OXFORD ECONOMICS

# THE ECONOMIC IMPACT OF HUAWEI IN JAPAN

NOVEMBER 2019


Huawei has co-sponsored the Tohoku Earthquake Support Charity Relay Marathon since 2013.

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# EXECUTIVE SUMMARY

**JPY 766 bn**

**Huawei's total contribution to Japan's GDP in 2018.**

***Huawei also supported 46,400 jobs and generated JPY 208 billion in tax receipts that year.***

**Huawei is a global leader in information and communications technology.** Since opening its first office in Japan in 2005, the business has played a significant role in developing Japan's digital infrastructure, and its investments for the future are aligned with Prime Minister Abe's vision for "Society 5.0".

Working collaboratively with local manufacturing partners, Huawei plays a major role in the development of the country's telecommunications infrastructure. It has also developed a suite of innovative business and consumer products that tailor technology solutions to the Japanese context, often in partnership with local businesses.

As well as fuelling Japan's digital transformation, Huawei delivers long-term benefits to Japan's productive potential through its investment in Japanese research and development (R&D), and by training its employees and the wider Japanese workforce through its corporate social responsibility (CSR) outreach programmes.

**This report investigates the full economic contribution that Huawei made to the Japanese economy between 2014 and 2018.** It explores the company's expenditure in the country, and the economic activity, jobs, and tax revenues that were supported as a result. These include the sizeable economic benefits generated through all the goods and services purchased from local suppliers by both Huawei's Japanese and global operations.

**The report also assesses the company's positive impact on Japan's future productive potential** through its investment in R&D and skills, and its impact on living standards through work supporting disaster recovery and environmental protection in Japan.

## CALCULATING HUAWEI'S TOTAL ECONOMIC IMPACT IN JAPAN

Huawei's total economic impact is measured in terms of its annual contribution to national GDP, the jobs it supports across the country, and the tax revenues it generates. These occur both directly and through "knock-on" impacts generated via the demand for Japanese products in the supply chain.

**In total, we find that Huawei sustained a JPY 766 billion contribution to Japan's GDP in 2018.** This comprises a JPY 20 billion contribution by Huawei's own operations (its "direct" impact), a JPY 521 billion contribution from the company's procurement of Japanese goods and services in the supply chain (its "indirect" impact), and a JPY 225 billion contribution in the consumer economy due to the payment of wages by both Huawei and firms in its supply chain (its "induced" contribution).

**We also find that Huawei supported a total of 46,400 Japanese jobs in 2018** through these three channels of impact, and generated JPY 208 billion in tax revenues for authorities at both the national and municipal level. This annual tax income is equivalent to the benchmarked salaries of 42,700 teachers and other education public servants.

**Huawei's Japan operations boast very high levels of productivity.** On average, each of its direct employees contributed JPY 18.7 million to the country's GDP in 2018—24% higher than the national average of JPY 15.1 million per worker.

**33%**

**Average annual growth in Huawei's total contribution to Japan's GDP between 2014 and 2018 (in real terms).**

***Its total impact on jobs rose by 32% per year, as did its total tax contributions.***

## HUAWEI'S ECONOMIC IMPACT HAS GROWN RAPIDLY

**Huawei's economic impact has grown significantly in recent years**, in line with the company's increasing commitment to the Japanese market. Its investments in Japanese staff and facilities have increased along with its procurement spend on goods and services produced by Japan-based suppliers.

**Fig. 1: Huawei's total economic impact in Japan, 2014-2018**[1]

| **GDP contribution** (JPY billion at 2018 prices) | **2014** | **2015** | **2016** | **2017** | **2018** | **Average annual % growth (2014-2018)** |
|---|---|---|---|---|---|---|
| Direct GDP | 9 | 10 | 10 | 14 | 20 | 20% |
| Indirect GDP | 165 | 269 | 289 | 339 | 521 | 33% |
| Induced GDP | 73 | 116 | 125 | 147 | 225 | 33% |
| **Total GDP impact** | **247** | **394** | **424** | **500** | **766** | **33%** |
| **Headcount** (rounded to nearest 100) | **2014** | **2015** | **2016** | **2017** | **2018** | **Average annual % growth (2014-2018)** |
| Direct jobs | 600 | 600 | 800 | 800 | 1,100 | 15% |
| Indirect jobs | 9,500 | 13,900 | 16,500 | 17,900 | 29,000 | 32% |
| Induced jobs | 5,100 | 8,200 | 9,000 | 10,500 | 16,300 | 34% |
| **Total jobs impact** | **15,200** | **22,700** | **26,300** | **29,200** | **46,400** | **32%** |
| **Tax generated** (JPY billion at 2018 prices) | **2014** | **2015** | **2016** | **2017** | **2018** | **Average annual % growth (2014-2018)** |
| Direct tax revenues | 3 | 4 | 4 | 4 | 5 | 14% |
| Indirect tax revenues | 45 | 72 | 79 | 92 | 142 | 33% |
| Induced tax revenues | 20 | 32 | 34 | 40 | 62 | 33% |
| **Total tax impact** | **68** | **108** | **116** | **136** | **208** | **32%** |

Source: Oxford Economics

[1] Growth rates reflect compound annual averages between 2014 and 2018 inclusive.

Overall, we find that Huawei's total contribution to Japanese GDP grew by an annual average of 33% between 2014 and 2018, in real terms (see Fig. 1). Over the same period, the total employment supported by Huawei, and the total tax revenue generated, both increased by an average of 32% each year.

**JPY 655 mn**

**Cost of training provided by Huawei to its Japan-based employees in 2018.**

***More than half of Huawei Japan's 1,050 employees received training.***

## HOW HUAWEI ENHANCES JAPAN'S FUTURE PRODUCTIVE CAPACITY

**Over the past five years, Huawei has invested heavily in R&D in Japan**. This includes work undertaken at its three Japanese R&D centres, where 300 staff are employed, and its partnerships with local Japanese firms and universities.

In 2018 alone, Huawei has provided formal training for more than 600 of its 1,050 staff in Japan, at a cost of JPY 655 million. This investment will positively affect the future productive potential of the Japanese economy—as will the company's CSR activities, which are aimed at improving the ICT skills of young Japanese people, and providing funding for local universities to pursue basic (i.e. early-stage) research in scientific fields of their own choosing.

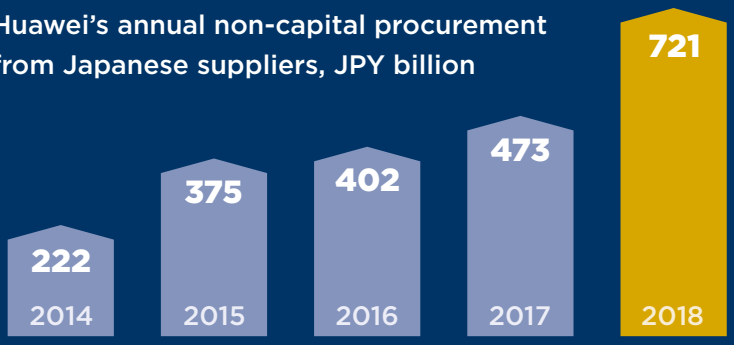
Huawei's CSR work also seeks to enhance the resilience of Japan's communications infrastructure to natural disasters, and contributes to a number of environmental protection schemes. Furthermore, the company plays an important role in Japanese business associations and industry fora, including three key groups run by the Ministry of Internal Affairs and Communications, to reinforce high-quality industry standards.

# HUAWEI'S PROCUREMENT SPENDING IN JAPAN

Huawei's total procurement spend in Japan 2014–18

**JPY 2.2 trillion**

Huawei's annual non-capital procurement from Japanese suppliers, JPY billion




## ECONOMIC IMPACTS

Direct · Supply chain · Wage spending

In 2018, Huawei stimulated a **JPY 766 billion** contribution to Japanese GDP. This was **3 times larger** than the GDP it supported in 2014, in real terms.

JPY 20 billion · JPY 521 billion · JPY 225 billion

In 2018, Huawei supported **46,400 jobs**. This is **more than 3 times** the number in 2014.

1,100 jobs · 29,000 jobs · 16,300 jobs

In 2018, Huawei's activities in Japan generated **JPY 208 billion** in tax receipts. This is **3 times** the 2014 value, in real terms.

JPY 5 bn · JPY 142 bn · JPY 62 bn

## R&D AND TRAINING

Employs **300** staff in R&D roles.

**JPY 655 mn** spent on formal training for its staff in 2018.

## CORPORATE SOCIAL RESPONSIBILITY


spent on CSR activities in 2018.

# 1. INTRODUCTION

## 1.1 HUAWEI'S GLOBAL OPERATIONS

Founded in 1987, Huawei is a leading global information and communications technology (ICT) solutions provider. Its stated mission is to bring digital technology to every person, home and organisation for a fully connected, intelligent world. Huawei is a private company, wholly owned by its employees, operating in more than 170 countries around the world and serving more than 3 billion people with its range of products and services.

Globally, Huawei now works with 211 of the world's top 500 companies, and 48 of the top 100. Amongst consumers, brand awareness of Huawei increased from 25% in 2012 to 88% in 2018,[2] as its annual worldwide smartphone shipments increased from 32 million to 206 million units in just six years.

**Research and development (R&D)—aimed at facilitating faster and easier communication across the world—forms a core part of Huawei's operations.** Indeed, as of mid-2019, some 80,000 of the company's 180,000 global workforce were engaged in R&D activity. The company's annual global spending on R&D increased from US $2.1 billion (JPY 230 billion) in 2009 to US $14.8 billion (JPY 1.6 trillion) in 2018. This is equivalent to 14.1% of its sales revenue. In that time period, its cumulative R&D investment has totalled more than US $70 billion (JPY 7.6 trillion). Huawei ranked fifth among global companies in the 2018 EU Industrial R&D Investment Scoreboard in 2018 and, according to the World Intellectual Property Organization (WIPO), filed more patent applications in 2018 than any other entity worldwide.

## 1.2 HUAWEI'S OPERATIONS IN JAPAN

Huawei's operational presence in Japan dates back to 2005. It has grown rapidly to employ 1,050 staff (of which three-quarters are Japanese local staff) in seven facilities across the country—four in Tokyo, plus one each in Yokohama, Funabashi, and Osaka.

Huawei's operations in Japan are mainly carried out by three of its business groups:

- The Carrier Network Business Group, which contributes to the continual upgrading of Japan's telecommunications infrastructure.
- The Enterprise Business Group, which delivers ICT solutions to corporate clients.
- The Consumer Business Group, which delivers handsets and other smart devices to individuals.

In addition, Huawei's Japanese employees are involved in many central corporate functions, including R&D at Huawei's three Japanese R&D centres in Yokohama, Shinagawa (in Tokyo) and Osaka.


[2] Source: Ipsos.

**BOX 1: JAPAN AND SOCIETY 5.0**

At the World Economic Forum in January 2019, Japan's Prime Minister Shinzō Abe described his vision for "Society 5.0"—where data, rather than capital, connects and drives everything, "helping to fill the gap between the rich and the less privileged".

Abe has long demanded that Japan be at the forefront of this new stage of human history, in which Artificial Intelligence, the Internet of Things, and robotics make life more liveable for "all sorts of people from all walks of life". He described a new reality for urban living, but also highlighted the potential for Society 5.0 to overcome chronic social challenges by, for example, connecting small villages in Sub-Saharan Africa with the medical and education services they require. "The engine for growth," he said, "is no longer fuelled by gasoline, but more and more by digital data. Our task is obvious: we must make data a great gap buster."

Society 5.0—also known as the "super-smart society" —refers to the fifth stage of human history, building on the previous era of computing and telecommunications in a new paradigm where "all things are connected and all technologies fuse".

Of course, one of the big challenges this new chapter presents is the management of unimaginable amounts of data. In his speech, Japan's Prime Minister highlighted the fact that more than 2.5 quintillion bytes of data are now being created every day— "as much as 250,000 times the printed material in the US Library of Congress".

In response to this enormous challenge—and opportunity—Japan's government and industry leaders have been working closely together. The Japanese Business Federation (Keidanren), of which Huawei is an active member, has published policy proposals for Society 5.0 in response to the government's own five-year national strategy.

As a result, joint industry-government committees have been established to oversee research and investment in five broad areas:

- next-generation infrastructure;
- smart public services;
- next-generation mobility;
- financial technology (FinTech); and
- next-generation healthcare.

According to Prime Minister Abe, there is no time to lose if Japan is to be a leading player in the shaping of Society 5.0. In his WEF speech, he warned: "A delay of one year means we will be light years behind."

### 1.3 THE SCOPE OF THIS REPORT

**This report provides an assessment of the economic contribution that Huawei makes to the Japanese economy.** This is assessed by undertaking an economic impact assessment appraisal. This technique allows us to model Huawei's economic impact in terms of its contribution to Japan's annual Gross Domestic Product (GDP) [3], the number of jobs it supports each year, and the tax revenues that are generated for the authorities as a result of its expenditure.

**But Huawei's contribution to the Japanese economy is not limited to these expenditure impacts.** The report therefore also investigates how investment in R&D and skills, and other CSR activities, act to enhance Japan's productive potential and living standards. A summary of our methodology is provided below, with more details in this report's Appendix.

### BOX 2: INTRODUCTION TO OUR METHODOLOGY

We calculate the impact of Huawei's operations on the Japanese economy using an economic impact assessment framework. This involves quantifying the impact of three channels of expenditure undertaken by Huawei (also summarised in Fig. 2, overleaf):

- **Direct impact**—relates to the operational expenditure that Huawei undertakes running its own activities. The direct impact thus encompasses the economic activity and employment that are generated across all its sites in Japan.
- **Indirect (supply chain) impact—**describes the economic activity and employment stimulated by Huawei's procurement of inputs of goods and services from Japanese suppliers, including purchases both by Huawei Japan and Huawei globally.
- **Induced (wage-related) impact**—captures the wider economic benefits that arise from the payment of wages by Huawei and firms in its supply chain to their employees, who then spend these earnings in retail, leisure, and other outlets. The induced impact includes the further activity that is stimulated in these outlets' own supply chains, and by the additional spending of those working in these consumer-facing industries.

**The sum of these channels makes up Huawei's total economic impact in Japan, which we calculate for a particular year.** The analysis is undertaken on a gross basis, so no account is taken of the economic activity displaced from elsewhere, or the alternative uses to which the labour and other resources might be put, in the absence of Huawei's activity.

[3] GDP is a measure the total production of goods and services in a country, in a given time period, as used to judge the rate of growth of the economy. The contribution of a business to national GDP can be measured as the difference between the value of its sales revenues and the cost its purchases of non-capital goods and services from other entities, or alternatively as the sum of its labour costs, capital costs, and net profits.

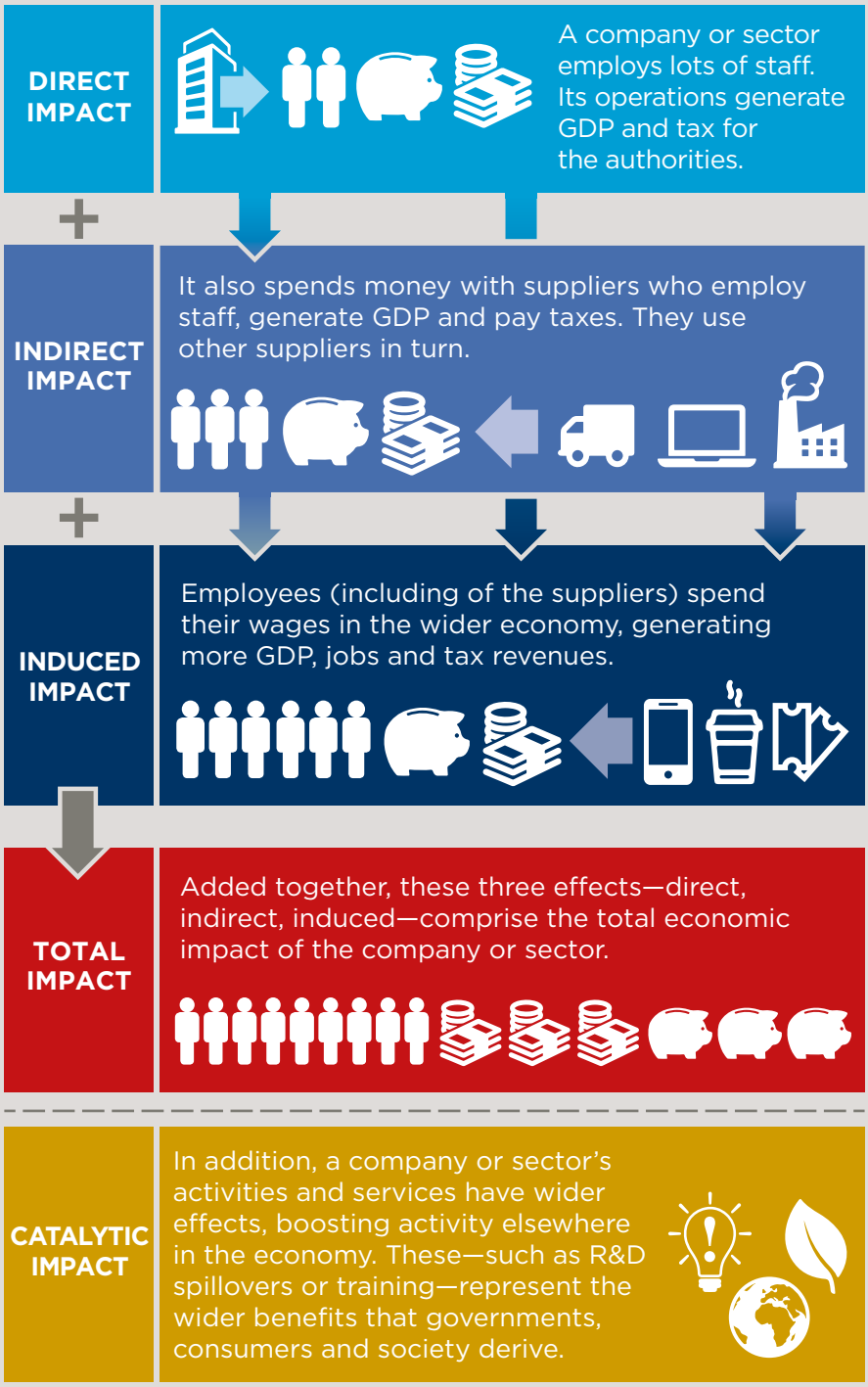
Huawei's economic contribution is measured using three metrics:

- Its gross value added contribution to Japan's national **GDP**, which represents the sum of profits and wages it generates;
- **Employment**, measured on a headcount basis; and
- **Tax revenue** flowing to the Japanese authorities.

This expenditure impact is estimated using an Input-Output (I-O) based model of the Japanese economy. This model was constructed by Oxford Economics, using data published by the Statistics Bureau of Japan. Further details on our methodology are in Appendix 1.

In addition, our analysis examines Huawei's **catalytic impacts**. These are the impacts the company has on the productive potential of the Japanese economy—and on the country's living standards—through spending on R&D, investment in the skills of both its own staff and the wider Japanese workforce, and its other CSR activities. These are largely treated in a qualitative way, and cannot be added to the expenditure impacts previously summarised.

**Fig. 2: Schematic of Huawei's economic contribution to the Japanese economy**



# 2. HUAWEI'S TOTAL ECONOMIC IMPACT IN JAPAN

**This chapter investigates the total economic footprint produced by Huawei's expenditure in Japan**. The impacts on the economy stem from its operational spending (direct impact); its procurement from Japanese suppliers (indirect impact); and the payment of wages to both Huawei employees and those in its supply chain, which are then spent on consumer goods and services (induced impact).

## 2.1 DIRECT IMPACT OF HUAWEI'S ACTIVITIES IN JAPAN

Huawei's direct contribution to the Japanese economy reflects the value that it adds through its own operations in the country. We estimate its gross value added contribution to GDP using the "income approach" to national accounting. This involves aggregating the profits Huawei makes in Japan with the compensation it pays its employees.[4]

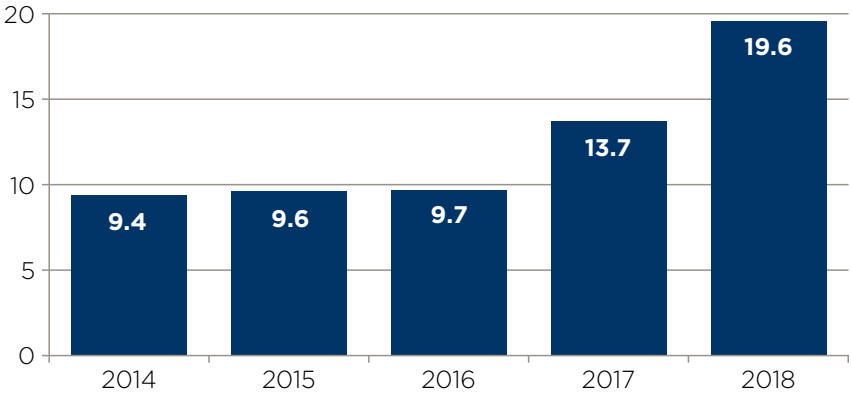
On this basis, we find that Huawei made a JPY 19.6 billion gross value added contribution to Japanese GDP in 2018 (see Fig. 3). This represents significant growth since 2014, during which time the company's annual contribution has more than doubled in real terms (after accounting for inflation).[5]

The rapid growth in Huawei's direct contribution to Japan's GDP since 2014 sets it apart from other manufacturers of telecommunications technologies, telecommunications service providers, and the economy as a whole (see Fig. 4).

**Huawei's gross value added contribution has grown at an average real rate of 24.4% per year between 2014 and 2018**. This is significantly faster than the whole economy of Japan, which grew at an average rate of 0.9% per year over this period, and the manufacturing sector, which grew at 1.6% per year. The electronics industry, including electrical, optical and high-tech manufacturing, expanded at only 1.7% per year, a rate of growth that masks the significant contraction of the telecommunications equipment manufacturing sector, which shrank by 7.4% per year over the period.

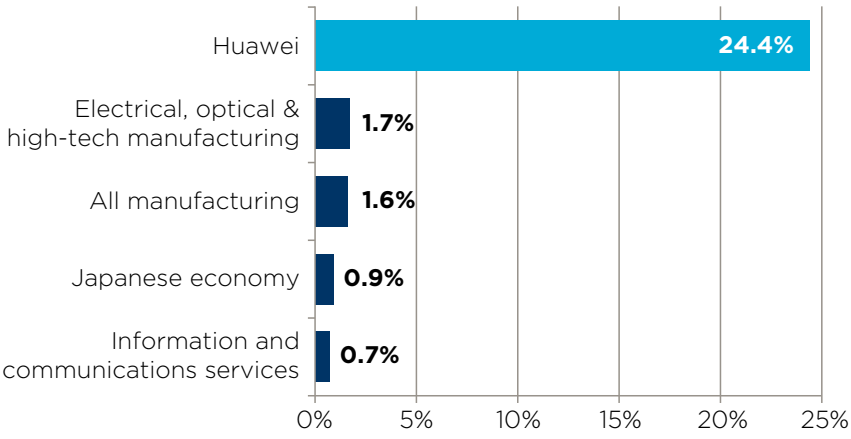
**Fig. 3: Huawei's direct contribution to Japanese GDP, 2014-2018**

JPY billions (in 2018 prices)




Source: Huawei

**Fig. 4: Compound annual growth rate in real GDP between 2014 and 2018**




Source: Huawei; Oxford Economics; Japan Ministry of Economy, Trade and Industry

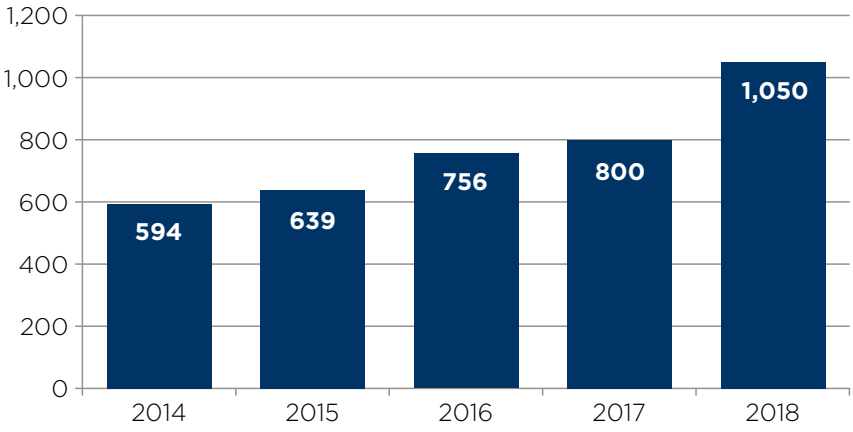
[4] Profits are measured in terms of earnings before interest, taxation, depreciation and amortisation.
[5] All figures are presented in 2018 prices.

The number of people that Huawei employs in Japan has also grown rapidly since 2014. On the back of average employment growth of 15% per year, Huawei employed 1,050 people in 2018 (Fig. 5).

**Huawei's contributions to Japanese GDP and employment indicate that its employees are highly productive.** In 2018, we calculate that each Huawei employee generated an average gross value added contribution to GDP of JPY 18.7 million —which makes the company 24% more productive than the national average of JPY 15.1 million per worker in 2018.

Huawei and its staff paid JPY 4.7 billion in taxes in 2018—mainly comprised of labour taxes and corporation tax. Between 2014 and 2018, Huawei's direct tax contributions totalled JPY 19.2 billion (in 2018 prices).

**Fig. 5: Huawei's Japanese workforce, 2014-2018**




Source: Huawei

## 2.2 INDIRECT IMPACT ARISING FROM HUAWEI'S PROCUREMENT

The economic impact of Huawei in Japan extends far beyond its direct operational spending. Huawei purchases inputs of goods and services from Japanese suppliers, both for its Japanese operations and the rest of its businesses worldwide.

Between 2014 and 2018, Huawei spent a total of JPY 2.2 trillion in nominal terms with Japanese firms—of which some JPY 721 billion (33%) occurred in 2018 alone. The majority of this procurement expenditure originated outside of Japan. In 2018, 97% of Huawei's total non-capital spend with Japanese suppliers that year, some JPY 698 billion, came from overseas (see Fig. 6).

**Fig. 6: Huawei's annual non-capital procurement from Japanese suppliers between 2014 and 2018, JPY billion**

| Source of expenditure | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Japanese operations | 13 | 2 | 12 | 5 | 23 |
| Rest of the world | 209 | 373 | 390 | 468 | 698 |
| **Total** | **222** | **375** | **402** | **473** | **721** |

Source: Huawei

**BOX 3: HUAWEI'S LANDMARK ACHIEVEMENTS IN JAPAN**

Huawei has made numerous technological breakthroughs in the Japanese market. These have supported the growth of the country's ICT sector, and the digitalisation of business activity across Japanese industries. Notable landmarks include:

**2006:** Huawei introduces the world's most advanced distributed base station to the Japanese market, helping support the spread of wireless internet throughout Japan's urban areas—despite their lack of space. In the initial stages of the global mobile broadband trend, Huawei also helps Japanese operators launch the "pocket WiFi" service for boosting mobile broadband, which accumulates millions of users in a short time.

**2008:** Huawei launches H11HW, the first Huawei carrier mobile phone in Japan, which supports video-call services.

**2011:** Huawei achieves a download speed of 110 megabits per second—the fastest in Japan at the time—in Tokyo, Nagoya, and Osaka, across Japan's first LTE network (TD-LTE). In addition, it launches the first Huawei carrier smartphone in Japan, S31HW, which is the first model to unite the Android smartphone and the pocket WiFi LAN router.

**2014:** Huawei achieves a speed of one gigabyte per second on its LTE TDD network, and introduces the first sim-free smartphone, Huawei G6.

**2015:** Huawei signs a memorandum of understanding with a major Japanese mobile network carrier to collaborate on Fifth Generation (5G) research.

**2016:** Huawei cooperates with the mobile network carrier arm of Japanese conglomerate SoftBank to commercialise the world's first LTE Massive Multiple Input-Multiple Output (Massive MIMO) network. Advanced 5G technology is installed into the existing 4G network to improve device speeds and user experience. The first "smart terminal" customer service centre is opened in the Tokyo district of Ginza.

**2017:** Huawei installs a 5G base station at the top of the Skytree broadcasting and observation tower in Sumida, Tokyo, which can transmit data at 4.5 gigabytes per second over a distance of 1.2 kilometres. The company is ranked No.1 in the SIM-Free smartphone market in Japan.

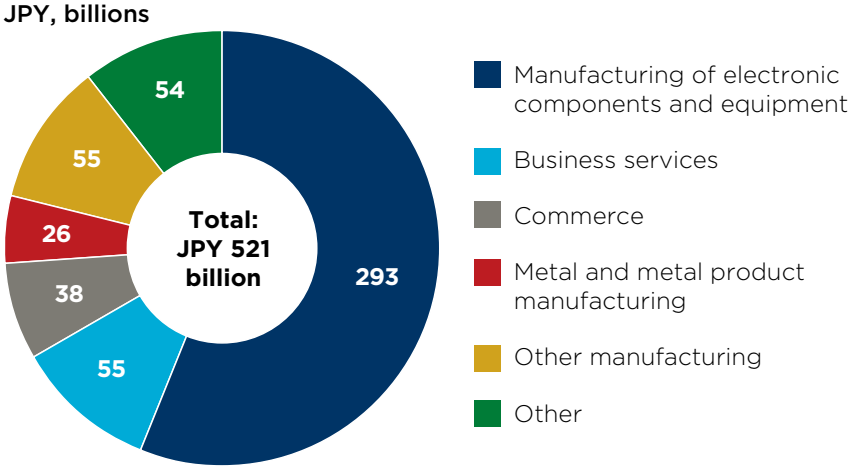
**2018:** Huawei brings the highly advanced Active Antenna Unit (AAU) 5G installation to Japan. This smaller and lighter antenna is more resilient to the natural disasters that Japan faces periodically, including typhoons, earthquakes, and tsunamis. The first Huawei smart terminal shops open in the Tokyo districts of Akihabara and Shinjuku.

Huawei's procurement stimulates economic activity along its Japanese supply chain, as, in turn, Huawei's suppliers make purchases from their own supply chains.

**In 2018, we calculate that Huawei's JPY 721 billion of procurement from Japanese businesses supported a JPY 521 billion contribution to GDP along the company's Japanese supply chain.** The largest portion of this indirect impact occurred in the electronic components and equipment manufacturing industry, which we estimate accounted for 56% (JPY 293 billion) of this GDP contribution (see Fig. 7). Business services, which are relied upon to support Huawei's operations in Japan as well as further down the supply chain, was also a significant beneficiary, with its impact on GDP totalling JPY 55 billion (11% of the total). Huawei-supported activity in manufacturing sectors other than electronic components and equipment also collectively contributed JPY 81 billion to Japanese GDP in 2018.

**Fig. 7: Industrial distribution of Huawei's indirect impact on the Japanese economy, 2018**

JPY, billions




Source: Huawei; Oxford Economics

## 2.3 INDUCED IMPACT FROM THE PAYMENT OF WAGES

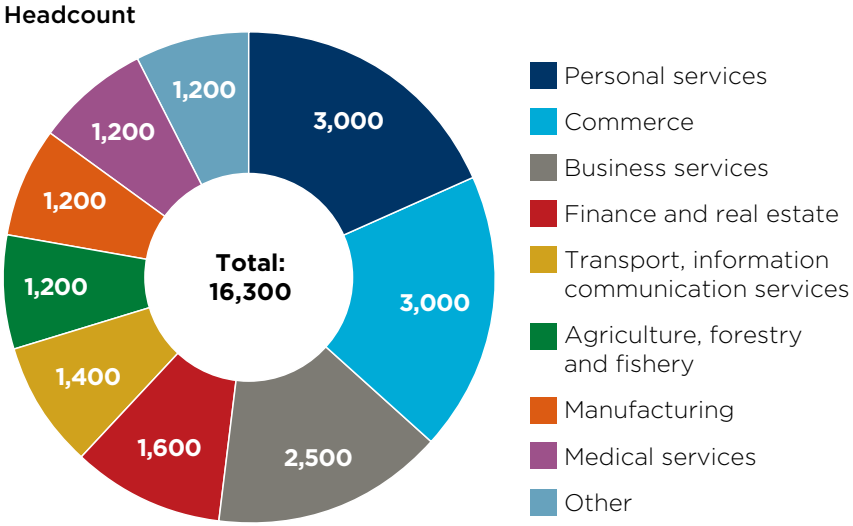
Between 2014 and 2018, Huawei paid its employees a total of JPY 33 billion in gross wages (in nominal terms). Over the same period, we estimate that people employed in its supply chain were paid JPY 812 billion. These wages stimulate consumer spending, which in turn boosts economic activity at leisure, retail and other outlets, and in these companies' own supply chains.

**In 2018 alone, the payment of these wages contributed some JPY 225 billion to Japanese GDP, as well as sustaining 16,300 jobs and JPY 62 billion in tax receipts**. To put these figures into perspective, the tax revenue generated in 2018 amounted to the equivalent of the salaries of 42,700 teachers and other education public servants across Japan.[6]

[6] Estimates based on average salary information from the Ministry of Internal Affairs and Communications, Japan, "Local public service systems" http://www.soumu.go.jp/main_sosiki/jichi_gyousei/c-gyousei/teiin-kyuuyo02.html

The employment created by wage-financed consumer spending benefits a wide range of industries (see Fig. 8). One of the main beneficiaries is the personal services sector (including eating out, hotels, and amusement and recreational services), where the payment of wages by Huawei and in its direct supply chain are estimated to have supported 3,000 jobs in 2018 (18% of the total). A further 3,000 jobs were generated in commerce, including both retail and wholesale.

**Fig. 8: Industrial distribution of Huawei's induced impact on the Japanese economy, 2018**

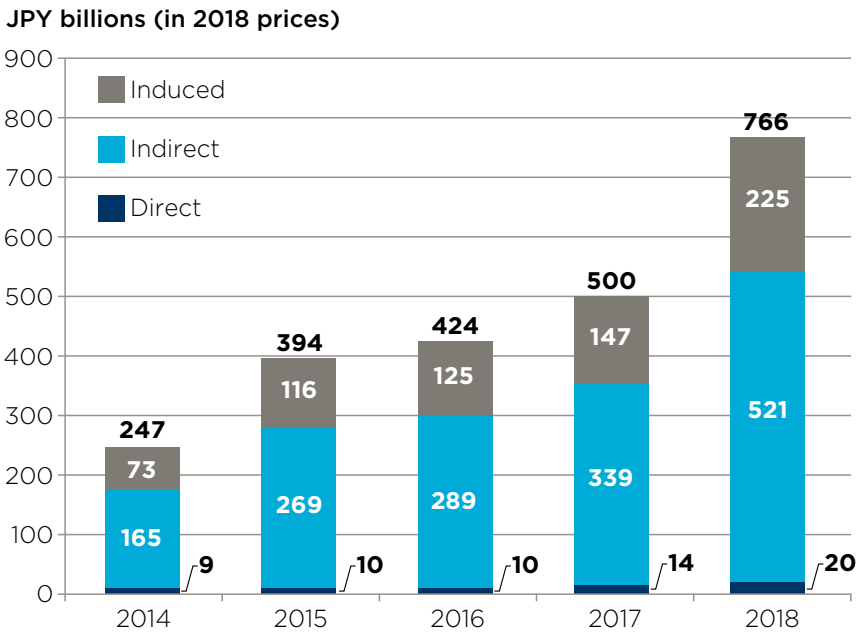



Source: Huawei; Oxford Economics

## 2.4 HUAWEI'S TOTAL EXPENDITURE IMPACTS IN JAPAN

Huawei's economic footprint in Japan is the combination of its direct, indirect and induced impacts. Aggregating these three channels indicates the company supported a total contribution to Japan's GDP of JPY 766 billion in 2018. This represented a substantial increase on the company's contribution of JPY 247 billion in 2014—equivalent to an average growth rate of 33% per year (see Fig. 9).

**Fig. 9: Huawei's total annual contribution to the Japanese economy in real terms, 2014-2018**



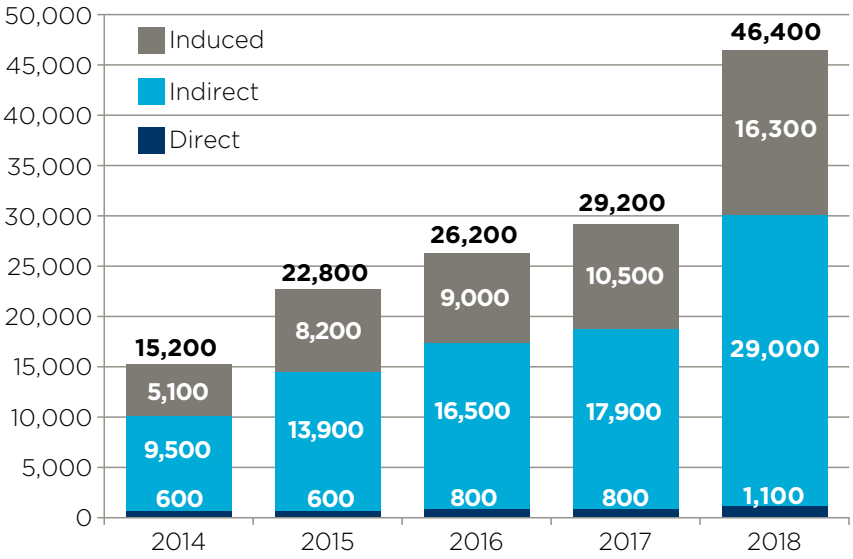

Source: Oxford Economics

**Huawei's impact on the Japanese labour market has also increased significantly since 2014.** Indeed, summing the three channels of economic impact, we find that the total number of jobs it supported rose by an annual average of 32% from 15,200 in 2014 to 46,400 in 2018 (see Fig. 10).

We also find that the total value of tax receipts supported across the three impact channels increased by 32% per year in real terms between 2014 and 2018 (see Fig. 11). Huawei's total tax footprint of JPY 208 billion in 2018 is the equivalent of 4% of the Japanese government's total expenditure on education and science that year.[7]

**Fig. 10: Huawei's total annual employment impact, 2014-2018**

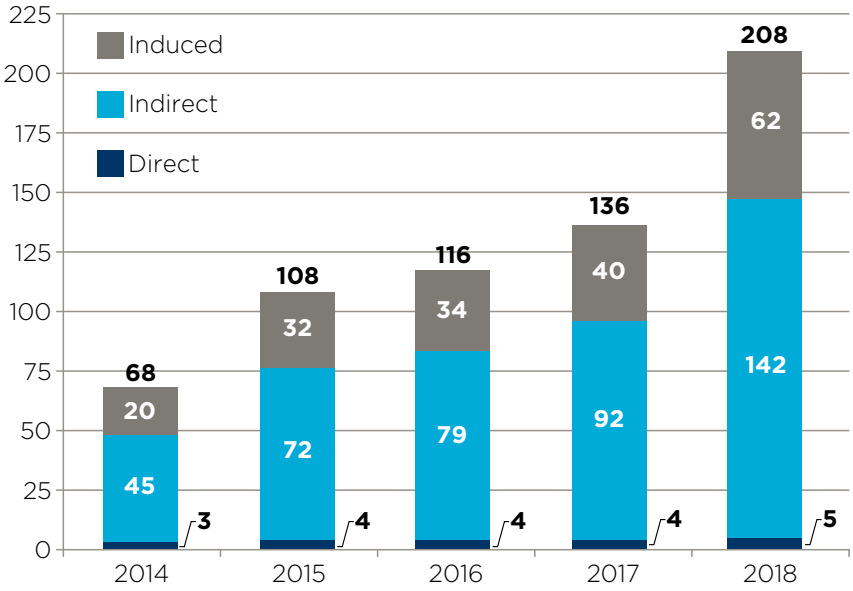
Headcount




Source: Oxford Economics

**Fig. 11: Huawei's total annual tax contributions in real terms, 2014-2018**

JPY billions (in 2018 prices)




Source: Oxford Economics

[7] Ministry of Finance, Japan, "Highlights of the Draft FY2018 Budget": https://www.mof.go.jp/english/budget/budget/fy2018/01.pdf

# 3. HUAWEI'S CATALYTIC IMPACTS

In addition to the "core" economic impacts described in Chapter 2, Huawei plays a fundamental role in Japan's ongoing digital transformation, which boosts productivity growth and supports the living standards of the country's people. As a major provider of technology solutions to Japanese enterprises and organisations, Huawei fuels digital innovation. Its products and services are facilitating the ongoing growth and evolution of Japan's ICT sector and delivering productivity gains to businesses across all sectors of the Japanese economy. The rapid growth in demand for Huawei products and services demonstrates the importance they play in supporting Japan's international competitiveness.

In addition to its role as a facilitator of Japan's digital transformation, Huawei also benefits the long-term productive potential of the Japanese economy more directly. There are three important channels through which these long-term impacts materialise:

- Huawei's expenditure on R&D;
- Huawei's investment in the skills of its own staff and the wider Japanese workforce; and
- Huawei's CSR activities.

This chapter examines these activities in turn.

**BOX 4: HUAWEI'S APPROACH TO UNIVERSITY COLLABORATIONS**

Huawei's collaboration with academia in R&D is a core part of the company's ethos. It is a channel to learn from researchers' successes and failures, to close the gap between basic science and its commercial application.

In Japan, Huawei's collaboration with universities begins most commonly with a dedicated project on a specific research topic. Huawei's market insights mean it is better placed than academic researchers to identify end-user needs and desires, to complement the university team's years of experience and high-level expertise. But the relationship does not stop there, the university team is then encouraged to propose further ideas for collaboration as the venture develops.

Under a system known as the "R&D Academy", information about projects is regularly circulated by Huawei to a wide set of Japanese universities. Professors from those institutions are invited to visit Huawei's laboratories to see the work being undertaken, and encouraged to think about ideas for new projects to be carried out jointly by their institution and Huawei.

The Huawei Innovation Research Program (HIRP), meanwhile, allows any member of the Japanese public to access information about projects that Huawei is working on, and to take the initiative to contribute their own expertise. Each year, over 100 types of technology or areas of research are publicised and amplified through this scheme.

## 3.1 R&D INVESTMENT

Huawei is a major investor in R&D around the world. In 2018, its global R&D spend totalled US $14.8 billion (JPY 1.6 trillion), up from US $2.1 billion (JPY 230 billion) in 2009. Its cumulative R&D outlay over the whole period totalled US $74.4 billion (JPY 8.2 trillion).[8]

The 2018 EU Industrial Investment Scoreboard ranked Huawei as the world's fifth-highest R&D-spending business for the financial year 2017-18.[9] The company's global R&D spend for that year, estimated to have been US$13.6 billion (JPY 1.53 trillion), accounted for 1.5% of all the R&D carried out by the world's top 2,500 R&D-investing companies.

### 3.1.1 Huawei's R&D activity in Japan

Huawei carries out R&D in every country in which it has a significant presence. Within Japan, it now operates three R&D centres in Yokohama, Shinagawa (in Tokyo) and Osaka. Three hundred staff work at these centres, of whom 80% are Japanese local staff. The workforce is split between younger professionals, aged in their 20s and 30s, typically with a doctorate degree, and senior experts with many years of experience in major Japanese manufacturing businesses.

The majority of Huawei's ongoing R&D investment falls into the "short-to-medium-term" impact category. But an increasing focus is being placed on long-term projects, too. Many of these are focused on the application of the basic research to new technological fields for the first time. Huawei pursues open collaboration with its R&D partners in Japanese enterprises and universities and is organised to engage effectively with local strengths and expertise.

### 3.1.2 Technological innovation with Japanese enterprises

Almost all of the major Japanese corporations in the telecommunications industry have partnered with Huawei in some capacity. This has led to some significant technological breakthroughs. Many of these innovations are commercially sensitive, but the following examples demonstrate some of the valuable collaborations undertaken in 2019.

- Collaboration to improve smartphone camera technology for use in the products of both Huawei and its partnering firm. The innovation helped reduce the weight and thickness of camera modules (lenses with integrated image sensors) without reducing their durability—enabling camera zooming with a 30x magnification factor, for example.
- Technological innovation to improve the software underpinning 3D computergenerated imagery. The resulting technology has already been incorporated into Huawei smartphones.

[8] Source: Huawei.
[9] European Commission, 'The 2018 EU Industrial R&D Investment Scoreboard', December 2018.

### 3.1.3 Joint work with Japanese universities

Huawei invests in collaboration with universities and research institutes around the world, sponsoring research projects to further scientific discovery in the field of communications technology. Huawei's R&D engagement with universities can be typified by three categories:

**Joint R&D on practical applications:** Huawei engages with universities and research institutes on specific solutions to real world problems. For example, Huawei co-works with researchers in the use of phase change technology to cool down servers. The project led to significant space savings compared with more conventional cooling technology using separate machinery (such as fans or dehumidifiers).

**Jointly-run laboratories for longer term research:** Huawei also makes longer term investments in R&D initiatives to pursue fundamental technological breakthroughs. For example, crucial innovations in the materials used for new folding-type smartphones, such as the recently launched Huawei Mate X, were achieved through joint laboratory work in Japan. The laboratory was used in the development of more flexible, plastic materials, to replace the more rigid glass used in mobile phones.

**Monetary donations to the universities, to fund basic research:** Finally, Huawei's university funding goes beyond resolving practical industry problems. It also helps fund basic (i.e. early-stage) research in universities. Such basic research is critical to the innovation process, often providing the initial theoretical underpinnings to major commercial innovations, with large commercial rewards and benefits to wider society. However, it typically yields no, or little, direct financial returns to those who finance it. Universities are leading the charge in basic theoretical research on Artificial Intelligence, for example, but commercial returns to such breakthroughs are likely to be captured by other enterprises, further in the future, that realise commercially viable innovations and applications around the technology.

Note: this lack of direct returns characterises a major market failure in research funding. Huawei, along with other leading technology companies, provides research funds to universities to allocate as they see fit on basic research funds, with no specific share or return sought by Huawei itself.

## 3.2 INVESTMENT IN SKILLS

Huawei invests heavily in the skills of its own employees, and also runs a range of programmes aimed at improving the human capital of the wider Japanese workforce.

In 2018, Huawei employed some 1,050 employees in Japan, of which around 75% were Japanese local staff. In that year, 637 of these staff received more than 400 hours of formal training, at a cost to Huawei of JPY 655 million—up from JPY 230 million in 2017.

Huawei also helps to train university and college students—future Japanese workers who may or may not become Huawei employees—in several ways. In total, some 8,000 working days of training were undertaken by individuals in Japan in 2018 as part of the "ICT human resource development" strand of its CSR strategy (see Box 5, overleaf).

**BOX 5: HUAWEI'S KEY SKILLS-RELATED CSR ACTIVITIES IN JAPAN**

**Science Inter-college:** Huawei co-sponsored the Science Inter-college event organised by the Ministry of Education, Culture, Sports, Science and Technology, and established its own Huawei Award. Science Inter-college allows students to present their research, in competition with each other, to foster creative human resources. Every year, nearly 200 students are selected to participate in the event. Huawei Japan has been cooperating with many companies since 2015 as a member of the consortium contributing to Science Inter-college.

**Seeds for the Future:** Huawei's headquarters in Shenzhen, China, has developed the flagship Seeds for the Future skills programme, to build the human resource capabilities of students from around the world. Some 80 Japanese university students have participated in this programme since 2015. This programme involves a two-week trip to China featuring cultural, technical, and business training. During the programme, students spend an initial period in Beijing, where they receive Mandarin training and learn about Chinese culture. Students then travel to Huawei's headquarters in Shenzhen, where they learn about the company's international business culture and values, and about Huawei's products and solutions, as part of a wider introduction to a career in the ICT industry.

**Science and Technology Film Festival:** Huawei sponsored the Science and Technology Film Festival (organised by the Japan Science and Technology Reconstruction Foundation) in 2017 and 2018, to further improve the ICT skills of the Japanese workforce. Two films sponsored by Huawei received both the Huawei Award and the Prime Minister's Award.

**National High School Student Social Business Project Exchange Fair:** Held every year in Ise City, Mie Prefecture, this exchange fair sees around 200 high school students (who are working on solving regional issues using business techniques) gather from all over the country to give presentations and promote developed products. Huawei has been attending this event since 2017 and has established its own corporate award.

**Promoting science education for children:** Huawei Japan is involved in the promotion of science education amid growing concerns about children's "separation from science". The company participates in, and sponsors, the annual Festival for Youth Science held at the Science and Technology Museum in Tokyo and Chiyoda. At the Huawei Japan stand, the company's employees help children to understand how mobile phone technology works.

**Helping senior citizens to use new technology:** In 2017 and 2018, Huawei cooperated with IAC Japan (International Academy of Chief Information Officers in Japan) to sponsor the "Senior Project". The project provides ICT training courses and conducts ICT-themed lectures and smartphone usage workshops for Japanese senior citizens to promote ICT knowledge.


### 3.3 INVESTMENT IN CSR ACTIVITIES

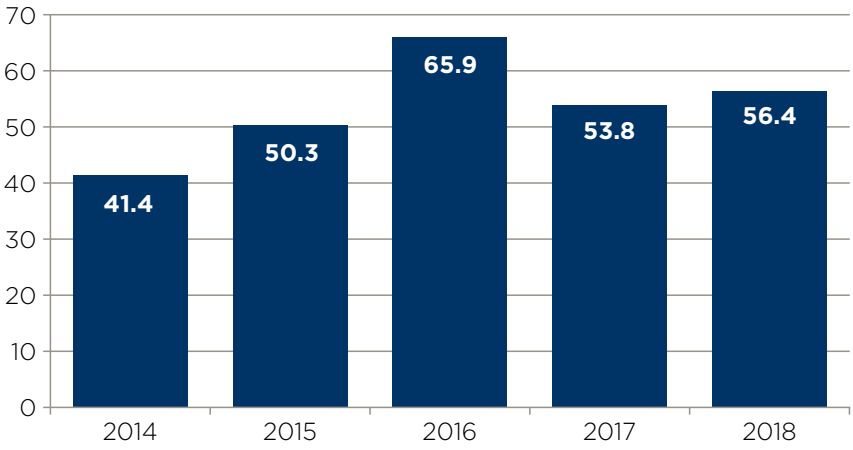
Huawei's investment in skills and the funding it provides to basic university research form two key pillars of its CSR strategy in Japan. The company spent an annual average of more than JPY 53 million between 2015 and 2018 across all CSR activities, up from JPY 41 million in 2014 (see Fig. 12).

In addition to skills and research, Huawei Japan's CSR programmes also target other areas:

- Building resilience to natural disasters in Japan's communications infrastructure, including undertaking swift restoration work and product innovation.
- Participating in pan-industry fora, to exchange ideas and support national policy objectives in the field of infrastructure development.
- Promoting environmental protection.

**Fig. 12:Huawei's spending on CSR programmes, 2014-18**

**JPY million per annum**




Source: Huawei

#### 3.3.1 Countering the impact of natural disasters

Huawei has played an important role in restoring communications infrastructure following natural disasters, including the Great East Japan Earthquake, and in helping network operators provide a stable connection at all times (see Box 6, overleaf).

More generally, the company also actively collaborates with local partners to improve network resilience in the face of such environmental challenges. The focus on producing smaller and lighter products, such as the 5G Active Antenna Unit (AAU)—introduced to Japan in 2018—demonstrates the company's commitment in this field.

#### 3.3.2 Participation in national industry fora

Huawei participates in three pan-industry fora brought together by Japan's Ministry of Internal Affairs and Communications:

- The International Mobile Telecom (IMT) Working Group, responsible for defining local wireless standards. Participation in this group enables Huawei to share its international experience and expertise with local partners, drawing on its involvement in the international standards organisation 3GPP (3rd Generation Partnership Project).
- The 5th Generation Mobile Communications Promotion Forum (5GMF), focused on the roll out of 5G across Japan. Again, Huawei is able to share its international experience with local participants.
- The Intelligent Transportation Systems (ITS) Info-Communications Forum, where it works with local partners to use technology to improve the efficiency and operation of Japan's transport networks.

In addition, Huawei is a member of 16 industrial associations and standards bodies in Japan,[10] as well as being involved in the Japan Business Federation (Keidanren), the regional Kansai Economic Federation (Kankeiren), and the Japan-China Economic Association (JCEA). It also participates in exhibitions such as Interop Tokyo and Wireless Japan, and other industry collaborations such as the Next-generation Network & Services Forum.

### 3.3.3 Environmental protection

Huawei is actively involved in initiatives to protect the environment through its engagement with Japanese business organisations. As a member of Keidanren's Committee on Nature Conservation it actively participates in nature protection activities, and donates to that federation's Nature Conservation Fund.

In addition, Huawei employees took part in nature restoration work at Tsunami Memorial Park, Nakanohama, organised by the Keidanren Nature Conservation Council, as part of the Tohoku reconstruction project. They also worked as volunteers at the biodiversity conservation and education programme in Uonuma City, Niigata Prefecture.

**BOX 6: HUAWEI'S RESPONSES TO JAPANESE NATURAL DISASTERS**

- Relief efforts in the aftermath of the Great East Japan Earthquake on March 11, 2011. Huawei employees immediately headed to the affected area, repairing 668 base stations in two weeks and making every effort to restore the customer network. From Huawei headquarters, the Chairman of the Board of Directors and CFO travelled to Tokyo immediately to oversee support for the affected areas, including donations and relief supplies valued at approximately JPY 50 million.
- Support for the Save the Children Japan "Children's Town Development Club", including through the donation of Huawei tablets.
- Co-sponsorship since 2013 of the Tohoku Earthquake Support Charity Relay Marathon, hosted by the Japan Philanthropic Association, including through the provision of Wi-Fi routers for event activity.
- Support for the production of special calendars in Minamisanriku Town, Miyagi Prefecture, made with thinned cedar wood from the Tohoku Forest, which was severely damaged by the Great East Japan Earthquake. The calendars raised awareness for the conservation of the forest and the reconstruction of the affected areas.
- Sponsorship of the Hot Air Balloon Festival & Symposium held in Watari Town, Miyagi Prefecture, in 2012. This helped a local community-based project that revived lost forests and farmland greatly damaged by the Great East Japan Earthquake.
- Support in the reconstruction of disaster areas hit by the Great East Japan Earthquake. This support has been a mainstay of Huawei Japan's CSR programme in the eight years since the earthquake, and is one of its most important components. In 2019 a new initiative, the "Kokoro Smile Project", was launched. This provides psychological support for children affected by disasters in Ishinomaki, Miyagi Prefecture. Its basic philosophy is "to be close to the hearts of every child and to accompany them in their growth". The project provides psychological counselling for children who have suffered from the earthquake, with the goal of "helping them recover their lost smiles."
- Huawei donated to the victims of the 2016 Kumamoto earthquake and continued to care for the victims.

[10] CIAJ, JNSA, ARIB, XGP Forum, TTC, Edgecross Consortium, JDLA, MPF, JCTA, JLabs, GUTP, PC3R, A-PAB, Industrial Value Chain Initiative, JUTA, and SDO.

# 4. CONCLUSION

This study has examined the total contribution that Huawei made to the Japanese economy between 2014 and 2018, and the way in which its activities in that period are contributing positively to the economy's future productive potential.

Huawei contributes to the Japanese economy through its own local operations, its procurement from Japanese suppliers, and the payment of wages which are then spent in the consumer economy. In 2018, we calculate that **Huawei stimulated a JPY 766 billion contribution to Japanese GDP, while supporting some 46,400 jobs and JPY 208 billion in tax revenues.**

Huawei is also having a positive impact on Japan's future productive capacity, through its investment in the country's R&D and skills. This includes not only investment in its own intellectual property and workforce, but also in the skills of young Japanese people more generally, and in early-stage, basic research in universities.

**In 2018, Huawei invested heavily in R&D activities in Japan. It also spent JPY 655 million on formal training for its own staff, and provided 8,000 working days of training to other young people as part of its CSR programme.**

Finally, over the last decade, Huawei has engaged positively with other industry players to protect and enhance Japan's telecommunications system, supporting the growth of one of the world's most technologically advanced economies.

Japanese students on Huawei's flagship Seeds for the Future skills programme.

# APPENDIX: METHODOLOGY

**Methodology for capturing direct impacts**

The direct impact of Huawei—including the contribution to GDP, jobs created, and taxes paid by the businesses and employees—were estimated from information provided by the company.

**Methodology for capturing the indirect and induced impacts**

To estimate Huawei's indirect and induced impacts, Oxford Economics utilised an input-output model of the Japanese economy, using the latest official Japan input-output table published by the Statistics Bureau of Japan.[11]

An input-output model gives a snapshot of an economy at any point in time. The model shows the major spending flows from 'final demand' (i.e. consumer spending, government spending investment and exports to the rest of the world); intermediate spending patterns (i.e. what each sector buys from every other sector—the supply chain, in other words); how much of that spending stays within the economy; and the distribution of income between employment income and other income (mainly profits). In essence an input-output model is a table which shows who buys what from whom in the economy.

The total value of the procurement from Japanese suppliers by Huawei's Japanese operations and the company's headquarters in China was provided by the company. The composition of their procurement was estimated based on information the company provided about the kinds of goods and services bought by their Japanese and global operations, respectively. Each year's data was fed into the model to arrive at total sales throughout the Japanese supply chain, by sector of supplier for that year. The indirect contribution to GDP was worked out from there, using GDP-to-turnover ratios for each industry for that year. The indirect employment impact was calculated in turn, using GDP-to-jobs ratios for each industry for that year, again sourced from the Statistics Bureau of Japan.[12]

The induced sales figure for each year were calculated in two stages. The impact relating to spending by employees in Huawei's supply chain was worked out alongside the indirect impact, taking Huawei's procurement as the starting point. This calculation used an extended part of the input-output model, which takes into account the pattern of Japanese household consumption as well as intra-industry transactions. The impact relating to spending by Huawei's own employees was modelled separately, using estimates of their spending power—the sector wage bill net of employees' tax and national insurances—as the starting point. The two estimates of induced sales, on an industry-by-industry basis, were added together and the induced GDP and jobs impacts estimated from there.

Finally, tax contributions were estimated taking into account sales, GDP and employment by industrial sector, and applying various appropriate tax-to-expenditure and tax-to-income ratios, sourced from the National Tax Agency and other official datasets.

[11] e-Stat, (2019), 'Input-Output Tables for Japan, 2015', 27 June 2019.
[12] e-Stat, (2019), 'Input-Output Tables for Japan, 2015', 27 June 2019.

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After the Great East Japan Earthquake of 2011, Huawei employees repaired 668 base stations in two weeks.

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