Google's Impact In The UK: At Home, At School, At Work.



2018

PUBLICFIRST

Note: This report was commissioned by Google and prepared by Public First. Google did not provide any new or internal data to generate these estimates. All of the report's modelling is based on third-party or public data, alongside Public First's own estimates.

PUBLICFIRST

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Introduction

If you're like the vast majority of people in this country, you'll have used a search engine at some point today: to check a fact or to look up when your GP opens, to find a restaurant or browse the news. If you have kids at school, they'll probably have used either Google Search or YouTube to help with their homework. And at work you might use Gmail for your email or Google Docs to co-operate on a new report, while your employer uses Google Ads and Google Search to seek out new customers. Many of us are doing things that would have been almost impossible in the past -- from communicating in any one of over 100 languages using Google Translate to exploring the furthest parts of the Scottish Highlands using Google Maps.

It is easy to take a world of more information for granted. 2018 is the twentieth anniversary of Google Search. Today we live in a world in which access to much of our collective knowledge is just a click away. Many of the benefits created by the Internet or search engines do not show up in traditional economics statistics, which often do not take full account of the full benefits created by saved time or the opportunities access to information brings. But just because something is hard to measure, does not mean that is unimportant.

So in this report, we explore how Google is helping people have fun, learn and work more productively:

- At home. Google's products are used by families to free up time and have more fun. Every year, two thirds of adults (64%) use YouTube to figure out how to do DIY, and 60% use it to help them cook. People value online search so much that the average household would rather lose their car, TV licence or even an hour's sleep a night than access to online search. In total, our estimates suggest that Google services could be creating at least £37 billion in consumer surplus for British families.

  Our findings support the growing view among economists that traditional economic metrics such as GDP don't capture the benefits of the digital economy.

- At school. Google and YouTube are now an important part of the education system. We polled parents across the UK and found that every week, more than half of the school pupils in the country (4 million) use Google to help with their homework. As adults, Google opens up new ways to learn about the world: researching the issues lying behind an election, keeping up with local news, or just seeking a faster answer.

  Regardless of age, income, level of education or location, Google's products benefit everyone. 88% of British adults use a search engine at least once a day, which creates a time saving equivalent to an extra bank holiday every year.

- At work. Google helps workers and businesses be more productive, better collaborate and reach new customers. At the same time, Google services are enabling a new generation of small businesses from independent app developers to YouTube creators to reach new global audiences. In total, we calculate Google services are driving at least £55 billion in economic value for the UK annually.

  We find that digital services underpin the traditional economy. They act as a multiplier: boosting productivity, enabling wholly new types of business and increasing the total size of the economy.

How we quantified Google's impact

In this paper, we sought to use a range of different methods to quantify the impact created by Google Search and other Google products:

- To start, building on the precedent of previous Google impact reports *(Google Economic Impact, Google's Economic Impact: United Kingdom | 2014, and Google Economic Impact: Australia)*, we used traditional economic modelling built upon third-party estimates of Google's UK market size and standard returns on investment (ROI) to measure the economic activity driven by Google Search, Google Ads, Adsense and Android. In addition to national estimates for the UK as a whole, we also created new estimates for each parliamentary constituency (see accompanying website), calculating their share of the national value using weighting by population, demographics and industry breakdown.
- In order to build a broader picture of the benefits, we conducted extensive polling to ask ordinary families and business how they made use of Google products and what difference they made to their leisure or work. Working with Deltapoll, we polled a nationally representative sample of 2,024 adults in Great Britain and 508 senior business managers across the UK, asking them 22 questions about their experience using Google and other online products.
- The best methodology to accurately estimate the consumer benefits created by free internet services is still a matter of intense debate amongst economists. For the purposes of this project, we experimented with a range of different methodologies, exploring how this affects the range of possible estimates, and allowing us to produce new benefits for the marginal value created by Google in the UK.
- Finally, we explored 12 in-depth case studies of how businesses and individuals across the country are using Google to power their business.

Public First would like to record its gratitude to the chief economist at the Social Market Foundation (SMF) and the Director of Research of Economics at the British Chambers of Commerce (BCC) for their review of our modelling.

The Impact Of Google



1

The average household would rather lose their car, TV licence or an hour's sleep a night than access to online search.[1]

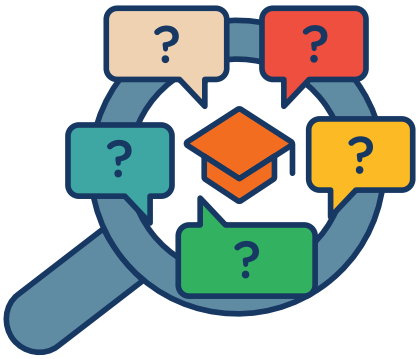
88% of British adults use a search engine at least once a day[2].



2

A majority of businesses regularly use a search engine to learn new skills (80%),[3]

keep up to date with industry trends (77%), research a new business opportunity (73%), understand tax or legal obligations (78%), explore new marketing opportunities (70%), or research ways to improve efficiency (75%).



3

Every day Google answers over 11 million questions from children seeking to learn.[4]

Every week, more than half of school pupils in the country use Google to help with their homework, with 43% using YouTube.[5]



4

Every year, nearly two thirds of adults (64%) use YouTube to figure out how to do DIY or for manual instructions, and 60% to help them cook.[6]

5

Two thirds of adults use Google Maps at least once a month to help get them where they want to go,[7]

saving on average sixteen hours a year and the economy the equivalent of 330 million imperial gallons of fuel.[8]



330 million gallons of fuel saved

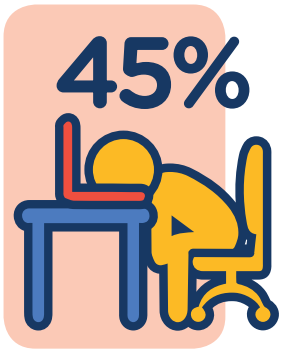
1. For the purposes of this report, we worked with Deltapoll to poll a nationally representative sample of 2,024 adults in Great Britain and 508 senior business managers across the UK. As part of this polling, we asked consumers to identify which household technologies they would be most prepared to give up for a year.
2. From Public First / Deltapoll polling.
3. Calculated as an average of the value of the time saved by using Google Search and the stated Willingness to Accept (WTA) payment to give up Google Search. To calculate the value of time saved, we followed the methodology of Varian (2011), assuming that Google saves 15 minutes per question, with the average person asking 1 answerable question every 2 days, and time saved valued at the median wage rate. We calculated median WTA amount by providing a forced choice in our polling - "Would you prefer to keep access to Google Search or go without access to Google Search for one month and get paid £..." - and randomly testing 5 different amounts. Full details of the methodology are provided in the appendix.
4. From Public First / Deltapoll polling.
5. From Public First / Deltapoll polling.
6. From Public First / Deltapoll polling.
7. From Public First / Deltapoll polling.
8. Following the methodology of Google Economic Impact: Australia, we calculate time saved by Google Maps, using estimates of time saved through GPS navigation from TNO (2007), usage of Google Maps from our polling and What is the economic impact of Geo services?, and total time spent travelling from the Department for Transport's National Travel Survey.



6

After word of mouth, online search is the second most important way that customers find businesses today.[9]

In total, Google Search and Google Ads drive at least £50 billion in economic activity. [10]



7

45% of workers believe their job would be much harder or take longer without a search engine.

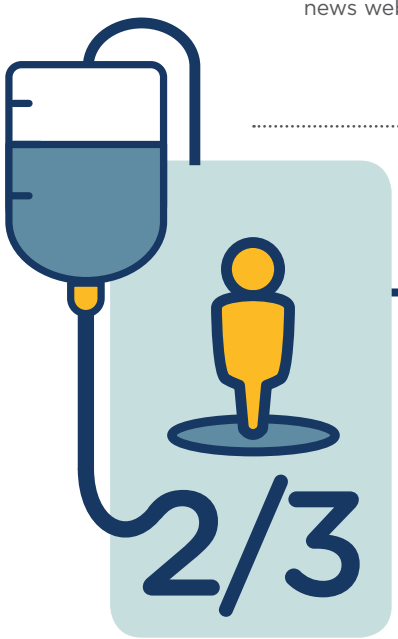
The same proportion of businesses believe their companies could survive for at most a couple of days without access to a search engine.[11]

8

The average search user uses over 3 online news sources,[12]

with almost half of the impressions (44%) to British news websites coming from Google.





9

Almost two thirds of adults regularly use Google to find out how to access or use public services,

such as GPs, hospitals, or schools.[13]

10

Traditional economic statistics such as GDP struggle to measure the value created by free internet services.

Independent estimates suggest that incorporating the value of all free internet services could boost GDP by 0.75 percentage points a year.[14] That's the equivalent of adding an industry the size of pharmaceuticals or agriculture every year.



9. From Public First / Deltapoll polling.
10. Following the precedent of Google's Economic Impact: United Kingdom | 2014 and Google Economic Impact: Australia, we use third-party data to estimate the total size of the UK Google Ads market, combining separate top down and bottom up estimates. Our top-down estimate uses Ofcom data on the total UK paid search market and Google's market share, while our bottom up estimate multiplies the number of UK Google Search users, by the average number of searches per user, the number of ads per page, click-through rates and the cost-per-click. Following the methodology of the US Google Economic Impact Report, we then multiply this revenue by the assumed Return on Investment (ROI) factor of 8.
11. From Public First / Deltapoll polling.
12. News Consumption in the UK: 2018, Ofcom.
13. From Public First / Deltapoll polling.
14. The Attention Economy: Measuring the Value of Free Digital Services on the Internet, Erik Brynjolfsson & Joo Hee Oh, 2012

AT HOME

Standard economics distinguishes between work time and 'leisure' time - everything outside working hours. We all know that 'leisure' is a bad description. We spend our time juggling kids, appointments, shopping for food, trying to keep our home in some kind of order, and then hopefully finding time to enjoy ourselves and sleep. On average, we spend as much as 18 hours a week on so-called 'unpaid work.' [15]

That makes time precious - every minute we save on the routine we can spend on something we like.

We found that Google's products were used in a wide range of ways to save time - from using YouTube to understand how to do DIY or make a recipe, to using Search to understand and use local council services.

They were also used in two other key ways. The first was to understand and learn. Google's mission is to "organise the world's information and make it universally accessible and useful". Our polling suggests people find Search an easier way to find the answer to a factual question than other methods.

The second was for true leisure. Watching beauty, entertainment, gaming, and cooking channels on YouTube is increasingly becoming the way in which we spend our free time.

15. https://www.ons.gov.uk/economy/nationalaccounts/satelliteaccounts/articles/leisuretimeintheuk/2015#when-not-in-leisure-women-were-more-likely-to-be-performing-unpaid-wor

Saving time and learning more with Google Search

The time saved with Google Search is equivalent to an extra bank holiday every year

The internet revolution is the greatest transformation in information and communications since the printing press. It is likely that we, too, are only at the beginning of what the internet - and associated technologies of data storage (cloud) and science (machine learning and AI) - can do. But, already, it is transforming our ability to access and understand information - just as the printing press did. This is something of huge value to people across the country:

Ofcom data estimates that there are 40 million users[16] of Google Search and we estimate they saved 23 hours a year[17] from using Search vs other methods. As our polling shows search is easier and faster than other methods of finding and understanding information.

We estimate the annual median 'consumer surplus' of Google Search to be £126 per person (the amount you would have to compensate users for losing access) or £15.5 billion in total.[18]

Things you can do in 23 hours or less

- Read Anna Karenina
- Watch Frozen a dozen times;
- Take almost 3 days off work
- Run about 5 marathons

£126 is:

- More than two weeks of a family food shop;
- Around a month's additional bill for a family's internet, phone and TV[19]

"Organise the world's information and make it universally accessible and useful"

Google's mission

Compared to the time before search engines existed:

89% agree that it is now far easier to look up information or look up a fact

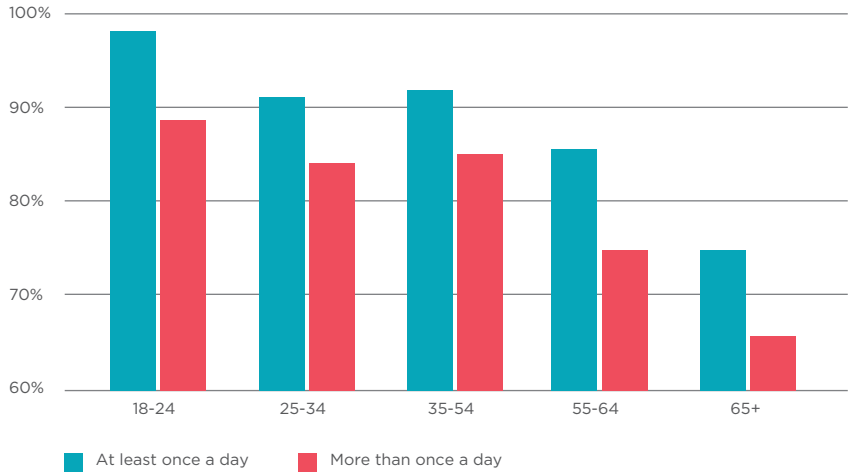
90% agree that they that are more likely to look up something when they are unsure

89% agree that having more access to information is a good thing

16. Ofcom Communications Market Report https://www.ofcom.org.uk/research-and-data/multi-sector-research/cmr/cmr-2018
17. To calculate the amount of time saved, we followed the methodology of Varian (2011), assuming that Google saves 15 minutes per question, with the average person asking 1 answerable question every 2 days.
18. Calculated as an average of the value of the time saved by using Google Search and the total Willingness to Accept (WTA) payment to give up Google Search. To calculate the value of time saved, we multiply average time saved valued by the median wage rate. We calculated the value of Willingness to Accept by providing a forced choice in our polling - "Would you prefer to keep access to Google Search or go without access to Google Search for one month and get paid £..." - and randomly testing 5 different amounts. Full details of the methodology are provided in the appendix.
19. Ofcom data suggest that average household spend on television, fixed internet, mobile voice & data, and fixed voice was £117.13 a month in 2016.

The hunger for information is large and growing. Our poll found that 88% of Brits use a search engine at least once a day - and over a third (39%) use it more than 5 times a day. For 18-24 year-olds, 98% use a search engine daily.

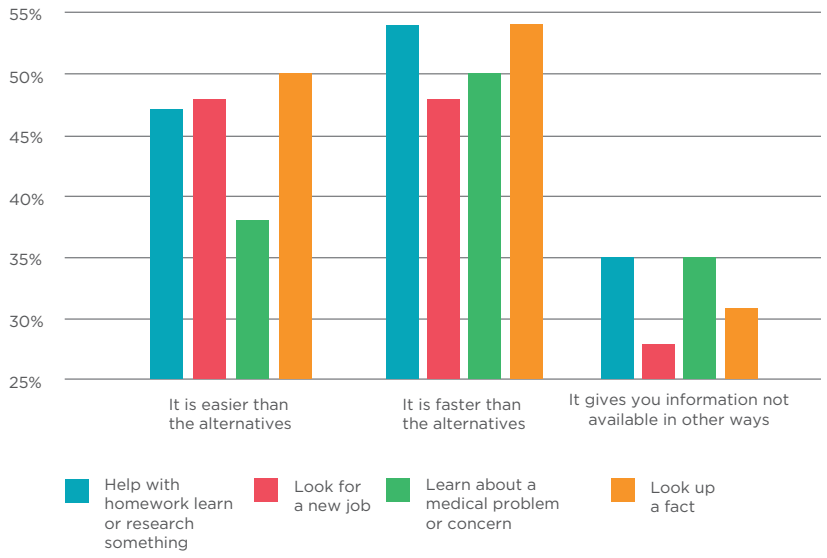
Daily use of search engine



For most people, the value of a search engine is time not money. Yes, Google is free - and provides many sources of information that historically were expensive. But libraries are also free. According to our poll, for most Brits the bigger advantages are its speed, ease of use and the additional information it provides. For finding a fact:

- 54% agree that it is faster than the alternatives
- 50% agree that it is easier than the alternatives
- 31% agree that it gives you information not available in other ways

Why do you use a search engine?



Google Scholar: access to the world's best research

The UK government, like other governments around the world, spends billions on research to benefit humanity. From science and history to economics, academics across the country seek to advance human knowledge and understanding.

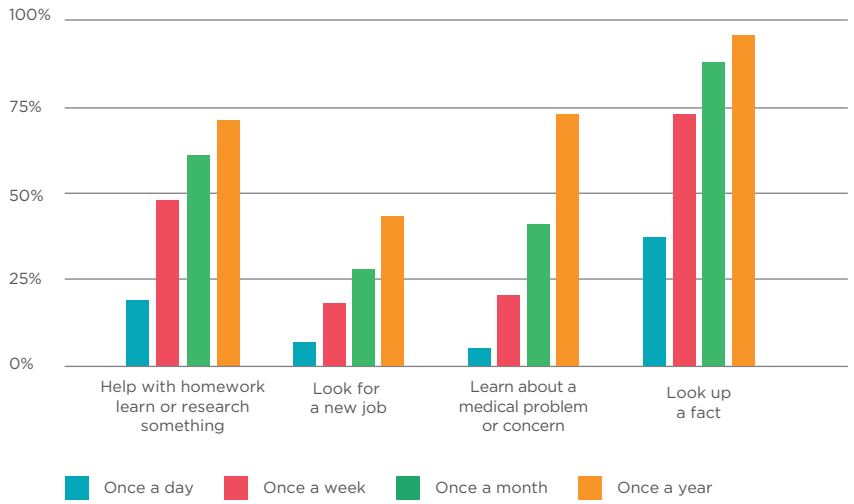
Google Scholar helps people access that research. It is a simple way to search for academic literature across sectors and disciplines: articles, theses, books, abstracts and court opinions, from academic publishers, professional societies, online repositories, universities and other web sites.

Some studies have found Google Scholar to have both better sources and to be more usable than other methods of finding academic papers.[20]

45% of people used a search engine to research a new job in a given year.[21]

Google is most used by people to look up particular pieces of information. From our polling, 98% of people look up facts at least once a year. But it's also a reflection of the preoccupations of daily life. Around 70% of people will use search engines to help with homework, learn or research something (almost a fifth of people use it for this reason every day). 45% of people used a search engine to research a new job in a given year.

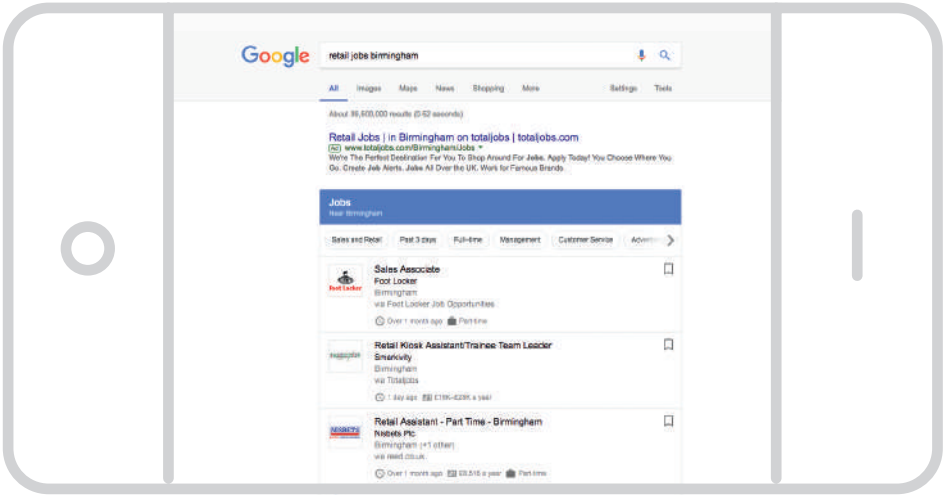
How often do you use a search engine to...



20. https://www.jstor.org/stable/20865386?seq=1#page_scan_tab_contents https://pdfs.semanticscholar.org/7dab/41504f61a8f85fc83c26e6700aad34a251c5.pdf
21. Public First and Deltapoll polling

Google Jobs: find the right job for you[22]

In July 2018 Google launched their job portal in the UK. When you search for "jobs near me", "teaching jobs", or similar queries you can go to a feature that lets you explore jobs from across the web that meet your needs. You can access salary information, reviews and ratings of the employer and different options to apply for a job, or use a location filter to see jobs in the areas that are convenient for you, and how long it would take to commute to a job from your home.



Google has collaborated with The Guardian Jobs, Reed.co.uk, Haymarket, Gumtree, The Telegraph, Reach plc's totallylegal, CV-Library and totaljobs.com to launch the feature, and all jobs providers can make their job openings discoverable in this experience. Anyone searching for jobs on Google will see postings from these sites and many others from across the web as soon as they're posted. Google has published open documentation on how to make job openings discoverable in this new feature.

22. https://www.blog.google/around-the-globe/google-europe/helping-more-people-uk-find-their-next-job/

Search is socially inclusive

34% of adults have used a public library in the last year and 52% have visited a museum.[23] Meanwhile 97% of adults have used a search engine, with almost no difference between different socioeconomic groups (just a 1 percentage point difference between lower and higher groups).[24]

Google Arts and Culture

Google Arts & Culture puts over a 1,500 museums at your fingertips. It's a free, immersive way to explore art, history and wonders of the world from Van Gogh's bedroom paintings to Mandela's prison cell. The Google Arts & Culture app is free and available on the web, on iOS and Android.

The Google Cultural Institute partnered with more than 1,500 institutions from 70 countries, giving a platform to over 400,000 artworks and a total of 6 million photos, videos, manuscripts and other documents of art, culture and history.

The Art Camera is a robotic camera custom-made to create the highest possible resolution images of paintings. The camera is capable of taking "gigapixel" images, which are more than 1000 megapixels. The Art Camera has created over 2,000 ultra-high resolution images of artworks around the world.

Almost two thirds of people use search engines to find or access public services. A third use it to learn more about the issues involved in elections and referendums.

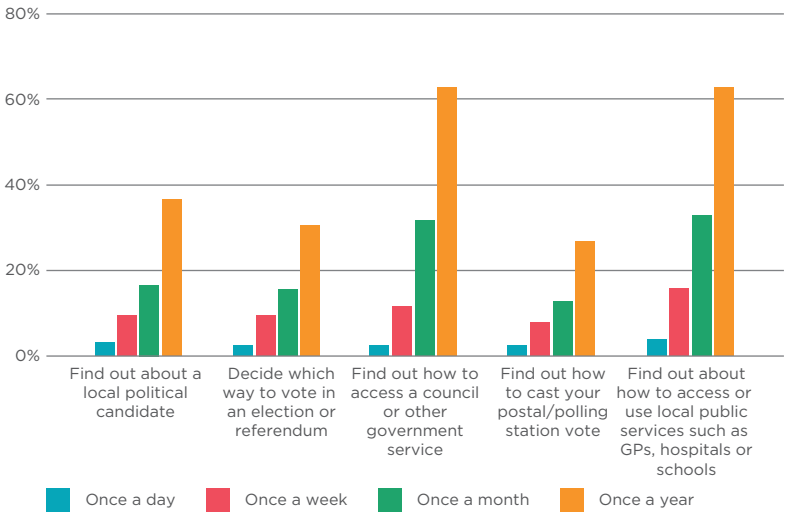
For the democratic process to work, people need to be informed. We asked people how often they used search engines for elections and to access local public services. We found:

- Almost two fifths of people use a search engine to find out about a local political candidate.
- Almost a third of people use a search engine to help decide which way to vote in an election or referendum. Evidence from other studies suggest that people use a variety of offline and online sources to come to a conclusion on politics.[25]
- Almost two thirds use it to find out how to access a council or other government service.
- Almost two thirds use it to find out about how to access or use public services such as GPs, hospitals, or schools.

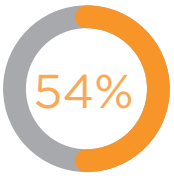
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23. Taking Part survey April to September 2017 (Provisional), DCMS, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664921/Mid-year_17-18_TP_release.pdf
24. Public First and Deltapoll polling
25. Dutton, William H. and Reisdorf, Bianca and Dubois, Elizabeth and Blank, Grant, Search and Politics: The Uses and Impacts of Search in Britain, France, Germany, Italy, Poland, Spain, and the United States (May 1, 2017). Quello Center Working Paper No. 5-1-1

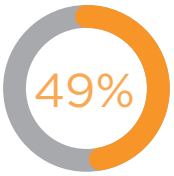
How often do you use a search engine to...



This isn't only useful for the people using public services - it increases the efficiency of those services. When routine information is readily available, staff free up time for other tasks.



Use a search engine at least once a week to learn about the national news.



Use a search engine at least once a week to find an article in the national news.

Saving time and the environment with Google Maps

Google maps saves the average person 16 hours a year[26]

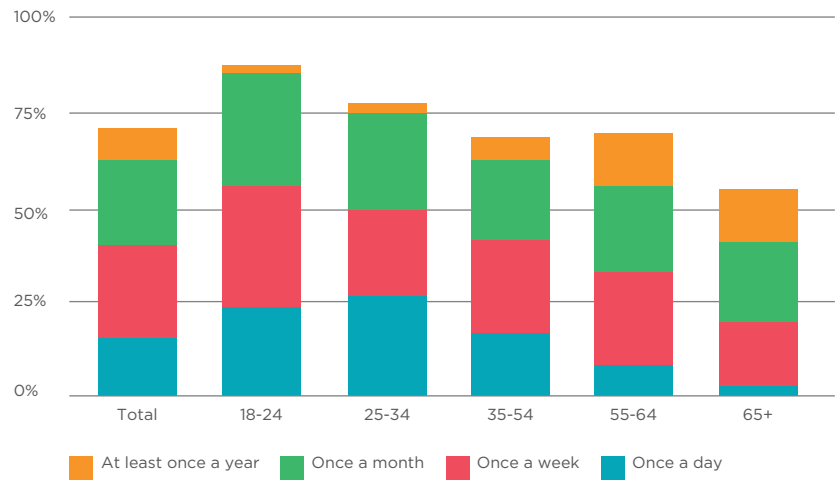
Our estimates suggest that the value created to consumers by Google Maps in the UK was £8.1 billion last year - or around £300 for the average household.[27] That value is a result of the ease with which people can find businesses, sights, and get places more quickly and more easily.

Nearly two thirds of adults use Google Maps at least once a month[28] and it saves the average person sixteen hours a year from quicker journeys in their car, using public transport or walking.

As part of that, drivers save around ten hours a year from better directions - and the economy as a whole 330 million imperial gallons of petrol. That is the equivalent of £1.7 billion in household savings in lower fuel costs.[29]

In addition, by reducing the total amount of driving, it is likely to have reduced total CO2 emissions by around 3.7 million metric tons. That's the equivalent of the CO2 produced by a plane circling the world 330,000 times.[30]

How often do you use Google Maps?

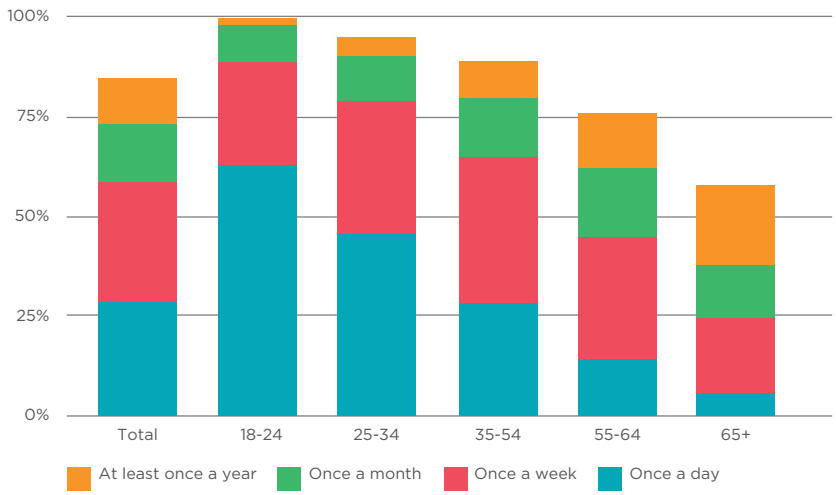


26. Following the methodology of Google Economic Impact: Australia, we calculate time saved by Google Maps, using estimates of time saved through GPS navigation from TNO (2007), usage of Google Maps from our polling and total time spent travelling from the Department for Transport's National Travel Survey.
27. We value the above estimates of time saved at the average of Department for Transport WebTag values for an hour of leisure and commuting time. We then combine this with an independent estimate of Willingness to Accept payment in substitution for Google Maps, drawing upon our polling and other independent estimates.
28. Public First and Deltapoll polling
29. We combine the above estimates of time saved with Department for Transport estimates of average new car fuel consumption and speeds driven with independent estimates of the average age of cars on the road, price per gallon and respective prevalence of petrol and diesel cars.
30. We combine the above estimate of fuel saved with independent estimates of average CO2 emissions per mile driven and flown.

Making life easier and more entertaining with YouTube

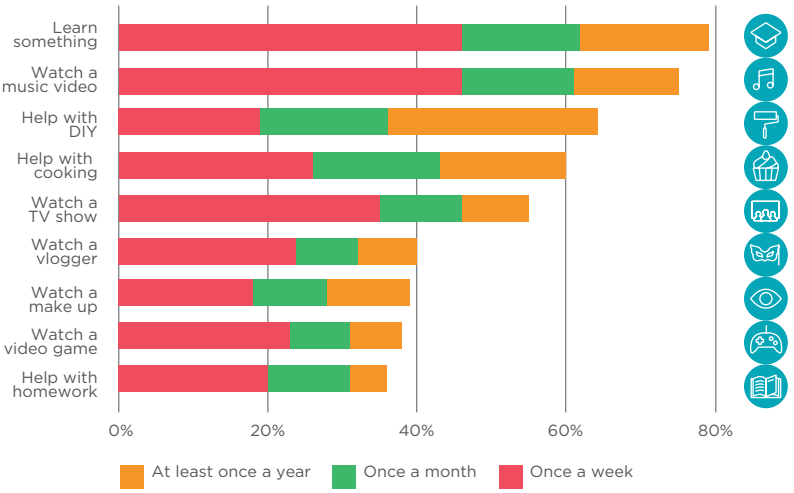
YouTube is becoming as important a source of video as traditional TV

How often do you watch a video on YouTube?



- The majority of British adults (59%) watch YouTube at least once a week
- Two thirds of 18-24 year olds (64%) watch YouTube at least once a day, and a majority use it at least once a week to learn something (66%), watch a TV show (59%), watch a music video (65%) or a vlogger (54%)

How often do you watch a video on YouTube?



Every year, 31 million people use YouTube to figure out how to do DIY or for manual instructions

The average person in Britain will spend eight days of their life building flat pack furniture. Nearly two thirds of couples have had an argument putting it together. It has become such a national crisis that in 2004, Northampton College put a course on for people assembling flat-pack furniture.

It's not surprising. Papers with written instructions don't easily explain 3D objects. They also get lost.



of adults in the UK say that they have used YouTube to figure out how to do DIY, or for instructions from manuals, in the last year. 7% say they use it at least once a day.



of YouTube users said it was an easier way to find advice than the alternatives, with another 46% saying it saved them time.

But in recent years it has become routine for manufacturers - from IKEA to Maclaren buggies - to post videos to YouTube on how to correctly assemble their products. They can do it for free, and it's much easier for us to understand. They sit alongside millions of videos that explain everything from how to wire a plug and put up shelves to complete household renovations.

Every month YouTube registers more than 700 million views of beauty-related content.

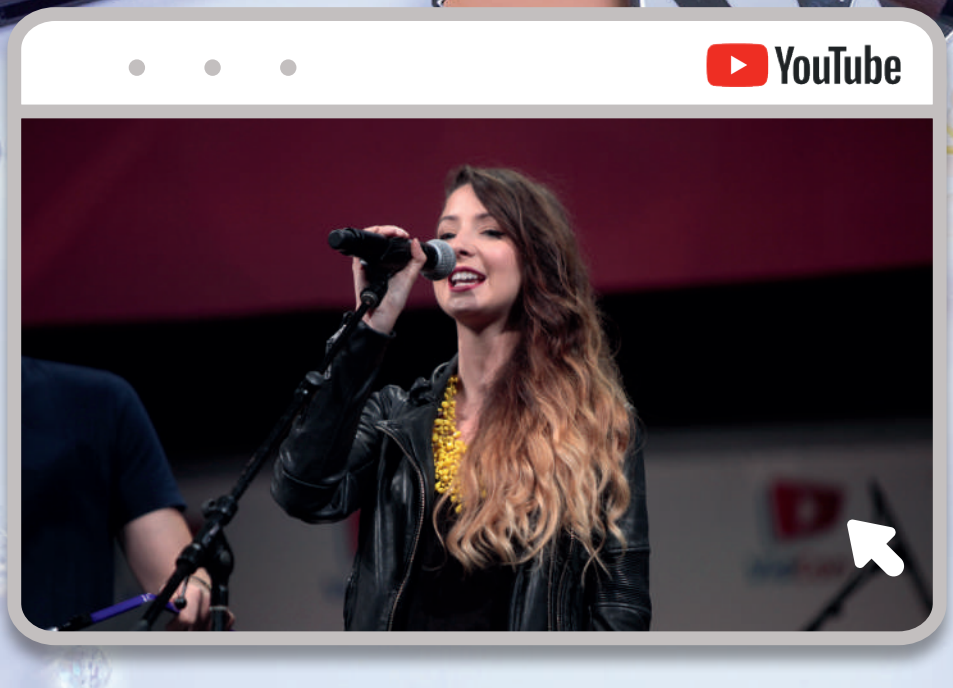
Cosmetics have always been big business. The global cosmetic products market was valued at $523.43 billion in 2017, and is expected to reach $805.61 billion by 2023.[31]

YouTube didn't invent the makeup industry. But it has changed it. In 2017 there were 88 billion beauty-related video views on YouTube, growing from "only" 55 billion in 2016.[32] Every month YouTube registers more than 700 million views of beauty-related content.

But what is more interesting is what they're watching. Only 3% of these videos are big beauty brands. The rest - 97% - belongs to vloggers: individuals, like you or me, who give their unique perspectives on what works and why. And Britain has emerged as one of the leading places for those vloggers to live and work.

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31. Reuters report of Orbis Research, March 13, 2018, https://www.reuters.com/brandfeatures/venture-capital/article?id=30351
32. https://www.statista.com/statistics/294655/youtube-monthly-beauty-content-views/



Zoella

Zoella is the second most popular beauty vlogger in the world. She has over 12 million subscribers who watch her videos on everything from how to apply makeup to pizza tasting. One of her most recent videos got over 4 million views, and her popularity online has led to bestselling books, own-brand makeup and TV appearances.

Vloggers need to be upfront about what they're doing. Any product placement in a make-up tutorial has to be flagged in text on the screen, or by the vlogger explaining they've been paid to talk about a certain item. They're a quality filter, tutorial, and entertainment all in one.

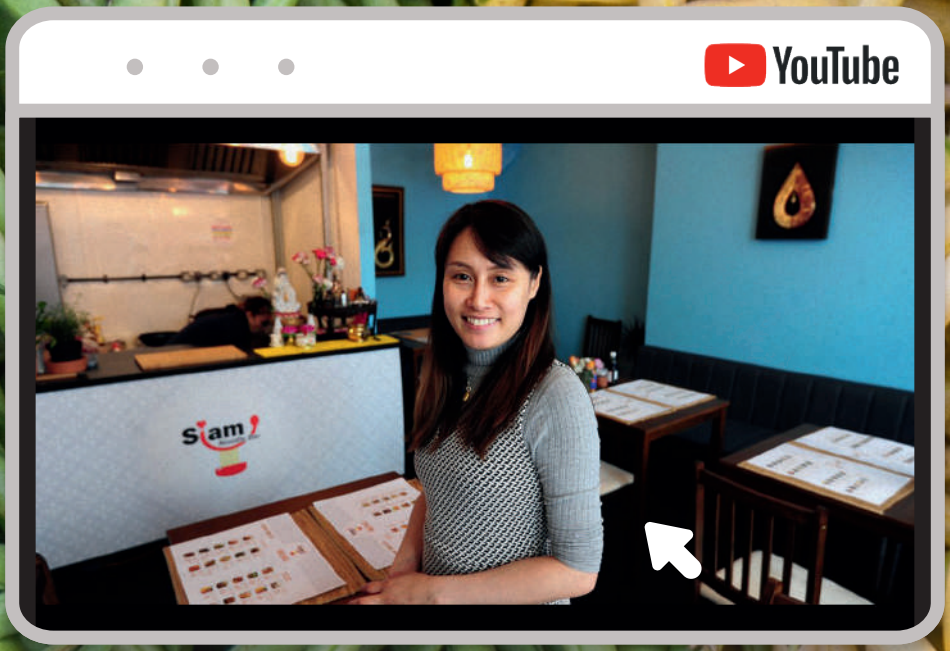


Image: Manchester Evening News

The YouTube chefs

Lallalin Mahasrabphaisal, 37, owns a supermarket in Manchester. A chef who ran a popular Thai cafe in the basement quit with two days warning. So Lallalin taught herself to cook using YouTube videos. She is now a celebrated chef.

Most of us don't become professional chefs watching YouTube. But 43% use YouTube to help with cooking every month[33]: whether it's techniques for chopping an onion or complex baking recipes. Watching cooking on television is nothing new - but the sheer breadth on YouTube, and the ability to find exactly what you need - has helped millions of us make better meals.

33. Public First and DeltaPoll polling

AT SCHOOL

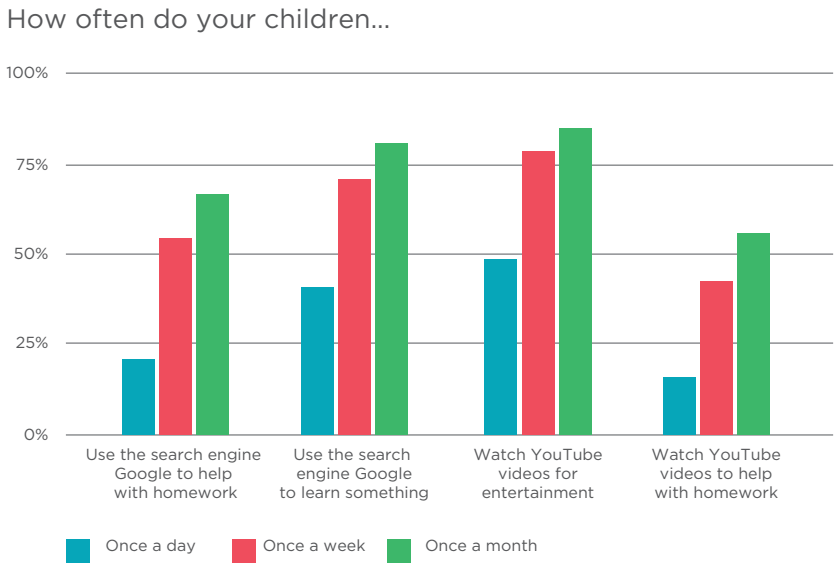
At home and at school, Google Search and YouTube are used by millions of students to learn history, science, geography and more. They have the ability to find any piece of information, from a wide range of reputable sources, within seconds: worldwide, there are over 500 million views of learning-related content every day.[34] Every day Google answers over 11 million questions from British children seeking to learn.[35]

For teachers, YouTube is now a major resource for lessons. In some subjects, more than half of teachers are using videos weekly in lessons. And for some entrepreneurial teachers, they are not only teaching their class, but also using YouTube to educate people across the world.

34. https://www.thinkwithgoogle.com/data/learning-related-content-viewed-on-youtube/
35. Estimated from Public First and DeltaPoll polling

Helping with homework

Every week, more than half of the school pupils in the country - 4 million children - use Google to help with their homework while 43% use YouTube for the same purpose [36]



Parents also use Google and YouTube to help their kids. From our polling, 28% of British adults believe YouTube videos are a more entertaining way to help with homework while 40% find it easier than the alternatives.

Be Internet Legends

Be Internet Legends is a multi-faceted educational programme developed by Google in partnership with the educators and online safety experts at Parent Zone. It is designed to help children to become safe, confident explorers of the online world. It has been developed for Key Stage 2 pupils (aged 7-11, Primary Schools) and is the first online safety course to be accredited by the PSHE association. It consists of five key pillars to help children learn the essentials of how to stay safe online:

- Be Internet Sharp - Think Before You Share
- Be Internet Alert - Check it's For Real
- Be Internet Secure - Protect Your Stuff
- Be Internet Kind - Respect Each Other
- Be Internet Brave - When in Doubt, Discuss

36. Public First and DeltaPoll

Google have distributed free resources to 12, 000 teachers year to date. The programme has been taught to over 40,000 UK kids so far with plans to reach 60, 000 UK kids by the end of 2018.[37]

Be Internet Citizens

Be Internet Citizens is focused on encouraging young people to have a positive voice online and includes teaching them an understanding of the differences between free speech, hate speech and fake news. Part of YouTube's global Creators for Change programme, Be Internet Citizens has been designed to teach 13 to 15-year-olds about media literacy, critical thinking and digital citizenship. The programme provides participants with a strong foundation, empowering them with the confidence to become producers of online content, where they can express their identities, share their stories, make a social impact, and bring communities together.

The Be Internet Citizens curriculum, designed in partnership with the Institute for Strategic Dialogue, focuses on how to spot negative behaviour online, how to escape social bubbles, understanding concepts such as scapegoating, emotional manipulation and Us vs Them, and how to use video online to build positive communities and counter radicalisation firsthand.

Be Internet Citizens is aiming to reach 20,000 13-15 year olds by the end of 2018. After completing Be Internet Citizens workshops in 2017

- 97% of young people felt they gained new knowledge or skills
- 84% of young people left the workshop confident that they would know what to do if they came across hate speech online
- 97% of youth workers felt the workshop content was relevant for young people
- 99% of youth workers said young people enjoyed the workshop[38]



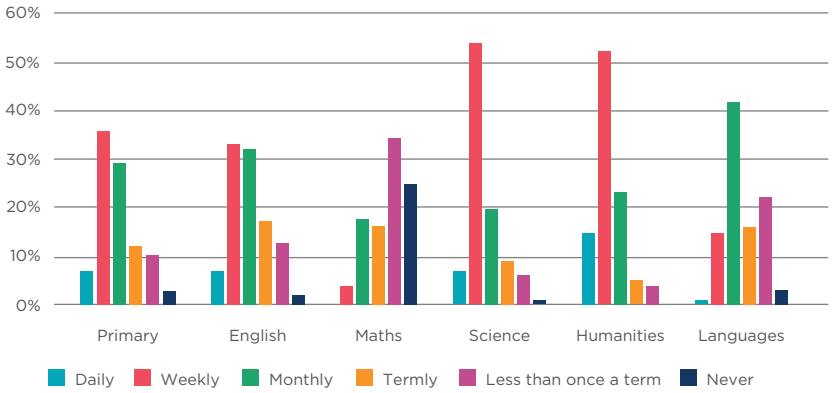
Helping teachers do their job

Two thirds of teachers show YouTube videos in class at least monthly

YouTube has become a major resource in lessons. We surveyed thousands of teachers through TeacherTapp (a new app founded by a professor at UCL, and former teachers and education journalists) and found that teachers are routinely using YouTube videos as part of their lessons. Science and humanities teachers use it particularly frequently - the ability to understand the natural world has been transformed by the depth and variety of footage and explanations available on YouTube.

37. Data compiled by Parent Zone
38. Data compiled by Institute for Strategic Dialogue

On average, how often do you show YouTube videos as part of your lessons?





Mr Bruff

Mr Bruff grew up in a disadvantaged family and began making online revision videos in 2011 to help students like him with their studies. Today his videos have had over 30 million views from over 212 different countries. His channel has since moved into free podcasts and eBooks that provide resources for students - and the success of the content has allowed Bruff to quit his day job to focus on producing content full time.

"One of the things I'm most well-known for is using rap music. When there's information students need to memorise for an exam, like key quotations or timings, I set that to rap." Big Shaq's 'Mans Not Hot' was recently used to help students revise quotations from Macbeth, and he set a guide to an AQA GCSE paper to a Stormzy rap.

"In 10 years in the classroom I taught roughly 1,000 students, but in one day online I can hit as many as 700,000 views. The impact is staggering."



English Like A Native

Anna Tyrie started her YouTube channel back in 2016 as a hobby. Her fun and educational language videos to help non-English speakers improve their conversational skills were so popular that in 2017 she took the decision to leave her job to focus on the channel full time.

With over 283,000 subscribers within 2 years of launching and 16 million video views, Anna has now set up a business that offers paid for language assistance including lessons, eBooks and more.

AT WORK

Anyone who sets up a new business faces challenges. One sale can make the difference between profit and failure: in 2016 there were 414,000 new businesses established - 637 per Parliamentary constituency. There were also 328,000 that ceased trading - 505 per constituency.[39]

Perhaps the hardest challenge is reaching and finding new customers. While in the past only large companies could afford a national advertising campaign through TV or the press, Google Search and Google Ads have democratised the ability to spread the word about what you offer. Google products both make it easy to advertise to the farthest reaches of the planet - and for people in your local neighbourhood to physically locate you, even if you're a bit off the beaten path.

The ease of reaching customers is enabling whole new types of micro businesses from the British YouTube creator that becomes a global star through broadcasting from their bedroom to the app developers able to launch their programmes on Android, the world's most popular mobile operating system.

As well as reaching new customers, Google services are enabling businesses to become more productive. Online applications, cloud services and increasingly machine learning and artificial intelligence are important drivers of economic productivity, while across sectors a huge number of both workers and businesses say they could not do their work without access to Google Search, Google Apps, Google Maps or YouTube. At least six Google products are used by over half of workers.

Just as importantly, Google products have strengthened the business-customer relationship. Two thirds of the businesses we polled say that customer satisfaction is now more important than before search engines. For creators, YouTube has enabled a direct connection to their fans, and an open platform without gatekeepers to let them prove themselves. Making use of Google Search, individuals are far more likely than before to sample a wide variety of products or sources of information, news or entertainment.

39. House of Commons Library, Business Statistics, December 2017



Helping businesses make more money

If you look at the history of advertising, the first ads were signposts in the road. (This way to food, this way to firewood.) Advertising itself is information. And over time, people figured out that it's a better use of your time and resources to place your sign closer to the destination. Advertising was always about reaching people at the best possible moment: when they were most interested in buying the thing.

With the 20th century came mass media. Mass media meant an expansion and infusion of new voices in media. Genre entertainment (such as Westerns, situation comedies, and news shows) was largely premised on the ability to define audience segments and sell advertising on that basis.

Then radio disrupted newspapers, TV disrupted radio and mass-market magazines, and along came the internet. Today, websites you love, blogs you read, content you're viewing or subscribing to — nearly all of that is funded by ads.

Google's chief innovation was using data to:

- Help advertisers reach people at the best possible moment
- Help them ensure that their pounds were well spent

That means better, fewer ads – and an improved user experience.

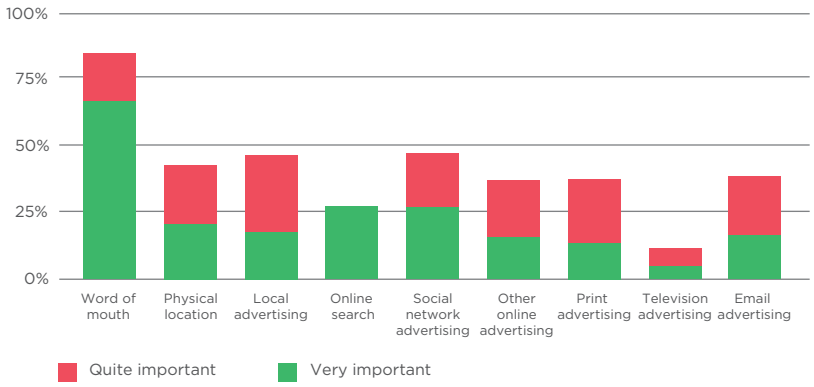
For an average small business - whose turnover is less than £300,000 a year[40] - this makes a big difference.

40. ibid

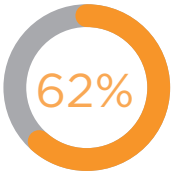
Two thirds of businesses say customer satisfaction is more important than before search

Google has changed customer interactions. Online search has become the second most important way of customers finding businesses, and over half of businesses say it's easier for global customers to find them. It has also changed how businesses perceive customers - ratings and reputations online mean that over two thirds of businesses consider maintaining customer/client satisfaction to be more important than before Search.

How important are the following as ways for customers to find your business?



Compared to the time before search engines existed...



Agree it is now far easier for local customers/clients to find my business.

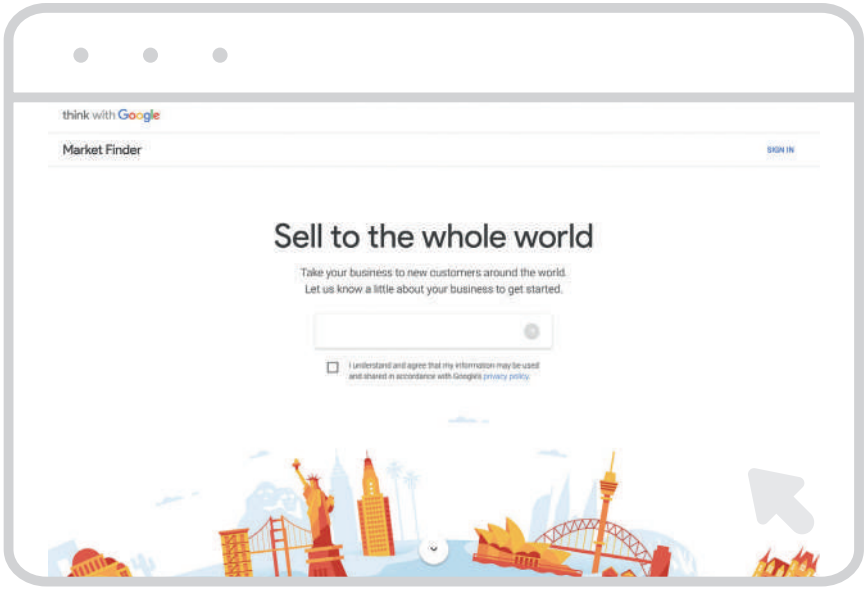


Agree it is now far easier for global customers/clients to find my business.



Agree maintaining high levels of customer/ client satisfaction is more important now than it was then.

Market Finder



Search allows new customers to find businesses. Google also developed a tool to help businesses find new customers abroad.

Google partnered with the Department for International Trade (DIT) in 2017 to launch Market Finder. The tool helps British SMEs identify export markets for their products and evaluate the costs and opportunities of entering new markets.

Digital Garage

Google Digital Garage provides skills training and coaching to small businesses (SMBs), job seekers and individuals to help them grow their business, career or confidence. All training is free, and over 20 topics are available, from taking first steps online, to digital marketing courses on social media and analytics, through to starting your own business or learning to code. The training is delivered through in-person workshops across the UK and online.

Google works nationally and locally with organisations including the Federation of Small Businesses, LEPs and Job Centres. National partners include the DCMS, Lloyds Banking Group and The Good Things Foundation. Local partners include regional government as well as public, private and third sector businesses and community support groups and networks.

Over 300,000 people have already been trained with:

- City Centre Training Hubs: long term pop ups (up to a year) offering on the spot, currently open in Edinburgh and Manchester, with previous sites in Sheffield, Birmingham, Leeds, Glasgow and Cardiff.

- The Google Digital Garage Bus Tour: visiting 170 towns and villages across the country, delivering day-long face-to-face training in communities.
- Bespoke tours that cater to industries in need; in 2017 Google hosted pop-ups in 12 coastal towns for hospitality and tourism businesses; and in 2018 we're visiting 14 market towns to help market traders and small businesses get found online.
- An online course offering users a certification in fundamentals of online marketing from Google and International Advertising Bureau Europe.

Independent research has shown that:

- 3 months after training 32% of people have seen a change in their job situation, and many have expanded their current job role, while others have changed jobs or starting a business.
- 74% of SMBs felt that the training has benefited their business, with many citing concrete results; 49% of SMBs report (after 14 weeks) a slight or significant increase in customers, sales/bookings, profits and/or revenue. Almost all attribute those impacts to changes made as a result of their training.[41]

Ushiwear



Ushiwear was started by Jilly Kapusi and her husband Neil, who produces unique hand-printed items from Jilly's studio in Yorkshire. Looking to enhance Ushiwear's online presence, Jilly and her husband Neil visited Google Digital Garage.

Through applying the new skills learnt at the courses and in one-to-one coaching, the couple increased their ecommerce sales - "within two weeks, we noticed a dramatic increase in sales. Not just nationally, but internationally, which was a massive boost for us," adds Jilly.

41. Building the UK Workforce of the Future, IPPR, October 201

"We've gone from being a less well-known brand, to an emerging new brand that people are getting excited about – with a brilliant website!"

This growth led to hiring a dedicated in-house fashion designer to support the increased demand for Ushiwear products. Today, Ushiwear Clothing have sent their products around the globe from Algeria to Australia, increased their staff size from 3 to 8 - with a dedicated social media & digital marketing role - and are about to launch their first physical store near Huddersfield in late 2018.

Campus

- Campus London is Google's physical space for startups that offers a diverse and connected community alongside world-class education for entrepreneurs.
- Since it opened in 2012, 4189 new jobs have been created by startups in the Campus London community.
- In 2017 startups at Campus London created 523 jobs and raised more than £39M in funding.
- 40% of campus members are women.[42]

Case study: Vestpod

Emilie Bellet's frustrating experiences with finance advisers motivated her to empower women to make the most of their money and financial futures. Previously an private equity specialist, she set up Vestpod, a digital platform that provides unbiased guidance on personal finances and women's specific challenges. Its free newsletter is full of experts' tips and knowledge that is relatable, relevant, and jargon-free.

At the 2017 Campus for Mums program, Emilie developed her idea with top mentors. From a basic landing page and newsletter amongst friends, Vestpod is now a thriving finance company – in an industry where women have traditionally been underrepresented.

"I participated in the 10-week Campus for Mums program – it's for entrepreneurs who just happen to be parents. We received continued support from an expert group of mentors and makers at Campus. I also work from the cafe downstairs, I attend events and network, and I regularly take mentoring sessions; in fact my second son joined me at the third session when he was just one week old!"

Emilie Bellet, founder of Vestpod

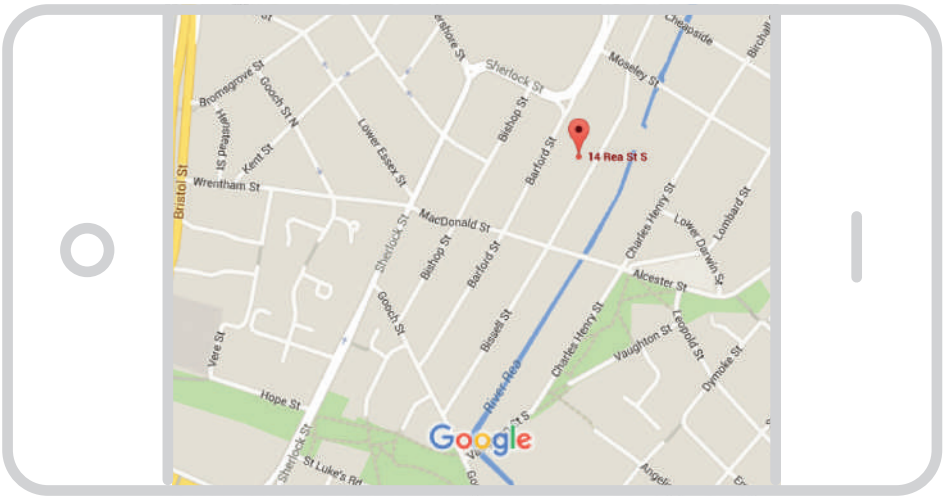
42. Campus Startup Report, Campus London, https://drive.google.com/file/d/1JAIP8w6Aj9dJ2ZzOYqLzg1qDEEZiwkXJ/vie

Helping businesses be found with Google Maps

Most businesses that sell online also exist in bricks and mortar. Google Maps helps customers locate them easily.

20% of the businesses we polled - the equivalent of over a million nationally - said that Google Maps was a crucial tool for making their business work. Almost three quarters of businesses use Google Maps in some way.

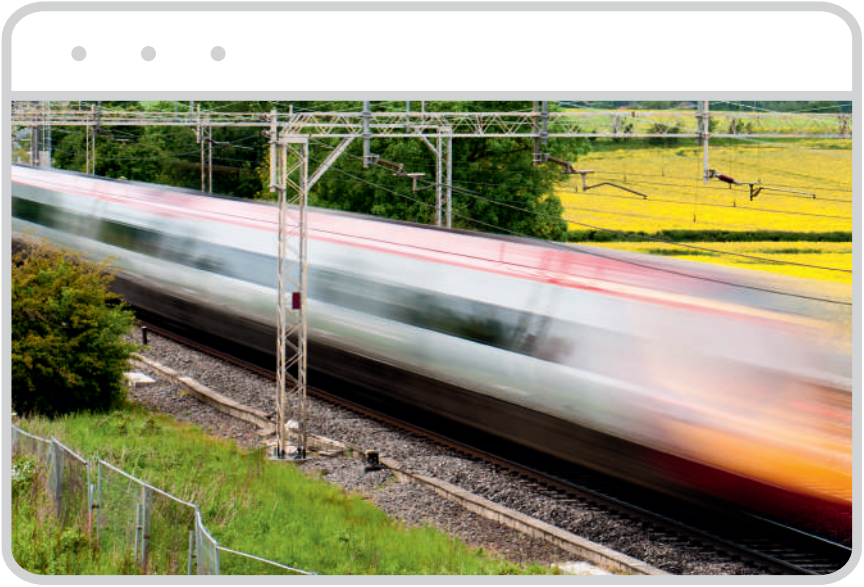
AppyParking



Searching for parking in congested London is notoriously challenging. Not only is the traffic overwhelming, but the colored curbs have specific meanings with different rules depending on the time of day. To address this issue, AppyParking decided to create a mobile app that helps drivers across the United Kingdom understand parking regulations and find open spaces.

The app pulls data in varying formats from many sources, creating a Parking Platform which tells drivers at the touch of a button where they can park with the least amount of hassle. The app colour codes parking spots to show drivers where there's free parking, where restrictions apply and where special types of spaces – such as electric-car charging and motorbike spots – are located. By using the various Google APIs - including Maps Directions, Places and Street View - the app allows users to navigate to open parking spots easily and even take a look at how tight or big the spaces are via Street View before they arrive!

Network Rail - HS1



Network Rail (High Speed) maintains the High Speed 1 (HS1) railway route between London and the Eurotunnel terminal. It maintains more than 12,000 associated civil engineering assets including bridges, tunnels, security fencing and drainage. The company was using spreadsheets, databases and disparate systems to catalog information about the assets, and its engineers struggled to find the information they needed to respond quickly to repair damage.

A solution was created for the engineers to use Google Maps that controls for zooming, searching and navigation, so they can easily find assets such as bridges. The Route Model uses the Layers feature of the Google Maps Javascript API so engineers can view details about an asset, such as drawings, inspection reports and potential hazards near bridges. Engineers can use Street View to get an up-close view of an asset and its surroundings. Armed with this information, engineers can quickly create repair plans and dispatch technicians to fix problems.

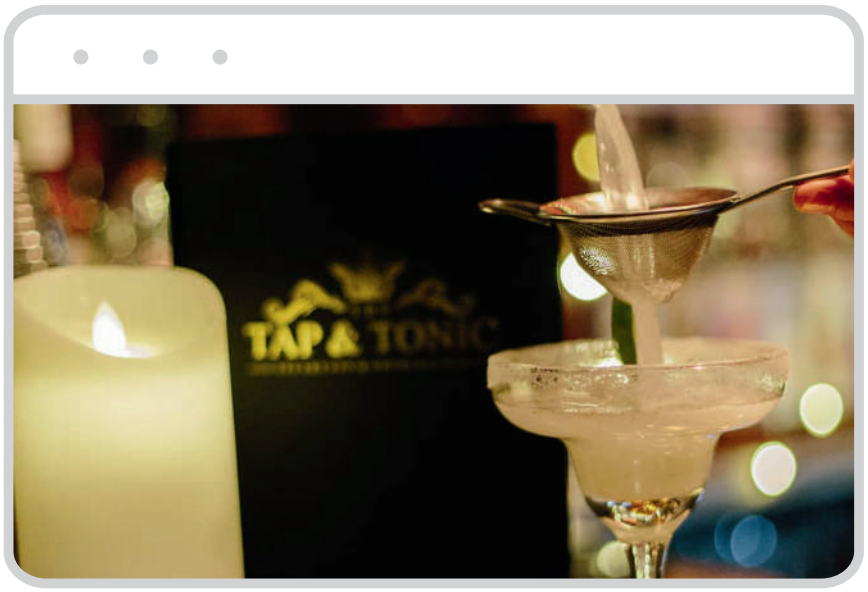
“With Google Maps APIs, we’re able to perform faster, more appropriate maintenance. Our engineers can quickly dispatch technicians to fix problems because they now have all the information about the repair at their fingertips.”

Tap And Tonic (Bar, Grantham)

The small market town of Grantham, Lincolnshire, has seen many pubs and bars over the years. But for Luke Adams and his family, setting up its very first speakeasy bar was a risk worth taking. The bar, Tap & Tonic, is located in what the family believes was an old communal bath house or cobbler’s workshop.

Following its opening in late 2015, the bar has been a huge success, with jobs created and a second venue - The Juniper Tap - just opened.

"We're not trying to be just another bar. We create an environment where people enjoy a bit of culture, relaxation and an experience of the Prohibition era" said Luke Adams, Director of Tap & Tonic.



With Grantham being a relatively small town - and thus a small market of potential visitors - Tap & Tonic has seen significant growth thanks to Google Maps and Google My Business in particular. (Google My Business lets you post updates to showcase what's new, respond to reviews to build loyalty and add photos to highlight what makes your business special). A 4.7 out of 5 star rating on Google reviews is testament to the positive reaction that the local community has had for the bar.

"We have so many people visiting us from out of town - Grantham is obviously quite small but we've had people travel from all over having found us on Google. It's been a huge help to us and helped us grow even more."

From offline to online and back again

The internet has changed consumer habits. Most 'bricks and mortar' companies also now sell and deliver online because customers generally find the experience cheaper, faster, and more convenient. Google's search and advertising tools help customers find and buy the products they want. Crucially it lets them see how other customers have experienced products with ratings and reviews.

But the story isn't that simple. 53% of shoppers like being in-store to make the final decision, and are increasingly using search on mobile while in-store.[43]

43. Pragma Consulting survey, reported in Forbes, July 2016

"Mobile is becoming the glue between our shops and online. Increasingly, customers are using the two channels combined and for example use their mobiles to check ratings and reviews and further product information when in-store."

Mark Felix, online trade director John Lewis.[44]

Cupcake Jemma

The success vloggers have found online has often helped offline - whether it's bestselling books or opening shops.

Jemma Wilson began baking at home and created a popular online cake business in 2006. While Crumbs & Doilies already enjoyed major London-based success, it wasn't until the launch of her YouTube channel that she was able to reach an international audience and with the opening of the Crumbs & Doilies shop in 2015, she now welcomes fans and customers from all around the world to come and try her bakes and even meet her in person.



Jemma's own FoodTube channel - CupcakeJemma - now has more than 33 million combined views. One of her most popular videos - "How to make the Best Ever Rainbow Cake"- has almost 4.4 million views.

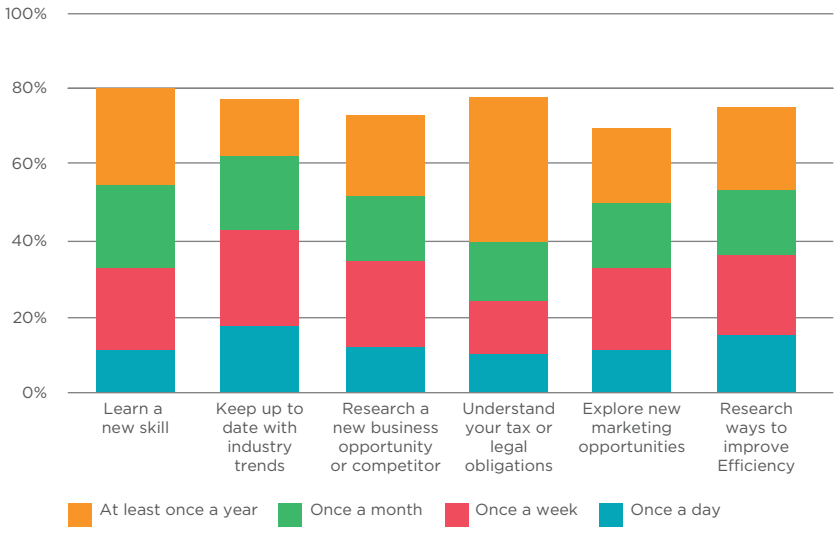
44. The Telegraph, 24 February 201 https://www.telegraph.co.uk/news/shopping-and-consumer-news/12172230/Are-mobiles-changing-how-we-shop.html

Improving productivity with Google

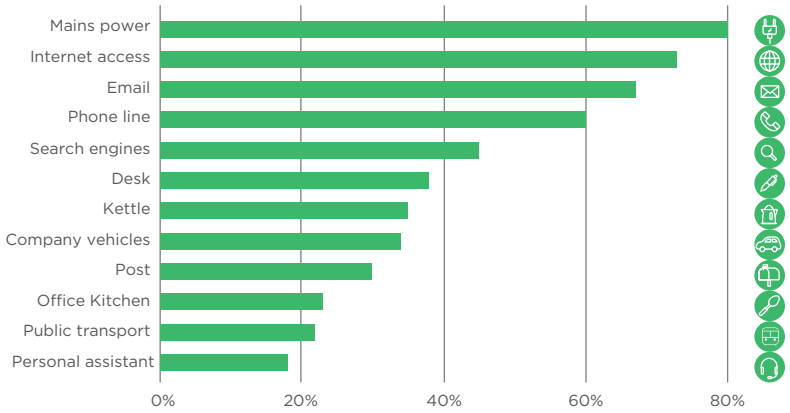
According to our polling:

- 44% of businesses say they would not be able to run without access to a search engine
- While 38% of businesses say they would not notice if the post stopped running, 45% believe they could run at best a day or two without access to a search engine
- The proportion of businesses say that online office suites are important to their business (46%) is now three quarters as large as the proportion requiring traditional desktop office software (61%)
- 20% of businesses say they would not be able to run without access to online maps, and 13% of businesses without access to YouTube
- A majority of businesses regularly use a search engine to learn new skills (80%), keep up to date with industry trends (77%), research a new business opportunity (73%), understand tax or legal obligations (78%), explore new marketing opportunities (70%), or research ways to improve efficiency (75%).

How often do you personally use a search engine in your business to...



How long could your company continue to operate efficiently without access to the following? A day or two (maximum)

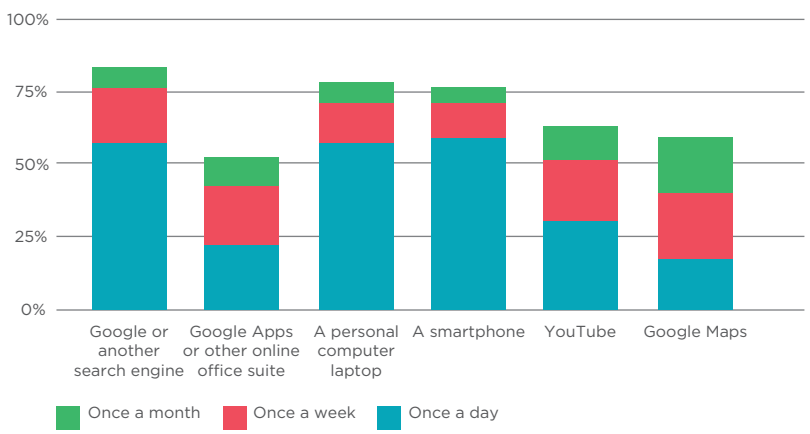


Three quarters of employees would find their life harder without a search engine

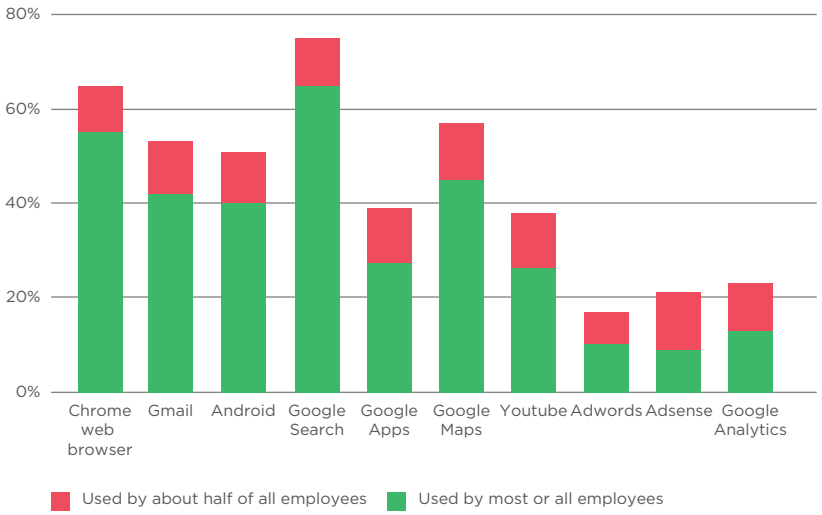
For employees, Google's suite of products have become essential tools for productivity.

- 57% use Google or another search engine at least once a day as part of their job or study - and 45% believe their job would be much harder or take longer without it. 65% of businesses say that most or all of their employees use Google Search specifically.
- 42% use Google Apps or another online office suite at least once a week as part of their job or studying - and 33% believe their job would be much harder or take longer without it. 43% of businesses say that most or all of their employees use Google Apps specifically.
- 51% use YouTube at least once a week as part of their job or studying.
- 59% use Google Maps at least once a month as part of their job or studying - and 17% use it daily.

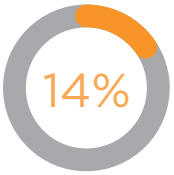
How often do you use the following products in your job or study?



Which Google products does your business use?



How hard would your job or study be to do without access to a search engine?



Very hard or impossible to do.



Difficult, and would take me much longer to do many of my core tasks.



It would cause a few issues and a few tasks would take longer, but it would not be too much of a problem.



It wouldn't make much difference at all.

Google as an employer

- Google directly employs 4,000 in the UK across 6 offices and is developing a new Campus in King's Cross which is able to house 7,000 employees across 3 buildings[45], one of which is the first wholly owned and designed Google building outside the US.

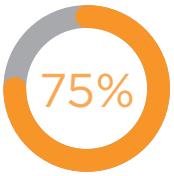
45. https://www.dailymail.co.uk/news/article-5104381/Google-calls-UK-great-home-announces-1bn-HQ.html

Google Cloud

For larger and scaling companies in the UK, Google Cloud has led to increased efficiency. A recent study by Deloitte[46] found that the productivity impact of Google Cloud services in the UK - including revenue expansion and cost savings - was $420 million to $1,160 million in 2017, or around £500m. The report also found that because Google uses 100% renewable energy to power its data centres, the switch for businesses to Google Cloud saves between 22 and 23 thousand tons of CO2 emissions on an annual basis. This equates to the average emissions of 4,600 to 4,700 passenger vehicles.

Warburtons

Warburtons, the largest bakery brand in the UK, is a family-run business that values its 160-year-old traditions. But one tradition was seriously affecting productivity: the retail sales team was spending one day per week inputting retail store information into the company's internal system from handwritten notes. That method might've worked in years past, but today, with Warburtons' client base having grown from a single store to 20,000 stores across the U.K., the manual input method proved unsustainable. It was time for the sales team's data input system to step up to Warburtons' stature as one of Britain's most successful retail brands.



Data entry time reduced by 75%

Warburtons chose DMI to develop a custom Android tablet application that would take the sales process mobile, making the entire inventory system real-time and efficient. DMI leveraged App Engine, Cloud Storage, Cloud Datastore and Cloud SQL to quickly build the backend and maintain all sales data. BigQuery was instrumental in quickly and cost-effectively leveraging the immense amount of data the app collected from the sales team as well as clients. Next, DMI created a concrete rollout plan with emphasis on training, pilot testing and quickly responding to feedback. The plan included a combination of classroom and onsite training sessions, with a special group of sales "stars" designated to evangelize the app to the rest of the field team. Incredibly, the average user was able to learn the entire hardware and software set in just half a day.

Front-line efficiency increased as did the efficiency of corporate backend systems, which were automatically updated. The new app cut the data entry process from one day/week to one day/month. The average sales rep is gaining one full day a week in saved time. In addition, Appleton says, "Analysis of sales data with Google BigQuery also pointed out cross-sell and upsell opportunities and led to a significant increase in sales."

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46. Economic, Social and Environmental Value of Cloud, Deloitte, September 2011



Individuals earning millions as YouTube creators

21 of the world's top 250 YouTube creators are based in the UK.[47]

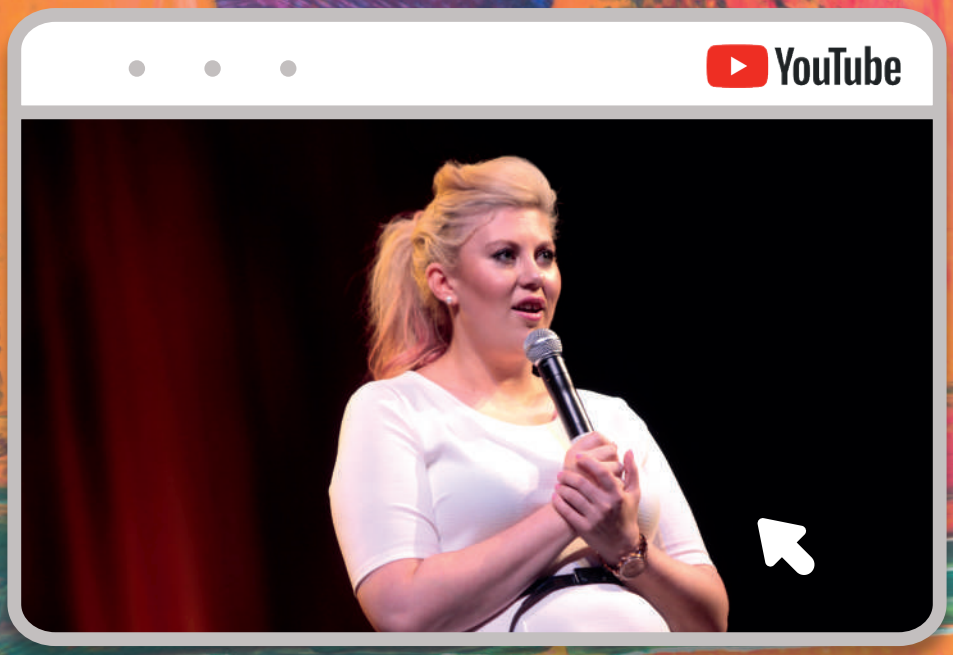
The most desirable job in the country is being an author.[48] Art and Design and Technology are two of the three most popular optional GCSE subjects.[49] Being a musician or actor comes top of the wish-list for pupils' future careers.[50]

Millions of us want to lead creative lives. For decades publishers, record labels, and TV producers have been besieged by requests from individuals who want a break.

YouTube has provided many with an alternative - communicating directly to people all over the world. Nearly two billion people worldwide watch YouTube[51], with data from Tubular Labs suggesting that three quarters of UK creators' audiences comes from outside the UK.[53, 53]

In some cases, it has created new multi-millionaires. Forbes estimates that the highest earning YouTuber of 2017 was 26-year old Daniel Middleton of Aldershot, whose channel DanTDM presents daily gaming videos to over 20 million subscribers.

47. https://www.youtube.com/intl/en-GB/yt/about/press/
48. https://yougov.co.uk/news/2015/02/15/bookish-britain-academic-jobs-are-most-desired/
49. http://www.cambridgeassessment.org.uk/our-research/data-bytes/the-most-popular-non-compulsory-gcse-subjects-in-the-period-2005-2014/
50. http://www.dailymail.co.uk/news/article-4532266/75-cent-children-want-YouTubers-vloggers.html
51. https://9to5google.com/2018/06/21/youtube-memberships-merchandise-more/,
52. https://www.thinkwithgoogle.com/products/youtube/
53. https://www.ozy.com/fast-forward/who-wants-to-be-a-youtube-billionaire/88794

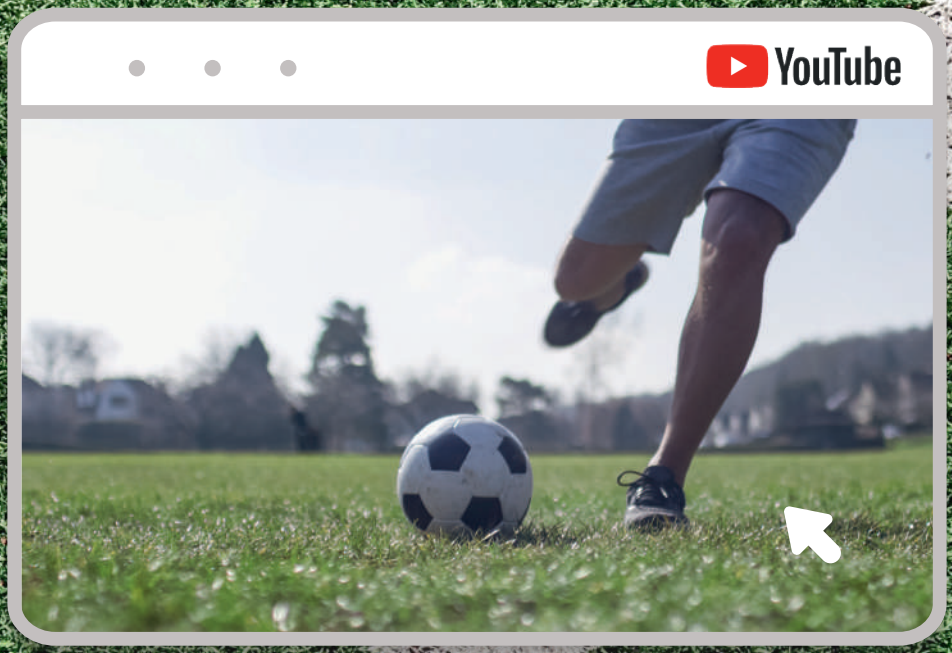


Sprinkle of Glitter

Louise Pentland's craft and DIY blog was supposed to be a hobby. Within a year it had become YouTube channel "Sprinkle of Glitter". Within four years she had become one of the world's top YouTubers.

"It was just a bit of fun, I didn't think you could make it a job. I went on maternity leave and I thought perhaps I might be able to make a bit of pocket money out of it so that I could stretch to a year's maternity rather than three months. And it became my work."

She has 2.5 million "Sprinklerino" subscribers watching videos on motherhood, family dilemmas and fashion. She has recently released her first bestselling novel and created her own clothing line.

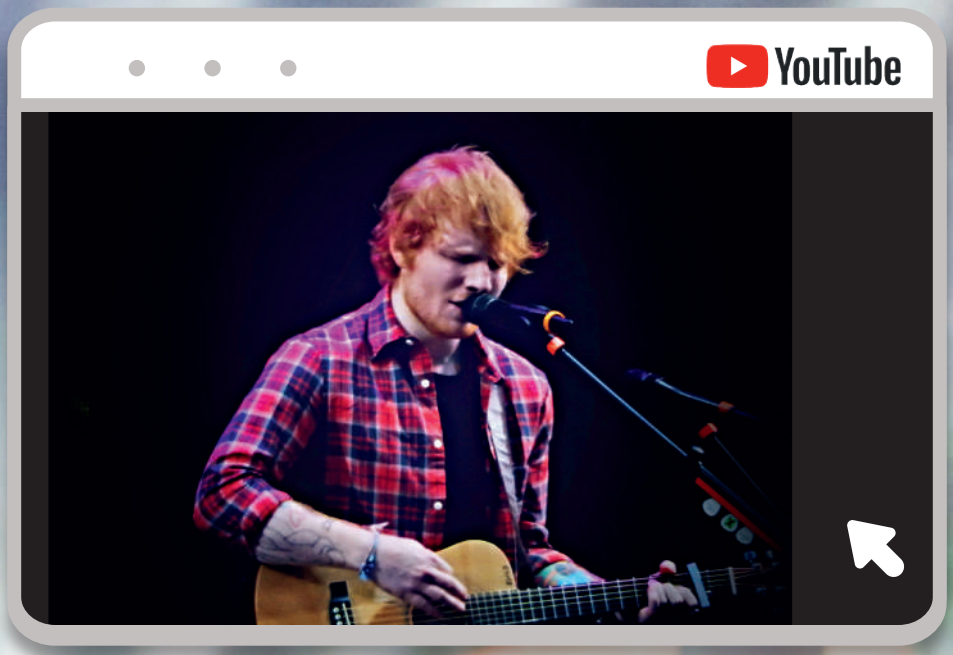


F2 Freestylers

Jeremy Lynch and Billy Wingrove, released by Arsenal and Tottenham Hotspur respectively, have managed to turn massive disappointment into a global business.

Building on their combined passion, experience, and skills in freestyle football, the duo officially launched F2Freestylers on YouTube in 2010. By blending technical difficulty with brilliant synchronization, they've gathered over 9 million subscribers and have the biggest YouTube football channel in the world. They've collaborated with Lionel Messi, Eden Hazard, Neymar, Diego Costa and others.

In 2016, the duo debuted on television in the United States, with their series "It's Called Football" premiering on the NBC Sports Network.



Ed Sheeran

Last year, Ed Sheeran broke records when he filled 16 of the top 20 spots in the UK charts, and 9 of the top 10.

But ten years ago, he was fairly unknown. It was substantially through videos on YouTube that he built his fan base and gained attention. It allowed an untypical singer to appeal directly to fans and show there was a huge market for his music.



Stormzy

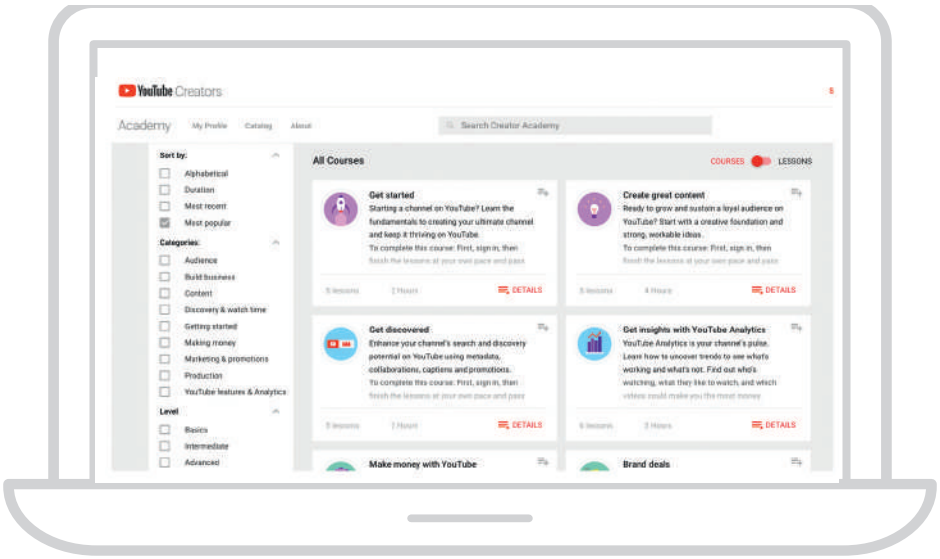
When Stormzy started uploading his freestyle rap videos to YouTube back in 2011, he would never have imagined that just 3 years later, he would be picking up 'Best Grime Act' at the MOBO's - and 4 years after that picking up his first Brit award.

The success of StormzyTV on YouTube led to Stormzy releasing EPs and mixtapes that shot to popularity - hitting number 1 in Hip-Hop charts ahead of label artists and appearing on Later with Jools Holland as the first unsigned rapper to do so.

With an estimated net worth of £1.5 million, Stormzy's meteoric rise has also delivered social return. In August 2018, he launched a scholarship that would fully fund two black British students to go to the University of Cambridge. "It sounds corny coming from a rapper, but I did love learning and I loved studying."

Creators Academy

YouTube Creators Academy helps people across the world, understand how to use YouTube to reach people and make money.



Making money through publishing and news

Supporting high quality journalism - training 20,000 journalists

Google's business revolves around connecting users with credible, timely and relevant information. In this way, the business model is aligned with assisting media content creators in adapting to digital technology and ensuring that high quality content continues to prosper on the internet.

Google's efforts to support the news industry span across partnership, product development and in some cases funding for innovation to publishers. All of these efforts are part of the Google News Initiative, which works with the news industry to help journalism thrive in the digital age.

Research by Deloitte estimates that the value of each click sent to UK publishers is worth between 3.5 and 7p.[54] An estimated 44% of referral traffic to British news websites comes from Google.[55] Google also helps publishers monetise their content through the sale of advertising space on their sites and apps. 68% of this ad revenue is shared with publishers.[56]

In collaboration with news organisations, Google has also developed a number of tools to help publishers thrive in the digital age. Publishers recognized that it was proving difficult to create news sites that were mobile optimised and provide the speed that users wanted to see. Together Google and the industry developed the Accelerated Mobile Pages (AMP) open source project, which has enabled publishers to create mobile optimised content that loads instantly, allowing publishers to make the most of the opportunities of mobile. A DoubleClick study on the impact of AMP found that over 80 per cent of publishers surveyed reported higher viewability rates and over 90 per cent saw higher engagement with greater click through rates.[57]

Another example is "Subscribe with Google," developed in partnership with the FT and other news publishers, which enables users to seamlessly subscribe to news sources through their Google account with a single click or tap. Google is also exploring ways to use machine learning and share data insights to help publishers present the right subscription offer to the right audience at the right time.

Through the YouTube Player for Publishers programme, Google has partnered with major UK publishers to provide a video hosting, streaming, and ads management platform, reducing publisher infrastructure costs and optimizing ad revenues. Google also supports publishers through tools and services such as Google Earth technology, News Consumer Insights and Consumer Surveys.

To help publishers make the most of digital opportunities, Google established the Digital News Innovation Fund (DNI Fund), a initiative to help facilitate innovation in the European news industry. Thus far, £10.5 million has been awarded to 66 UK projects involving national, local and hyperlocal newsrooms. A related initiative, Google News Lab, has trained 20,000 UK journalists for free on a range of digital tools over the last three years, and the Google UK Fellowship programme has provided 24 newsroom placements over three years for journalism students.

Lastly, recognising that the ability to analyse news media is more important than ever, Google has invested in a number of UK programmes to enhance news literacy. For instance, Google has joined with the Guardian Foundation, the National Literacy Association and the PSHE Foundation to launch News Wise - a news literacy programme for primary schools. The pilot, which launched in Autumn

54. https://www2.deloitte.com/uk/en/pages/technology-media-and-telecommunications/articles/the-impact-of-web-traffic-on-revenues.html
55. Calculated as the UK share of total Europe revenue from the News Ecosystem Report, Kaleida, 2018.
56. https://support.google.com/adsense/answer/180195?hl=en-GB
57. https://amphtml.wordpress.com/2016/06/07/ads-on-amp-where-faster-is-better/

2018, will be focused on primary school children in years 5 and 6 and will create an evidence-based model for teaching news literacy in primary schools, with the aim to embed news literacy into schools' curriculum. The programme will enable children to access, navigate, critically analyse and participate in the news through a suite of lesson plans, online resources and school workshops.

DNI Case Study

The UK's biggest local publisher Trinity Mirror is creating an alternative to 3rd party content providers. Project Vario will attempt to develop a compelling alternative to promoted content links in publisher apps; instead focusing on exclusive, targeted promotional offers that have real-life value to the users who wish to redeem them. The goal is to solve the commercial problem for publishers, SME advertisers, and consumers, at the expense of promoted content providers.

THE OVERALL VALUE OF GOOGLE



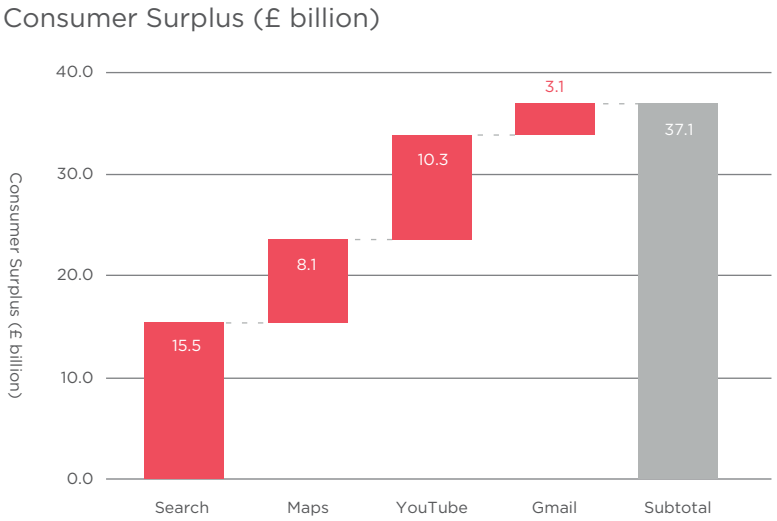
The value per household of Google's products beyond what customers pay for is worth at least £41 a month, or the same amount again as what households pay for their home broadband or mobile bill

Measuring the total value created by online services remains challenging. However, conservative estimates suggest that:

- The total consumer surplus, or the additional value beyond what is paid for, created by Google services in the UK is worth at least £37.1 billion, the equivalent of £561.20 per person per year.
- Incorporating the value of free internet services would boost the measured size of GDP by 0.75 percentage points a year, and by itself explain around a third of the recent productivity stagnation.
- The average household would rather lose their car, TV licence or an hour's sleep a night than lose access to online search.

If there is one thing that is striking about the digital economy to an economist, it is how much of it is free. The world's seven most popular websites - Google, YouTube, Facebook, Baidu, Wikipedia, Reddit and Yahoo![58] – are all offered without charge. As many estimates have calculated, the modern smartphone replaces what once would could have been dozens of separate devices, including: your phone, camera, video camera, games console, alarm clock, map, satnav, book, television, DVD player, walkman, stopwatch, torch, debit card, compact mirror, step tracker, portable speaker and compass. While the average Android smartphone costs around £160[59], by one estimate buying all items the phone has replaced would cost up to £1,400.[60]

58. https://en.wikipedia.org/wiki/List_of_most_popular_websites
59. https://www.statista.com/statistics/309472/global-average-selling-price-smartphones/
60. http://www.dailymail.co.uk/sciencetech/article-4971810/50-items-d-carry-replace-smartphone.htm



The high proportion of digital goods and services that are offered free of charge creates a challenge to traditional economic statistics such as GDP or inflation. While GDP has never been a complete measure of the welfare improvements created by a new technology or business, improvements in it could at least act as a rough proxy for how well our economy was doing. The combination of a lack of prices and many digital services having no real analogue equivalent makes it much more challenging to estimate how much they matter to consumers.

In response, economists have developed multiple methods that allow us to estimate how much value – or consumer surplus – is created by unpriced goods:

- Using time or attention as a proxy for the cost we are prepared to pay for digital goods. Money is not the only cost we have to pay to use a good or service – our time is valuable too. The average Briton spends nearly 16 hours a month on Google sites, while we use our smartphone on average two hours a day.[61] This time carries a significant opportunity cost of everything else we could be doing either for leisure or our job – suggesting that we must find the digital service at least as valuable as the alternative.
- Asking individuals to estimate the amount they would be hypothetically willing to pay for a free service – or alternatively, what they would be willing to accept to give it up. For decades, economists and social scientists have experimented with the best way to ask individuals about their preferences over unpriced goods, such as a natural park or clean air. When designed right, these surveys can deliver surprisingly results. In the future, the arrival of new mass online polling solutions such as Google Consumer Surveys and big data enabled by the internet could potentially allow us to significantly improve the accuracy, speed and reliability of our economic statistics – allowing us to better measure what as individuals we really care about.

61. https://www.ofcom.org.uk/research-and-data/multi-sector-research/cmr/cmr-2018

- Comparing your preferences for a free good against another good which has a price attached. Finally, rather than try and construct a hypothetical price – something we rarely do in real life – we often find it easier to compare between different items: would you rather give up your washing machine or dishwasher? By comparing items with prices to those that are unpriced, we can produce a ranking, and bracket how valuable the free good must be.

Measuring the value of the digital economy remains challenging. As we have seen throughout this paper, free online services make up an increasingly large part of our leisure, and for many are crucial to our job.

Traditional economics suggests a number of reasons why more and easier access to information should lead to faster growth, higher standards of living and new types of job. By making it easier for customers to find new businesses, online search has reduced the barriers to entry and enabled a new generation of small businesses and creators. And by reducing asymmetries in information between customers and businesses through innovations like consumer reviews it is much easier for individuals to find the book, restaurant or other service that will suit them, while ensuring that businesses raise their game.

Nevertheless, given that we are all used to receiving many online services for free, when asked in a survey how much you would be hypothetically be willing to pay for these online services, many will only state very low numbers or even nothing. By contrast, if you study the minimum an individual would be willing to accept to give up the current services, you can find valuations of many thousands of pounds a year.

As recent books like *Capitalism without Capital* have explored, our economy is increasingly becoming dominated by 'intangible investment', as investing in knowledge, communication and organisational cooperation become ever more important. This is likely to increase the challenge in accurately interpreting traditional statistics such as GDP, and increase the importance of studying a broader array of measures.

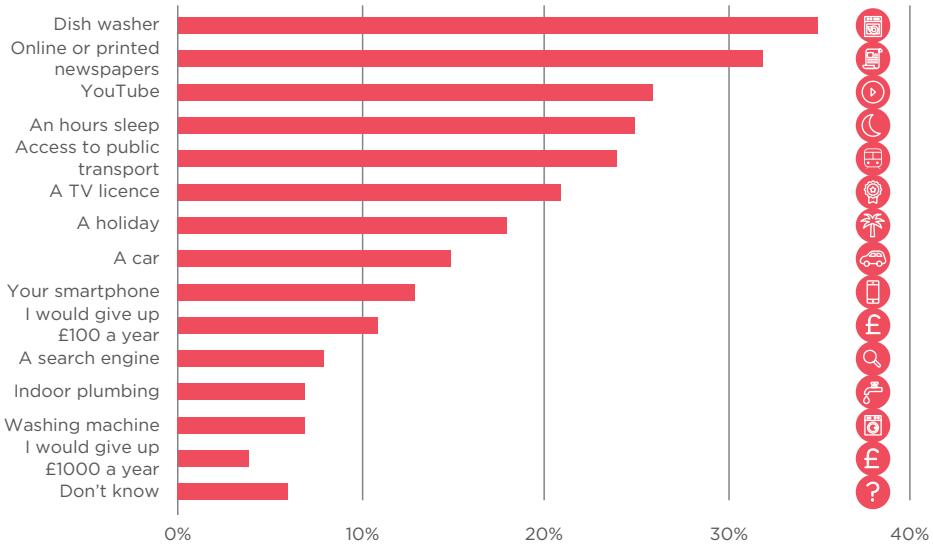
As part of this paper, we both reviewed existing estimates of the value of digital services and produced our own up to date estimates of the value of Google Services in the UK, making use of all three methods listed above. We believe a conservative estimate of the total consumer surplus created by Google services in the UK is £37.3 billion, the equivalent of £564.60 per person per year. As the recent independent Bean Review of Economic Statistics highlighted, fully incorporating the value of free internet services could boost the growth rate of GDP by up to 0.75 percentage points a year. Other studies, making use of more aggressive assumptions, find that the value of online search as a whole could be as high as £10,000 per person a year.[62]

62. Using Massive Online Choice Experiments to Measure Changes in Well-Being, Brynjolfsson, Eggers and Gannameni, 2017

Wherever possible, we calculated the value of each service both by both an estimate of the value of the time individuals have saved and by the amount that individuals say they value that service, averaging the results of the two methods. As a sense check, we also asked the people we polled to rank which they would rather give up out of a search engine and other common household items, finding results roughly in line.

Which would you be the most prepared to give up for a year?

Pick two or three



We have tried to base our estimates on reasonably conservative assumptions, believing it was better to err on the side of underestimating the value created. As is the case in much of the other literature, changing these assumptions or asking the question in a slightly different way, can lead to very different estimates. For example, our estimates from the polling data focussed on the value provided by Google Search, Google Maps, and YouTube specifically – not the generic category of online search, online maps and online video. We also made cautious assumptions in our choice of modelling form, with other reasonable choices leading to results significantly higher. More details on our methodology and the implications of different assumptions are given in Appendix A and B.

As the intangible and digital realm becomes an ever larger part of our economy, acting as an enabler for families, businesses and organisations, it will become ever more important to continue to work to update our economic statistics to ensure we are fully capturing the value created by it.

Other estimates of the consumer value created by the digital economy

Depending on their methodology and assumptions, the estimates of the value produced by the online economy can vary by many orders of magnitude. In general, however, even the more modest estimates find that online services are creating significant surplus value beyond what their users directly pay.

Goolsbee and Klenow's paper *Valuing Consumer Products by the Time Spent Using Them: An Application to the Internet* (2006)[63] uses the opportunity cost of the leisure time spent on the Internet to estimate a total consumer surplus equivalent to £2,000 on average in the US.[64]

McKinsey's report *The Web's €100 billion surplus* (2011)[65] used stated preference methods to calculate the total consumer surplus created by online services, netting off consumers preference to avoid advertising or sharing their data. Their estimates found that search created a monthly consumer surplus equivalent to £3, for email £3.1, maps £1.1 and video £0.9.[66]

Brynjolfsson and Oh's paper *The Attention Economy: Measuring the Value of Free Digital Services on the Internet* (2012)[67] updated the methodology of Goolsbee and Klenow (2006) to account for that the Internet might simply be substituting for watching TV, finding that free online sites create the equivalent of £340 per person in consumer surplus.[68]

Brynjolfsson, Eggers and Gannameni's paper *Using Massive Online Choice Experiments to Measure Changes in Well-Being* (2017) used online surveys to test both willingness to accept compensation in place of digital goods and to create a ranking of different goods. They find significantly higher numbers, with a consumer surplus for search the equivalent of £10,200 a year, for email £4,900, maps £2,100 and video £680. In order to test the reliability of these hypothetical numbers, they run a smaller scale experiment where they actually make some people go through with giving up the online service – and find this creates little change in valuation. In addition, they run a ranking experiment, and find that giving up search engines, email and smartphones are all ranked somewhere between the equivalent of losing $500 to $1000 a year.

Our own headline estimates lie in the middle of the range suggested by this literature and are roughly in line with the estimates of past estimates of the consumer value of Google from the US[69] and Australia[70], adjusted for inflation and population size. In Appendix A and B, however, we explore how more aggressive assumptions could lead to estimates an order of magnitude higher.

63. http://www.klenow.com/InternetSurplus.pdf
64. Updated to current pounds from the original US dollar estimate of $3000.
65. https://www.mckinsey.com/industries/media-and-entertainment/our-insights/the-webs--and-8364100-billion-surplus
66. The original estimates were given in euros: email (3.2), search (3.1), web mapping (1.1) and video (0.9). In order to make comparable to current data, we have converted to sterling and grown with average wages.
67. https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1045&context=icis2012
68. Updated to current pounds from the original US dollar estimate of $492
69. Economic Value of Google, Hal Varian, Google, 2011, http://assets.en.oreilly.com/1/event/57/The%20Economic%20Impact%20of%20Google%20Presentation.pdf
70. Google Economic Impact Australia 2015, AlphaBeta, https://media.wix.com/ugd/f01257_178469dfca6e48ef9ae11f34efb2ff0b.pdf

APPENDIX 1

METHODOLOGY FOR VALUATION

As described in the main report, accurately estimating the value created by digital products is extremely challenging – and this is particularly true for products that are free at the point of use, are used widely across the economy, and contain elements of both consumption and production, as is true for many Google products.

While we believe our estimates are based on conservative assumptions, it is worth being aware of their limitations:

- Many of our estimates are based on the gross impact of Google's products, as it is hard to accurately quantify what a counterfactual world without Google would look like.
- Conversely, in some cases we have not been able to fully quantify all the impacts created by Google products, suggesting that our estimates should be viewed as a lower bound.
- Many of our estimates make use of new polling carried out for this report – but as in any poll, consumers may underestimate or overestimate their use of products. (Full polling tables for data used in this report are available in an online appendix).
- Best practice in many of these areas, such as valuing an hour of leisure time or using stated preferences to calculate consumer surplus, remains an area of active academic debate.
- Google did not provide any new or internal data to generate these estimates. All our modelling is based on third-party or public data, alongside our own internal estimates.

Consumer Benefits

Google Search

Our headline estimate of the total consumer surplus of Google Search is calculated as the geometric average of:

- Time saved. Following the methodology of Varian (2011), we assume that using Google saves 15 minutes per question, with the average person asking 1 answerable question every 2 days. Time saved is valued at the median wage rate, taken from the ONS' Annual Survey of Hours and Earnings, and we scale the overall estimate by Ofcom / comScore MMX data on the number of UK Google users. (More information of this overall approach can be found in the Economic Value of Google, a presentation by Google Chief Economist Hal Varian.)
- Stated preference (Willingness to Accept). As part of our polling, we asked participants a single discrete binary choice question of "Would you prefer to keep access to Google Search or go without access to Google Search for one month and get paid [Price]" with the price offered randomised between £5, £10, £20, £50 and £100. We linearly regressed the results of this poll to derive a demand curve and used this to calculate total consumer surplus per user. Finally, we scaled this estimate by Ofcom / comScore MMX data on the number of UK Google users.

Following Brynjolfsson et al (2017), we chose a Willingness to Accept (WTA) rather than Willingness to Pay format for our Stated Preference question as we believed this best matched the status quo, given that the majority of Google Services are free to the end user and required no up-front investment.

One form of significant uncertainty in our analysis is the right functional form relating price and quantity demanded. While our headline results are based on a linear model, we also ran three other models based on different functional forms (see Appendix 2) and calculated the total consumer surplus under each of these. In order to be conservative, we have decided to use the smallest estimate of consumer surplus coming from these regression models as our final estimate of consumer surplus, which in this case is the linear model.

One challenge with polling and valuing Google is distinguishing between Google Search specifically, and the wider category of search engines. In order to test this, we replicated our stated preference question at the £10 level with a one-off nationally representative poll of 1,503 participants on Google Consumer Surveys, but instead asking about the category as a whole ("Would you prefer to keep access to online search engines (eg. Google, Bing) or go without access for one month and get paid £10?".) We found that this could have a significant effect, with just 21% preparing to give up access to all search engines for a month for £10, compared to 50% in our main Deltapoll poll.

As with many other products, the mean consumer surplus is significantly higher than the median – or, in other words, a few dedicated users use it disproportionately more than the average.

In order to ensure that our household level figures were not misleading, we based them not on the mean household value for WTA compensation, but instead a separate estimate of the median WTA. We derived this by regressing our polling data again, using an exponential method which we judged was more likely to accurately represent the bottom of the distribution.

We sense checked these results by, in addition, asking individuals to choose from a long list which items they would most and least be prepared to give up – with a Search Engine ranked between £100 and £1000, matching our other estimates.

Google Maps

Our headline estimate of the total consumer surplus of Google Maps is calculated as the geometric average of:

- Time saved. Following a similar methodology to Google Economic Impact: Australia, we calculate time saved by Google Maps, using estimates of time saved through GPS navigation from TNO (2007), total time spent travelling from the Department for Transport's National Travel Survey, and average daily usage of Google Maps from our polling. Time saved is valued using the average of the Department for Transport WebTag valuation for an hour of leisure and commuting.

- Stated preference. As with Google Search, we asked the participants of our poll a single discrete binary choice question of "Would you prefer to keep access to Google Maps or go without access to Google Maps for one month and get paid [Price]" with the price offered randomised between £5, £10, £20, £50 and £100. We linearly regressed the results of this poll to derive a demand curve and used this to calculate total consumer surplus per user. Finally, we scaled this estimate by Ofcom / comScore MMX data on the number of UK Google users. In addition, we constructed a separate estimate of the median WTA compensation for losing Google Maps which we used for our per person and household estimates.

As with Search, we sensitivity checked our estimates by running regressions on different functional forms, the details of which are provided in Appendix 2.

YouTube

We did not have sufficient data to estimate the elasticity of substitution between YouTube and other forms of leisure, and could not therefore directly estimate the value of YouTube.

Instead we relied on stated preferences, following again the same methodology. We asked the participants of our poll a single discrete binary choice question of "Would you prefer to keep access to Google Maps or go without access to YouTube for one month and get paid [Price]" with the price offered randomised between £5, £10, £20, £50 and £100. We linearly regressed the results of this poll to derive a demand curve and used this to calculate total consumer surplus per user, although as with Search and Maps we believe the use of a linear form is a highly conservative assumption. Finally, we scaled this estimate by Ofcom / comScore MMX data on the number of UK Google users. In addition, we constructed a separate estimate of the median WTA compensation for losing YouTube which we used for our per person and household estimates.

Gmail

We do not have our own polling data on Gmail, and so instead make use of an earlier estimate of the consumer surplus created from email by McKinsey's The Web's €100 billion surplus. We scale this past estimate with growth in wages since 2011, taken from the ONS' Annual Survey of Hours and Earnings, and then scale again by Ofcom / comScore MMX data on the number of UK Gmail users.

Business Benefits

Google Ads

Following the precedent of Google's Economic Impact: United Kingdom | 2014 and Google Economic Impact: Australia, we use third-party data to estimate the total size of the UK Google Ads market:

- A top-down estimate, calculated from Ofcom data on the total UK paid search market, scaled by Google's market share.
- A bottom-up estimate, calculated as the product of the number of Google Search users, the average number of searches per user, the number of ads per page, click-through rates, and the cost-per-click.

Following the methodology of the US Google Economic Impact Report, we then scale this with an assumed Return on Investment (ROI) factor of 8, from:

- Varian (2009) estimates that businesses make on average $2 for every $1 they spend of AdWords.
- Jansen and Spink (2009) estimate that businesses receive 5 clicks on their search results for every 1 click on their ads.
- Google estimates that search clicks are about 70% as valuable as ad clicks.
- Total ROI is then 2 * spend + 70% * 5 * 2 * spend – spend = 8 (spend).

More information on this methodology is available at https://economicimpact.google.com/methodology/

AdSense

Following the precedent of Google's Economic Impact: United Kingdom | 2014 and Google Economic Impact: Australia, we calculate the economic impact of AdSense as the amount paid to website publishers, derived from the geometric average of:

- 2017 global Google Traffic Acquisition Costs, scaled by DoubleClick (2011) data on Great Britain's share of AdSense impressions.
- The above, with a monetisation adjustment calculated as the ratio between the UK's share of global AdSense impressions and the UK's share of global digital ad spend.

In this case, we did not try to obtain an estimate for the ROI that British advertisers themselves obtain by advertising on AdSense, so this should be regarded as an underestimate of the total business benefits of AdSense. Under the assumption that the ROI from AdSense

advertising is likely to be roughly equivalent to the ROI from Search ads, the total economy activity driven by AdSense is likely to be three times greater than the estimate used in the main text.

Android

We calculated the revenue developers received from Android as the product of Statista estimates of total UK app economy revenue and App Annie estimates of the Android share of global app revenue.

APPENDIX 2

SENSITIVITY TESTING CHOICE OF REGRESSION ESTIMATES FOR CONSUMER SURPLUS

Our methodology and regression analysis assumed a linear model of $p = a - bq$, for some constants a and b, but in reality we do not have enough polling data to be sure of the correct functional form. While a linear model is possible, another possibility is that the true function giving the relationship between p and q should be expressed as $log\,(p) = a - bq$ for some constants a and b. In addition, rather than regressing a function of price on quantity, another possible method for estimating demand would be to regress quantity on a function of price. In this case, we would run a regression to estimate functions of the form $q = a - bp$ or $q = a - b\,log\,(p)$ rather than $p = a - bq$ or $log\,(p) = a - bq$ respectively.

If we estimate regression models of the form $p = a - bq$ or $q = a - bp$ then consumer surplus will equal the product of the price where quantity demanded is zero and the quantity demanded when the price is zero divided by two. In both cases, the estimated consumer surplus is thus $\frac{a^2}{2b}$.

If we estimate a regression model of the form $log\,(p) = a - bq$, then we can equivalently write this as $p = e^{a-bq}$. Thus if $p(q) \equiv e^{(a-bq)}$, total consumer surplus will be equal to $\int_0^1 p(q)\,dq = -\frac{e^{a-bq}}{b}\Big|_0^1 = \frac{e^a - e^{a-b}}{b}$

Finally, if we estimate a regression model of the form $q = a - blog(p)$, then we can equivalently write this as $log\,(p) = \frac{a-q}{b}$ or $p = e^{(a-q)/b}$. Thus if $p(q) \equiv e^{(a-q)/b}$, total consumer surplus will be equal to $\int_0^1 p(q)\,dq = \int_0^1 e^{(a-q)/b}\,dq = -be^{(a-q).b}\Big|_0^1 = b(e^{a/b} - e^{(a-1)/b})$.

The raw data giving the fraction of the population that would demand each product at various price points is summarized in Table 1:

Price	Search	YouTube	Maps
£5	0.52	0.38	0.4
£10	0.44	0.29	0.34
£20	0.45	0.19	0.23
£50	0.27	0.22	0.2
100	0.28	0.22	0.18

Table 1: Table expressing the fraction of the UK population that would not give up access to certain Google products at various price points, as estimated by Public First / Deltapoll poll.

Using the data in Table 1, we can run the above four regression models to estimate functions that relate price and quantity demanded. The results are summarized in Table 2:

Model	Search	YouTube	Maps
p = a − bq	a = 155.99, b = 303.56	a = 109.22, b = 277.78	a = 125.64, b = 328.3
q = a − bp	a = 0.482, b = 0.00243	a = 0.299, b = 0.00105	a = 0.342, b = 0.00193
log(p) = a − bq	a = 7.068, b = 10.161	a = 6.287, b = 12.315	a = 6.332, b = 12.026
q = a − b log(p)	a = 0.660, b = 0.0868	a = 0.413, b = 0.0498	a = 0.503, b = 0.0756

Table 2: Table expressing coefficients estimated for various regression models that relate price and quantity demanded.

Finally, we can use the coefficients estimated for the various regression models in Table 2 along with the expressions given for consumer surplus under each of these models to calculate the total consumer surplus that would be estimated according to each model.

Model	Search	YouTube	Maps
p = a − bq	£40	£21	£24
q = a − bp	£48	£42	£30
log(p) = a − bq	£116	£44	£47
q = a − b log(p)	£174	£202	£59

Table 3: Table giving estimated consumer surplus for certain Google products under various regression models.

The results in Table 3 indicate that the $p = a - bq$ model used to estimate consumer surplus in the main body of the report actually results in the most pessimistic estimates of consumer surplus.

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