeta Google Maps Study
	Trips per week	• AlphaBeta Consumer Survey
	Average trip time	• AlphaBeta Consumer Survey
Both methods	Online population	• Statista (2015)
	Monthly wage rate	• ILO (2014)

YouTube

We calculated the benefits of YouTube to consumers using willingness to pay, where consumers were asked to value their favourite online video service. Results from the AlphaBeta consumer survey amongst the Singaporean online population were used.

Table 7: Inputs and sources for calculating consumer benefits of YouTube

Estimation	Metric	Source
WTP for YouTube	Amount that consumers value product per year	• AlphaBeta Consumer Survey
	Online population (OP)	• Statista (2015)
	YouTube users as percentage of OP	• AlphaBeta Consumer Survey
	Percentage of Android devices in country	• e27 (2015)

Gmail

We calculated the benefits of Gmail to consumers using willingness to pay, where consumers were asked to value their favourite online email service. Results from the AlphaBeta consumer survey amongst the Singaporean online population were used.

Table 8: Inputs and sources for calculating consumer benefits of Gmail

Estimation	Metric	Source
WTP for Gmail	Amount that consumers value product per year	• AlphaBeta Consumer Survey
	Online population (OP)	• Statista (2015)
	Gmail users as percentage of OP	• AlphaBeta Consumer Survey

Methodology and Data: Societal benefits

Societal benefits are less easy to calculate than benefits to business or consumers because they comprise benefits that only show up in indicators over the longer term or benefits that are difficult to quantify like charitable activity or innovation. While these benefits are often not conducive to comprehensive quantitative measurement, they are important contributions to Singapore that can be observed and described.

We provide detail on how each of the societal benefits was estimated in the relevant sub-section in Chapter 4.

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