



OXFORD
ECONOMICS



HUAWEI



THE ECONOMIC IMPACT OF HUAWEI IN THE UK

MAY 2019



Huawei UK headquarters at Green Park in Reading

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EXECUTIVE SUMMARY

£3 billion

Spend with UK suppliers over five years (2018 to 2022).

Huawei's February 2018 commitment.

Huawei is a global leader in information and communications technology solutions. Since opening its first UK office in 2001, Huawei has played an important part in helping its UK carrier partners to develop and roll out both fixed and mobile networks throughout the UK, by its provision of network architecture, sites, and stations. More recently, it has offered its range of smart devices to personal customers in the UK and elsewhere.

Huawei has made two commitments to the UK economy. In September 2012, it announced a commitment to spend £1.3 billion in the UK over the following five years (2013-2017). In February 2018, Huawei made a further five-year commitment to spend another £3 billion with firms based in the UK between 2018 and 2022, which it is set to surpass by 50 percent if current levels of spending are maintained.

This report investigates the economic contribution that Huawei made to the UK economy between 2012 and 2018. It explores the expenditure it undertook, and the economic activity this stimulated, both in the UK as a whole and at a regional level. It also investigates how Huawei's research and development (R&D), staff training, and Seeds for the Future and ICT Academy programmes have enhanced the productive potential of the UK economy.

The report does not seek to quantify the competitive effect Huawei has had on the telecoms equipment market or the economic impact of the UK's digital infrastructure of which Huawei's equipment forms a vital part.

HUAWEI'S TOTAL ECONOMIC IMPACT IN 2018

Huawei's total economic impact comprises its contribution to UK GDP, the employment it supports across the country and the tax revenues that are generated for HM Treasury by the economic activities it sustains (see Fig. 1).

We find that Huawei stimulated a £1.7 billion contribution to UK GDP in 2018 alone. This comprises a £287 million contribution by Huawei's own operations (its direct impact), an £806 million contribution supported along its supply chain as a result of procurement (its "indirect" impact), and a £598 million contribution stimulated in the consumer economy (its "induced" contribution).

Furthermore, Huawei is found to have supported 26,200 jobs across the UK in 2018. This economic activity generated £470 million in tax revenues for the Exchequer.

£1.7 billion

Huawei's total gross value-added contribution to UK GDP in 2018.

Huawei also supported 26,200 jobs and generated tax receipts of nearly half-a-billion pounds in 2018.

Huawei also boasts very high levels of productivity. In 2018, each UK Huawei employee made an average contribution to the nation’s GDP of £183,000, meaning they are 3.5 times more productive than the average for the whole of the UK economy.

HUAWEI’S IMPACT HAS GROWN SUBSTANTIALLY SINCE 2012

Huawei’s economic impact has grown significantly with the company’s increasing commitment to the UK. Its investments in UK staff and facilities have increased, along with its procurement spend on goods and services from UK-based suppliers.

Overall, we find that in real terms Huawei’s gross value-added contribution to GDP was 507 percent greater in 2018 than 2012. In addition, there was a 414 percent rise in the number of jobs supported over this period, and a 273 percent increase in the UK tax revenues stimulated by Huawei’s expenditure. With Huawei having made a second five-year procurement commitment to the UK economy, it is likely that this contribution will continue to grow.

Huawei’s gross value-added contribution to UK GDP was

6 times larger

in 2018 than 2012.

Fig. 1: Huawei’s total economic impact, 2012-2018 (in 2018 prices)

| £ million | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Growth % (2012-2018) |
|---------------------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|----------------------|
| Direct GDP | 69 | 71 | 127 | 174 | 279 | 243 | 287 | 314 |
| Indirect GDP | 126 | 163 | 183 | 353 | 580 | 694 | 806 | 537 |
| Induced GDP | 83 | 107 | 124 | 282 | 442 | 512 | 598 | 620 |
| Total GDP | 279 | 340 | 433 | 809 | 1,301 | 1,449 | 1,691 | 507 |
| Headcount | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Growth % (2012-2018) |
| Direct jobs | 800 | 900 | 1,100 | 1,400 | 1,700 | 1,700 | 1,600 | 100 |
| Indirect jobs | 2,500 | 3,200 | 3,700 | 6,900 | 11,400 | 13,900 | 15,600 | 524 |
| Induced jobs | 1,800 | 2,300 | 2,600 | 4,300 | 6,800 | 7,800 | 9,000 | 400 |
| Total jobs | 5,100 | 6,400 | 7,400 | 12,500 | 19,900 | 23,500 | 26,200 | 414 |
| £ million | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Growth % (2012-2018) |
| Direct tax revenues | 44 | 42 | 54 | 54 | 83 | 79 | 101 | 131 |
| Indirect tax revenues | 37 | 47 | 52 | 92 | 150 | 178 | 199 | 444 |
| Induced tax revenues | 46 | 58 | 67 | 82 | 132 | 147 | 170 | 272 |
| Total tax revenues | 126 | 147 | 173 | 227 | 365 | 404 | 470 | 273 |

Source: Oxford Economics

26,200 jobs

supported in the UK economy.

Huawei supported five times as many jobs in 2018 as it did in 2012.

HUAWEI'S IMPACT IS FELT THROUGHOUT THE UK

Huawei is found to have stimulated a sizeable contribution to GDP in each of the UK's nations and regions in 2018. Of its £1.7 billion total UK contribution, some £405 million (24 percent) occurred in the South East of England, where Huawei's UK headquarters is located, in Reading, Berkshire. A further £237 million (14 percent) contribution was made to London's GDP, while the East of England experienced the third-largest impact of £158 million (nine percent of the overall total).

Huawei supported nearly 4,300 jobs in the South East in 2018, equivalent to 16 percent of the total UK employment that its expenditure supported that year. More than 2,600 jobs (10 percent) were supported in the East of England, and 2,400 jobs (nine percent) in London.

While in absolute terms, Huawei's economic impact is largest in regions such as the South East, where the bulk of its operations are based, its contributions are particularly important for other parts of the UK. For example, Huawei's employment impact as a share of a region's total employment is highest in Northern Ireland, where the jobs supported in 2018 were equivalent to 0.15 percent of its total employment. The same is true for the North East of England and Wales, where the relative employment shares are 0.14 percent and 0.11 percent, respectively. This underlines that Huawei's operations and supply chains are far-reaching across all parts of the UK economy.

HUAWEI'S IMPACT ON THE UK'S PRODUCTIVE CAPACITY THROUGH R&D AND UPSKILLING THE LABOUR FORCE

Huawei also supports a wider, "catalytic" contribution to the UK economy by boosting the nation's productive potential. In all, Huawei invested £112 million in R&D in the UK in 2018, including collaborating with 35 universities and research institutes. It invested £1.3 million in training its own staff, and also sent 50 STEM (Science, Technology, Engineering & Maths) undergraduates from leading UK universities to China, as part of its 'Seeds for the Future' programme.

SPENDING COMMITMENTS

2013-17

UK spending pledge

£1.3 billion



2018-22

UK spending pledge

£3 billion



Actual spend

£2.2 billion



2018 spend

£900 million



Huawei is on course to exceed new target by at least

50%

ECONOMIC IMPACTS

● Direct

● Supply chain

● Wage spending

In 2018, Huawei stimulated a **£1.7 billion** contribution to UK GDP. This is **6 times larger** than the GDP it supported in 2012, in real terms.

£287 million

£806 million

£598 million

In 2018, Huawei supported **26,200 jobs**. This is **more than 5 times** the number in 2012.



In 2018, Huawei's activities in the UK generated

£470 million in tax receipts.

This is **3.75 times larger** than in 2012, in real terms.



PRODUCTIVITY



Average GDP contribution of each UK worker in 2018

= **£183,000**

This is 3.5 times more productive than the UK-wide average.

RESEARCH & DEVELOPMENT



£112 m

invested in R&D in the UK in 2018.



More than

300

UK research staff employed in 2018.



Collaborations with **35** UK universities and research institutes.

1. INTRODUCTION

1.1 HUAWEI'S CONTRIBUTION TO THE UK'S DIGITAL INFRASTRUCTURE

Huawei has already made a major contribution to the UK's digital infrastructure. It has worked with its carrier partners (notably BT, EE and Vodafone) to roll out their 4G networks. Regarding broadband deployments, it has supported the roll-out and delivery of fibre and broadband connectivity, and in July 2018 Openreach announced it had chosen Huawei as one of the suppliers to help deliver its 'Fibre-First' programme with the aim of reaching three million British homes and businesses by 2020.¹

Huawei has also undertaken substantial R&D in 5G over the past decade to ensure

it offers the most attractive 5G network architecture, solutions, and transaction models to telecoms carriers to assist in their 5G deployments. As the UK stands on the cusp of the next big investment in network infrastructure in terms of 5G and 5G technology, this offers the potential for the UK to be a leading 5G nation.

Huawei continues to develop its offering to ensure carriers can deliver high-quality broadband and private line services. This should enable its carrier partners to continue to upgrade their fixed networks, including the adoption of fibre.

In addition to assisting its partners in the UK, Huawei is also one of the world's leading smartphone manufacturers, recently overtaking Apple to become the second biggest smartphone maker in the world. This rise is reflected in the UK market where Huawei is now the third biggest smartphone vendor.

In considering Huawei's contribution to the UK's digital infrastructure, it is useful to note government policy regarding the incentivisation of digital communications networks.

DIGITAL INFRASTRUCTURE: THE UK GOVERNMENT'S STRATEGY

In November 2017, the government released its Industrial Strategy aiming to build a Britain fit for the future. It set out a long-term plan to boost the productivity and earning power of people throughout the UK. As part of the Strategy, it called for a major upgrade in the UK's infrastructure, especially its digital infrastructure.

The Strategy pledges "We will build a Britain that lives on the digital frontier, with full-fibre broadband, new 5G networks and smart technologies."² On full-fibre broadband, it sets out the ambition "for ten million premises to be connected to the 'full-fibre' network, with a clear path to national coverage over the next decade."³ The government aims to have 15 million premises connected to full-fibre networks by 2025, and to achieve nationwide coverage by 2033. However, at the time of the initial release of the Strategy in 2017, the UK already lagged far behind other countries. Only

three percent of the UK had full-fibre coverage, substantially below that of Spain, Portugal, Japan and South Korea, where coverage was 70 percent or higher.⁴ The UK is therefore missing out on the much faster download speeds which fibre offers.

The Strategy also vows that the UK "will become a world leader in 5G, and will provide reliable, high-speed connectivity to our towns, cities and rural areas."⁵ 5G will offer the UK economy a wide range of benefits. These are likely to include improved connectivity (particularly in difficult environments such as on road and rail networks); the potential for new consumer devices and services; new Internet of Things (IoT) solutions; and smarter infrastructure and public services. To allow the British public to take full advantage of these extensive benefits the government aims to have almost total 5G coverage by 2027.

¹ Openreach, (2018), 'Openreach selects Huawei and Nokia to support its 'Fibre First' programme', Press Release, 10 July.

² HM Government, (2018), 'Industrial Strategy; Building a Britain fit for the future', 28 June. Page 128.

³ Ibid. Page 154.

⁴ Ibid. Page 154.

⁵ Ibid. Page 150.



Madam Sun Yafang, (the then) Chairwoman of Huawei, meets UK Prime Minister Theresa May, Beijing 2018.

These aims highlighted in the Industrial Strategy were further developed in the Future Telecoms Infrastructure Review released in July 2018. It re-emphasised the government's ambition to boost productivity and innovation throughout the economy via increased digital connectivity—including through improvements in both fixed and mobile networks, the Local Full-Fibre Network programme, and the roll-out of 5G.

Promoting investment

The UK government is encouraging investment in the development of fixed and wireless networks that are “fit for the future”. This involves creating a policy framework that attracts the necessary capital to install new infrastructure, then promotes the take-up of new networks.

“Industry has a critical role in developing the world-class connectivity we need.”⁶

The government estimates that installing a nationwide full-fibre network will require £30 billion in investment. Its strategy for fixed networks therefore looks to promote competition in order to maximise commercial investment.

“Reducing the cost and making it quicker and easier to roll out new telecoms infrastructure is essential. There are currently too many barriers which make building networks expensive and too slow.”⁷

Last autumn, the government set up a Telecoms Supply Chain Review to ensure the security and resilience of UK telecoms networks and services; and the quality, availability and long-term cost of telecoms equipment. The Review is due to conclude in mid 2019.

⁶ Department for Digital, Culture, Media & Sport, (2018), ‘Future Telecoms Infrastructure Review’, July. Page 2.

⁷ Ibid. Page 5.

1.2 STRUCTURE OF THIS REPORT

This report provides an assessment of the economic contribution Huawei makes to the UK, and its nations and regions. In doing so, it builds on the Oxford Economics report published in June 2015, which investigated the economic impact of the company in the UK between 2012 and 2014, extending the analysis to 2018.⁸

The economic footprint of Huawei is assessed using a standard means of analysis called an economic impact assessment. This technique allows us to model the company's economic impact in terms of contribution to annual

GDP, number of jobs supported, and tax revenues generated for the Exchequer. A summary of the methodology is provided overleaf, with more details in the Appendix at the end of this report.

Huawei's contribution to the UK is not limited to the activity that is supported by its on-going operations. We also investigate how Huawei's investment in R&D, staff training and its Seeds for the Future CSR programme act as catalysts for further economic activity, enhancing the UK economy's productive potential.

The report is structured as follows:

- Chapter 2 explores Huawei's economic contribution to the UK, and its nations and regions, between 2012 and 2018.
- Chapter 3 investigates how the company enhances the productive potential of the UK economy, through R&D and building labour skills.
- Lastly, Chapter 4 concludes.

Also included are a number of case studies looking at specific parts of Huawei's business.

INTRODUCING ECONOMIC IMPACT ANALYSIS

The impact of Huawei's operations is assessed using a standard means of analysis called an economic impact assessment. This involves quantifying the impact of three types of expenditure undertaken by Huawei (summarised in Fig. 2, overleaf):

- **Direct impact** relates to the operational expenditure Huawei undertakes running its own activities. It encompasses the economic activity and employment generated at its sites across the UK;
- **Indirect impact** is the economic activity and employment stimulated

along its supply chain by Huawei's UK and Chinese operations' procurement of inputs of goods and services from UK suppliers;

- **Induced impact** comprises the wider economic benefits that arise from the payments of wages by Huawei and the firms in its supply chain to their own employees, who spend their earnings in retail, leisure and other outlets. It includes the economic activity stimulated in these outlets' supply chains.

The sum of these channels makes up the total of Huawei's expenditure impacts.

The results are presented on a gross basis. They therefore ignore any displacement of activity from Huawei's competitors or other firms. Nor do they consider what the resources currently used by Huawei or stimulated by its expenditure could alternatively produce in their second-most productive usage. Huawei's economic contribution is measured using three metrics:

- **GDP**, or more specifically, the *gross value-added (GVA)*⁹ contribution to GDP;
- **Employment**, measured on a headcount basis; and
- **Tax revenue** flowing to the UK government.

⁸ Oxford Economics, (2015), 'The Economic Impact of Huawei in the UK', June.

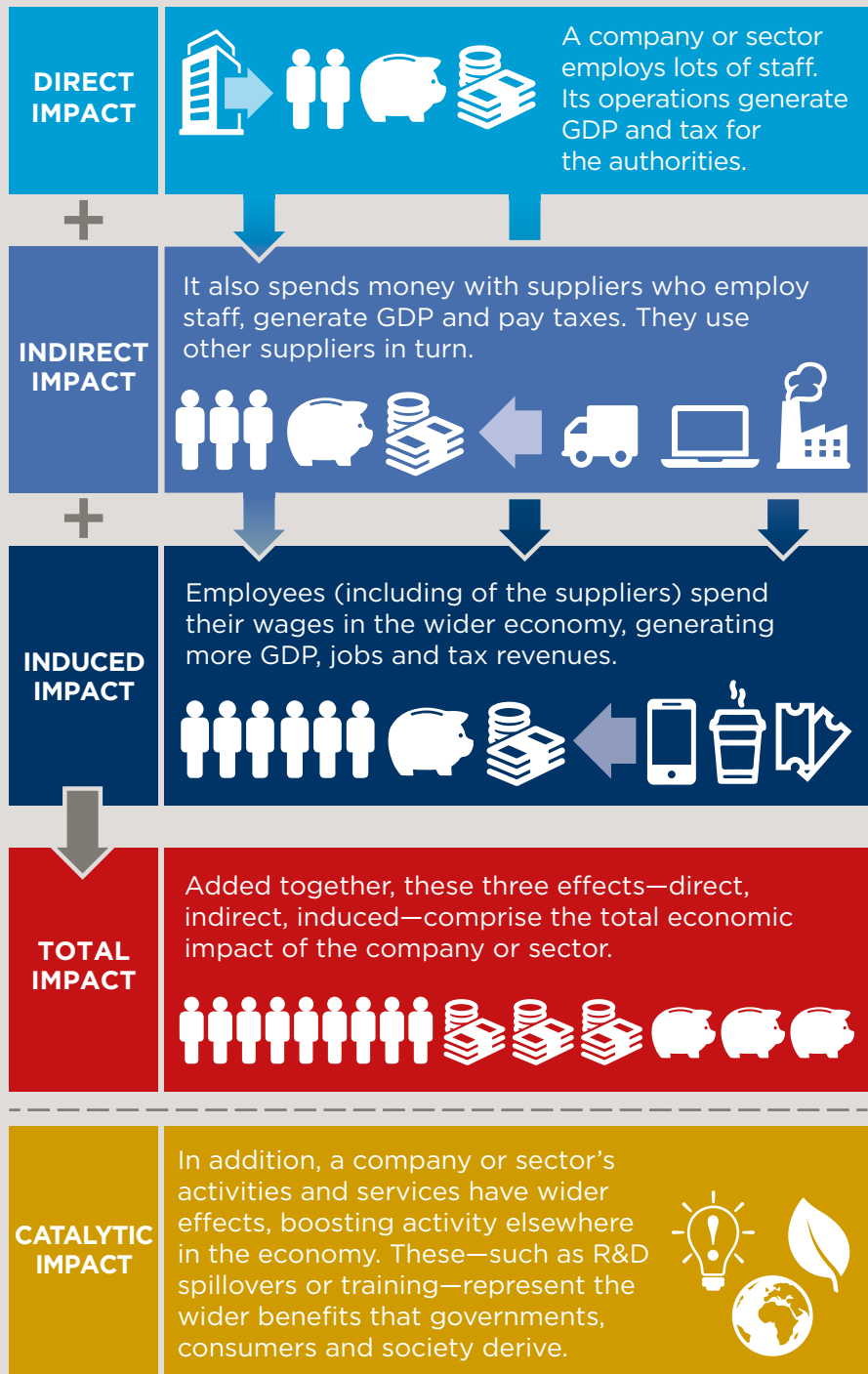
⁹ The gross value-added contribution to GDP is defined as the value of the output produced minus the expenditure on inputs of bought in goods and services used up in the production of that output. GDP measures the total economic output of the country. It is used to judge the rate of growth of the economy and to define whether it enters a recession. GDP equals the sum of gross value-added plus taxes minus subsidies on production.

The expenditure impact modelling is conducted using an Input-Output (I-O) based model of the UK economy. This model was constructed by Oxford Economics, using data published by the Office for National Statistics (ONS) in 2018.¹⁰ Further detail about the economic impact methodology is included in the Appendix.

Lastly, the analysis examines Huawei's **catalytic impacts**. These are the impacts the company has on the productive potential of the UK economy. These occur through the training and other investment in the staff's human capital which boosts their productivity. It also includes the company's expenditure on R&D, which drives improvements in organisation and methods of production, and develops new products and services. These are largely treated in a qualitative way and cannot be added to the expenditure impacts summarised above.

The report does not seek to quantify the economic impact of the UK's digital infrastructure, of which Huawei's equipment forms a vital part.

Fig. 2. Schematic of Huawei's economic contribution to the UK economy



¹⁰ ONS, (2018), 'United Kingdom Input-Output Analytical Tables, 2015', 2 March.

2. HUAWEI'S ECONOMIC IMPACTS IN THE UK

This chapter investigates the economic activity stimulated by the different types of expenditure undertaken by Huawei: its own operational spending; the impact of its UK and Chinese operations' procurement from UK suppliers; and the payment of wages by the company and the firms in its direct supply chain. The results are first presented for the UK as a whole, then for its nations and regions.

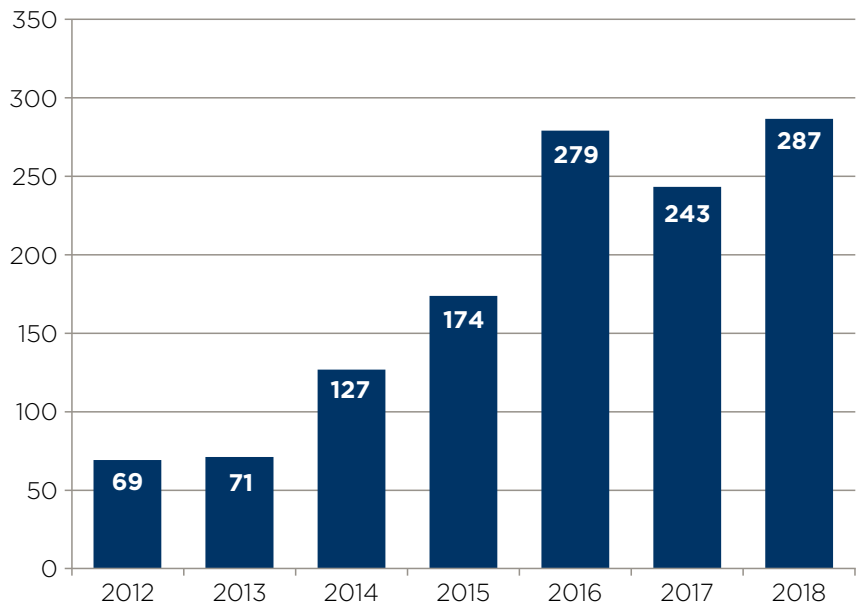
2.1 DIRECT EFFECTS ARISING FROM HUAWEI'S ACTIVITIES IN THE UK

Huawei contributes to the UK economy in a number of ways. The company's "direct" contribution to the economy reflects the value it adds within its own UK operations. We estimate this gross value-added contribution to GDP, as produced by Huawei's three UK entities, using the "income approach" to national accounting.¹¹ This involves aggregating the employee compensation paid and the profits made (as measured by the earnings before interest, taxation, depreciation and amortisation).

On this basis, Huawei's gross value-added contribution to UK GDP has grown rapidly since 2012 (see Fig. 3). In 2018, the company made a £287 million contribution, up almost 300 percent on 2012 in real terms (after excluding inflation).¹²

Fig. 3: Huawei's annual contributions to UK GDP, 2012-2018

£ million (in 2018 prices)



Source: Huawei

¹¹ Huawei's operations in the UK are made up of three distinct legal entities; *Huawei Technologies (UK) Co., Ltd.*, *Huawei Global Finance (UK) Limited*, *Huawei Technologies Research & Development (UK) Limited*.

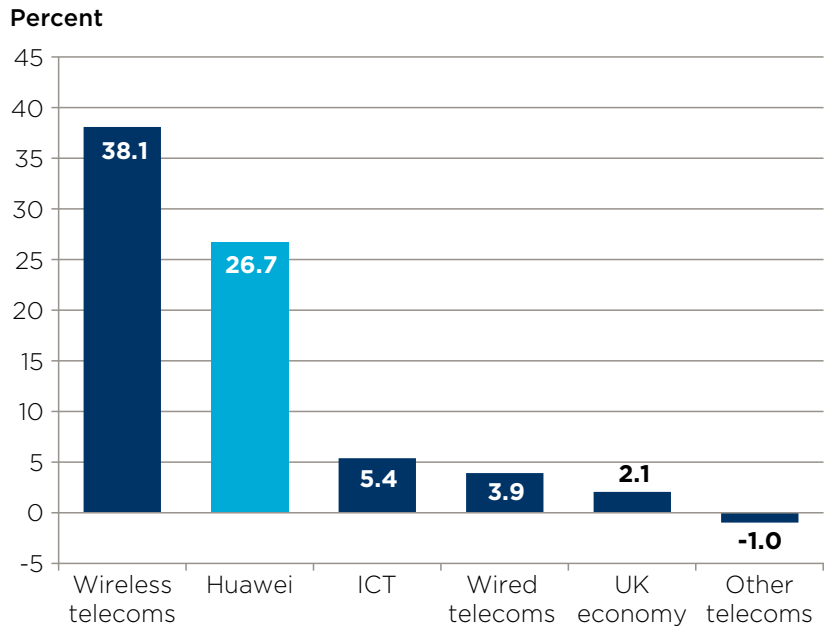
¹² All figures are presented in 2018 prices.

The rapid growth in Huawei’s own contribution to GDP since 2012 in part reflects the expansion in economic activity by its carrier customer base. The wireless telecommunications industry increased its value-added contribution to UK GDP, in real terms, by an average of 38 percent a year between 2012 and 2017 (see Fig. 4).¹³ In comparison, the wired telecommunications industry expanded its contribution by just under four percent per year over the same period—still well in excess of the UK economy’s average annual growth rate of two percent.

The number of people employed by Huawei in the UK has also grown quickly to support this expansion in activity. Between 2012 and 2016, the total number increased from 781 to 1,721 people, before subsequently dropping to 1,563 by 2018, reflecting the cycle of mobile network investment, in this case in 4G. Combining the two periods, Huawei’s employment has increased by an average rate of 17 percent each year between 2012 and 2018 (see Fig. 5). Some 17 percent of the 9,138 job years in this period occurred in 2018.

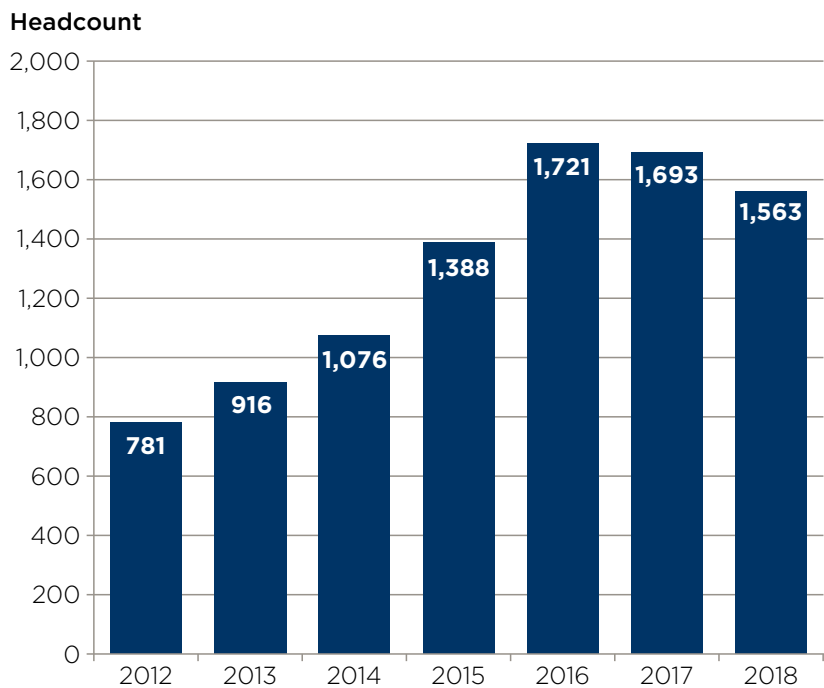
The rapid increase in Huawei’s gross value-added contribution, alongside its more modest expansion in employment levels, indicates that staff at Huawei have become considerably more productive over time.¹⁴ Indeed, productivity is found to have increased at an average annual rate of almost 20 percent, in real terms—despite the company’s already exceptionally high levels of productivity.

Fig. 4: Compound annual growth rate in real GDP between 2012 and 2018



Source: Huawei, ONS (2018)

Fig. 5: Huawei’s own employment in the UK, 2012 to 2018



Source: Huawei

¹³ ONS, (2018), ‘Annual Business Survey - 2017 Provisional Results’, 8 November.

¹⁴ Productivity is calculated as gross value-added per employee (including contractors).

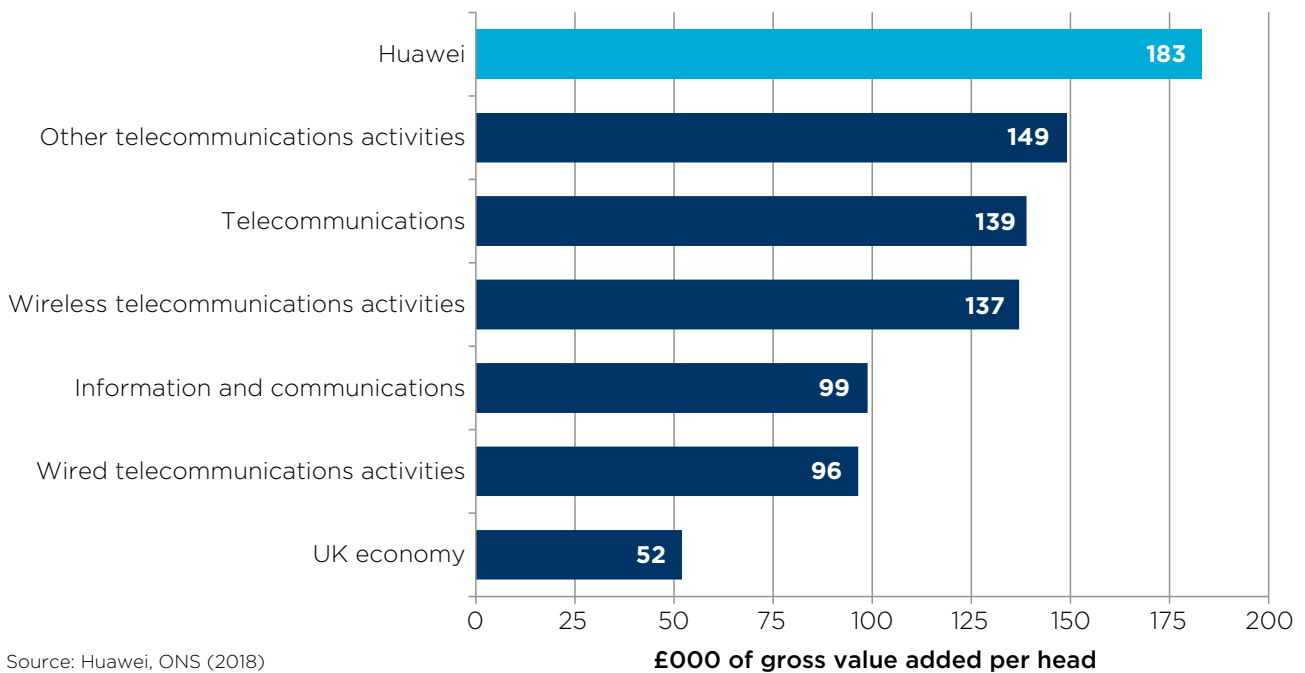
In 2018, Huawei workers produced an average value-added contribution of £183,000 (see Fig. 6). This far exceeds the average of £139,000 produced by workers in the telecommunications sector as a whole and is 3.5 times greater than the average for the whole UK economy.¹⁵

High levels of labour productivity are important because they boost price competitiveness and improve living standards in the UK.

Huawei’s significant and growing presence in the UK means it has also made a substantial contribution to

HM Treasury. Over the period 2012-2018, the company paid £457 million in taxes (in 2018 prices)—of which the major components were corporation and labour taxes. In 2018 alone, Huawei and its workers paid £101 million in tax receipts.

Fig. 6: Huawei’s labour productivity compared to the wider information and communication sector, and UK economy



2.2 INDIRECT EFFECTS ARISING FROM HUAWEI’S SUPPLY CHAIN

But the economic impact of Huawei in the UK extends far beyond its direct UK operational spending. Huawei also purchases inputs of goods and services from UK suppliers, both for its UK operations and the rest of its business worldwide.

Between 2012 and 2018, it spent £3.2 billion in nominal terms with UK firms—of which some £909 million (28 percent) occurred in 2018 alone. This is equivalent to almost a third of Huawei’s total UK procurement commitment of £3 billion for the period 2018-2022, as laid out in its latest five-year plan.¹⁶

However, UK businesses are major suppliers to Huawei’s global operations, not just its UK-based activities. The majority of Huawei’s procurement expenditure originates from its head office in China. In 2018, this amounted to £735 million—81 percent of its total spend with UK suppliers that year (Fig. 7).

¹⁵ ONS, (2018), ‘Annual Business Survey - 2017 Provisional Results’, 8 November. Data relate to the UK non-financial business economy.

¹⁶ Huawei, (2018), ‘Huawei Chairwoman Madam Sun Yafang meets UK Prime Minister Theresa May to announce new £3bn five year commitment to the UK’, 6 February.

Fig. 7: Huawei procurement spend from UK suppliers between 2012-2018, £ million

| Source of expenditure | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|-----------------------|------------|------------|------------|------------|------------|------------|------------|
| China | 75 | 88 | 128 | 228 | 468 | 614 | 735 |
| UK operations | 72 | 100 | 85 | 149 | 164 | 154 | 174 |
| Total | 147 | 188 | 212 | 377 | 632 | 769 | 909 |

Source: Huawei

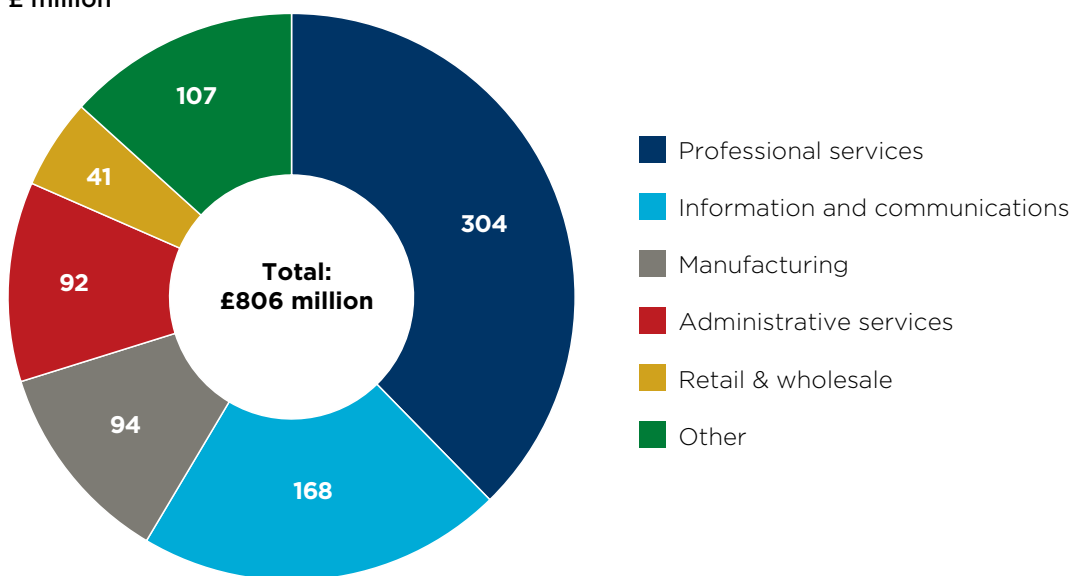
This UK supply chain expenditure stimulates economic activity at a wide range of companies, particularly in high tech sectors such as software and network design, as well as in the legal and financial services sectors. On average, we find it supported a value-added contribution of £416 million (in 2018 prices) each year between 2012 and 2018, as well as 57,200 years of employment, and £777 million in tax revenues for HM Treasury.

In 2018 alone, Huawei’s £909 million of procurement from UK-based businesses supported an £806 million gross value-added contribution to GDP along its UK supply chain. Using the same industrial pattern of its procurement as for our previous Huawei study, we estimate that 38 percent or £304 million of this GDP contribution occurred in the professional services sector (see Fig. 8).¹⁷ The information and communications sector was also a significant

beneficiary, benefitting by 21 percent or £168 million in 2018. Furthermore, Huawei’s procurement supported significant amounts of economic output in the manufacturing and administrative services sectors.

Fig. 8: Industrial distribution of Huawei’s indirect impact on the UK economy, 2018

£ million



Source: Huawei, ONS (2018), Oxford Economics

¹⁷ Oxford Economics, (2015), ‘The economic impact of Huawei in the UK’, June.

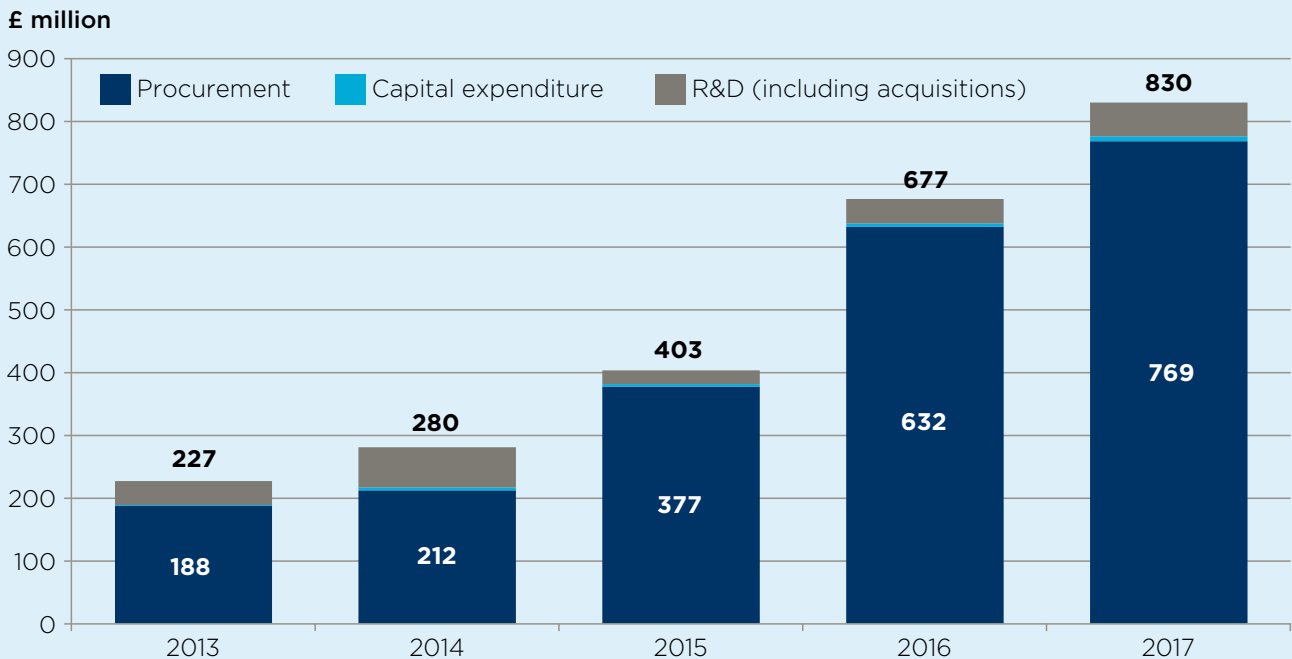
HOW HUAWEI EXCEEDED ITS UK SPENDING TARGETS

In September 2012, Huawei committed to spending £1.3 billion on capital investment and procurement in the UK over the following five years (2013 to 2017). This was an ambitious target, requiring substantial increases in its UK expenditure, which stood at £150 million in 2012. But despite this demanding goal, Huawei exceeded it, spending £2.2 billion on investment and procurement over the five-year period—almost £1 billion more than its original commitment (Fig. 9)—with an additional £330 million spent on R&D (including acquisitions).

Following the success of its initial five-year plan, in February 2018 Huawei made a further five-year commitment to the UK for the period 2018 to 2022, to spend £3 billion on procurement with UK firms.

In 2018, Huawei purchased over £900 million of goods from UK businesses, reaching 30 percent of its procurement goal in a single year. Huawei is therefore on course to exceed its target by 50 percent, even if current levels of procurement spending are simply maintained.

Fig. 9: Huawei’s annual UK procurement and investment expenditure, 2013-2017



Source: Oxford Economics

2.3 INDUCED EFFECTS ARISING FROM WAGES BEING SPENT

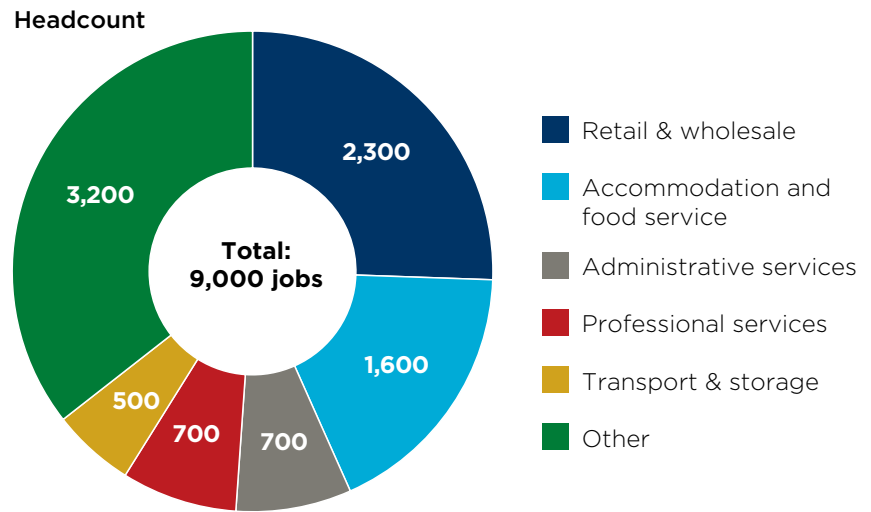
Over the period 2012-2018, Huawei paid its employees a total of £826 million in gross wages (in nominal terms). In addition to this, we estimate that those people employed in its direct supply chain received an additional £1.7 billion in compensation over the same period. The payment of wages to people working either for Huawei, or within its supply chain, stimulates consumer spending, which in turn boosts economic activity at leisure, retail, and other outlets, and in these companies' supply chains.

Over the period 2012 to 2018, we estimate that all this wage-financed consumption supported an average annual gross value-added contribution to GDP of £307 million (in 2018 prices). It also supported 34,600 years of employment, and a £713 million tax contribution to the Exchequer, in nominal terms.

We find that in 2018 alone, the payment of these wages contributed some £598 million to UK GDP, as well as stimulating 9,000 jobs and £170 million in tax receipts.

The employment created by this wage-financed consumer spending benefits a wide range of industries. Foremost among them is the retail & wholesale sector, where the payment of wages by Huawei and in its direct supply chain are estimated to have stimulated 2,300 jobs in 2018, or 25 percent of the total (Fig. 10). The accommodation, food & beverage-serving sector ranks second, benefitting by some 1,600 jobs (18 percent of the 2018 total).

Fig. 10: Industrial distribution of induced contribution to employment, 2018



Source: Huawei, ONS (2018), Oxford Economics

2.4 HUAWEI'S TOTAL EXPENDITURE IMPACTS ON THE UK

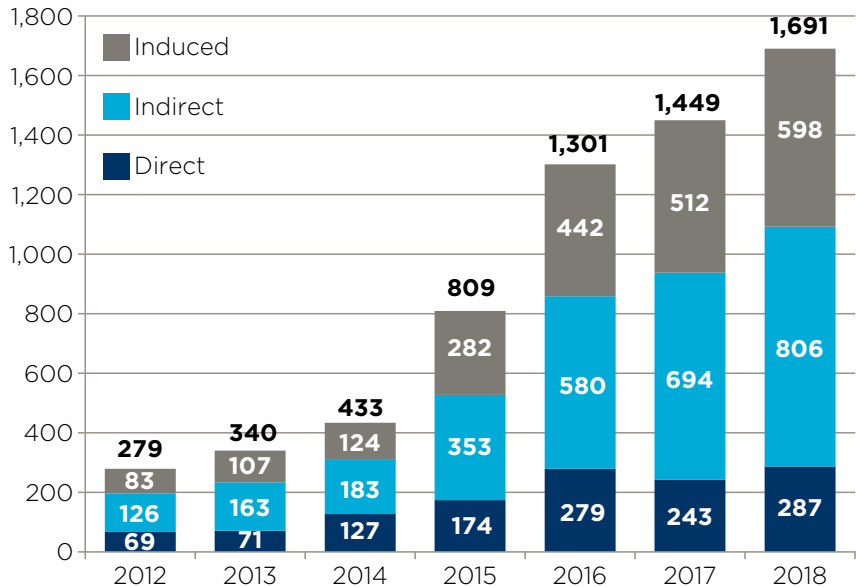
Aggregating the direct, indirect and induced economic impacts, we find that Huawei's total contribution to UK GDP has increased from £279 million in 2012 to £1,691 million in 2018, in real terms (see Fig. 11). This is an overall increase of 507 percent, with the largest relative growth occurring in the induced (wage-related) impact, which rose by 620 percent over this period. Huawei's indirect (supply chain) impact increased by 537 percent in this time.

Huawei's impact on the UK labour market has also increased significantly. Summing the three channels of economic impact, we find that the total number of jobs it supports rose from 5,100 people in 2012 to 26,200 people in 2018 (see Fig. 12). This is a 414 percent rise over the seven-year period, with the growth mainly stimulated by a 524 percent increase in the number of jobs stimulated by the company's procurement from UK suppliers.

We find that the total value of tax receipts supported across the three impact channels increased by 273 percent in real terms between 2012 and 2018 (see Fig. 13). This growth was led by a 444 percent increase in tax payments supported by the company's annual UK procurement. Overall, the tax revenues Huawei supported in 2018 alone would support the payment of 16,900 UK nurses' average salaries.¹⁸

Fig. 11: Huawei's total gross value-added contributions to the UK economy in real terms, 2012-2018

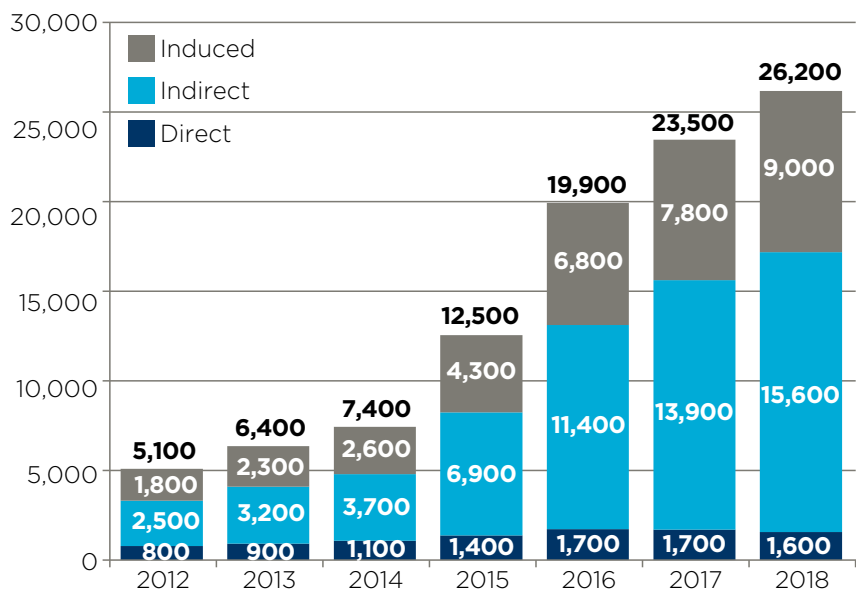
£ million (in 2018 prices)



Source: Oxford Economics

Fig. 12: Huawei's total UK employment contributions, 2012-2018

Headcount



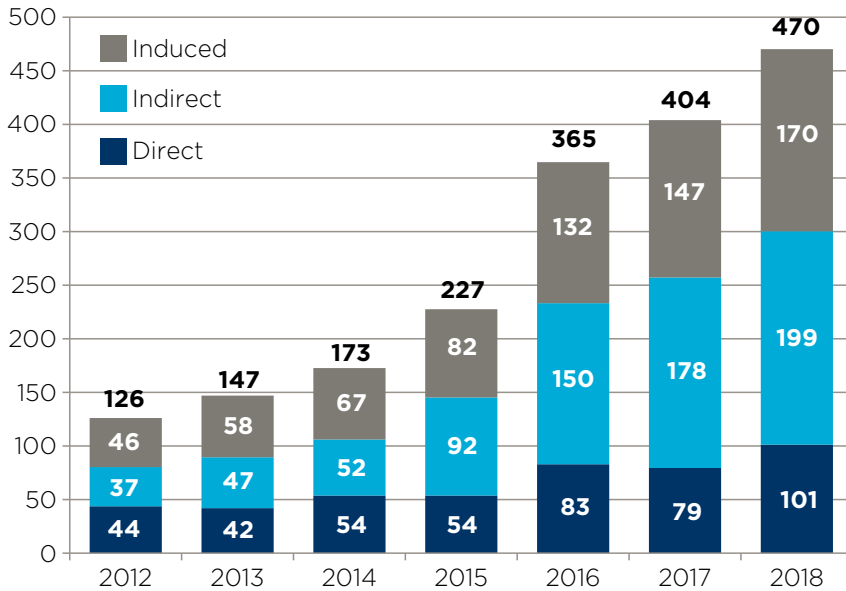
Source: Oxford Economics

Note: Totals may not sum due to rounding

¹⁸ ONS, (2018), 'Earnings and hours worked, occupation by four-digit SOC: ASHE Table 14', 25 October. Based on the mean average of a nurse's annual gross pay of £27,777 in 2018.

Fig.13: Huawei’s total UK tax contributions in real terms, 2012-2018

£ million (in 2018 prices)



Source: Oxford Economics

2.5 HUAWEI'S ECONOMIC IMPACT: A REGIONAL PERSPECTIVE

Huawei currently has 20 sites across the UK, including its UK headquarters in Reading, innovation centres in Cambridge, and the Huawei Global Finance centre in London (see Case Study 1, overleaf, and the Corporation of London’s 2018 publication).¹⁹ The company has also expanded its presence in other UK regions and now has three locations in and around Cambridge.²⁰

Companies in Huawei’s UK supply chain are located across the country. Naturally, its induced (wage-related) impacts are strongest where Huawei staff, and the people who work within its UK supply chain, live.

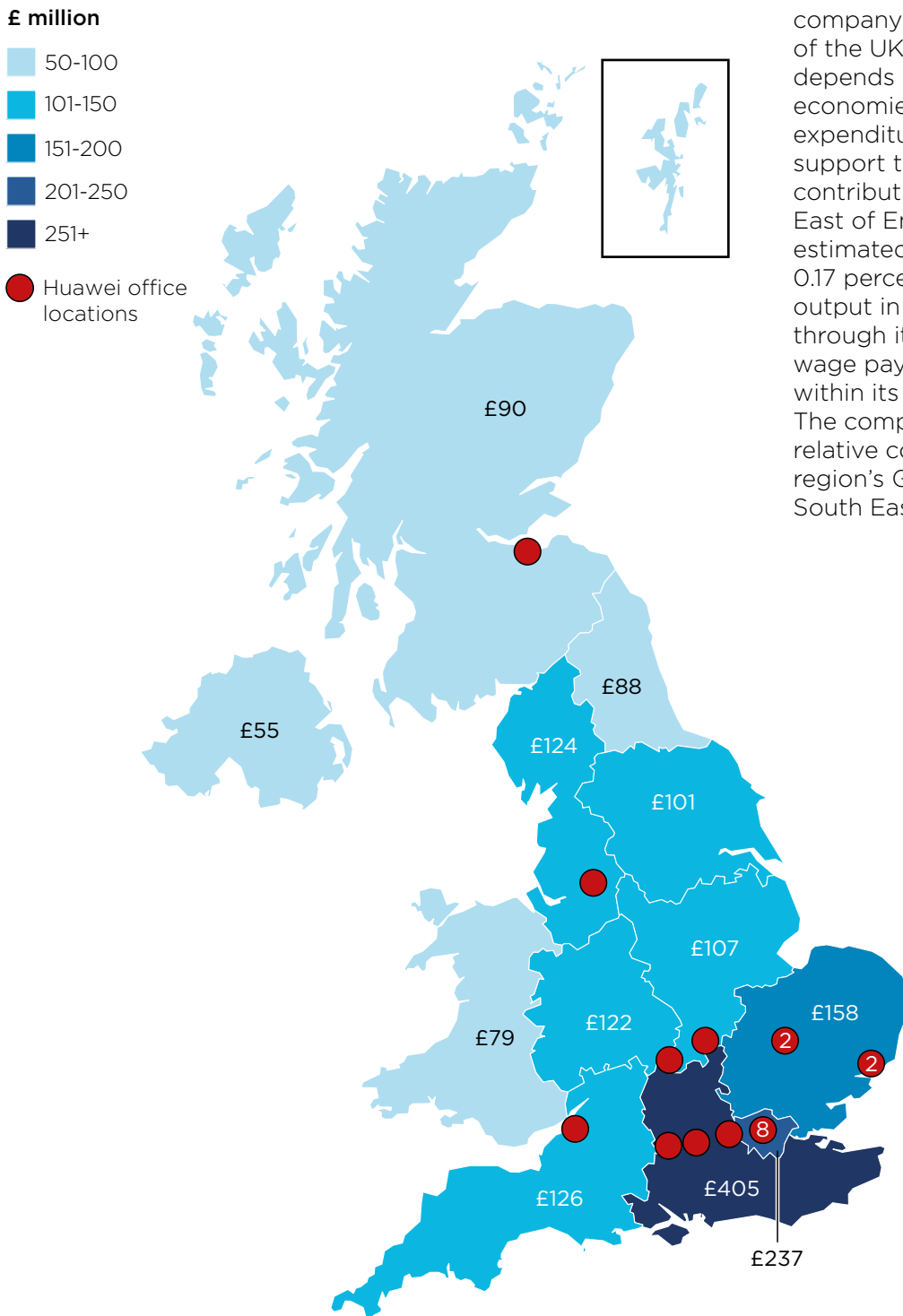
In 2018, we find that Huawei stimulated the greatest amount of economic output in the South East region. It supported some £405 million or 24 percent of its total value-added contribution to GDP in this region (see Fig. 14), reflecting the location of its head office in Reading.

The London region ranked second with a £237 million gross value-added contribution or a 14 percent share of total, reflecting the location of Huawei Global Finance, its AI research centre and six other offices, as well as the importance of the capital in the company’s UK supply chain. The East of England ranked third with a nine percent share, in part due to its multiple research operations in Cambridge and Ipswich.

¹⁹ City of London Corporation, (2018), ‘Case Study: Evan Bai, President at Huawei Global Finance, talks to the City of London Corporation about how the UK capital has played a fundamental role in the company’s growth’.

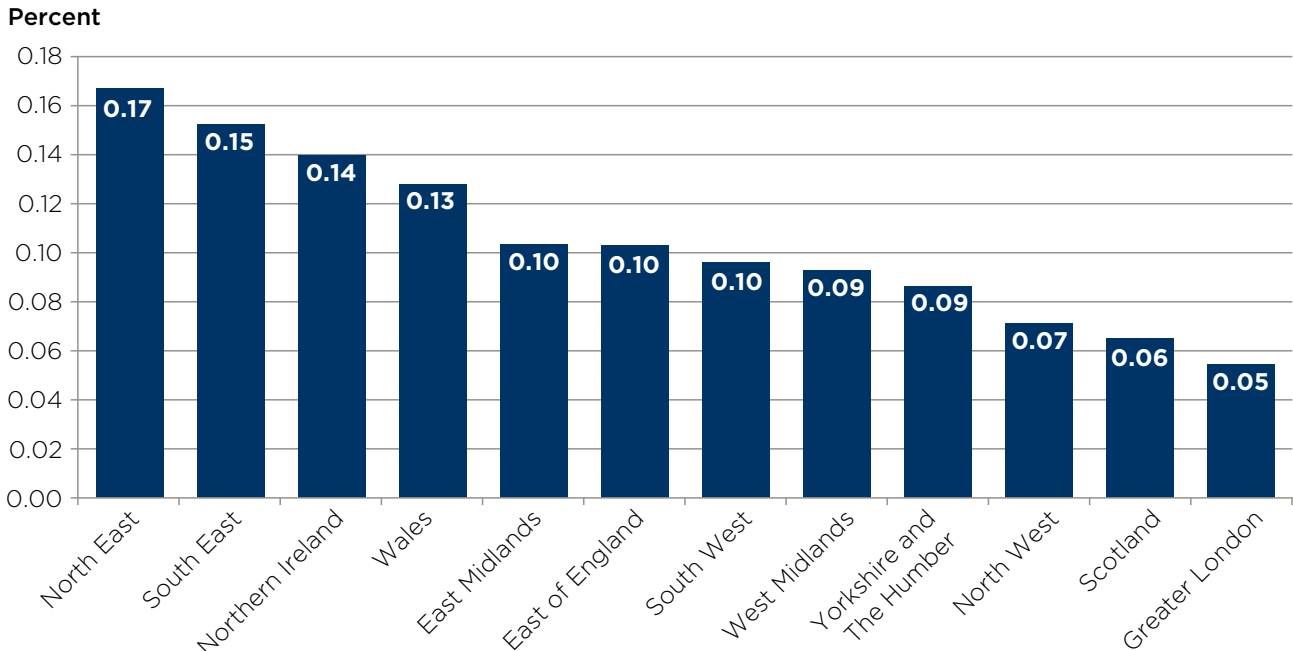
²⁰ Two operational and one newly acquired.

Fig.14: Huawei's total gross value-added contribution to UK GDP by region, 2018



Although Huawei makes the biggest absolute contribution to GDP in the South East, the company's importance to each of the UK's nations and regions depends on the size of their economies. The company's expenditure is estimated to support the largest relative contribution in the North East of England (Fig. 15). It is estimated to have supported 0.17 percent of the economic output in that region in 2018, through its procurement and wage payments stimulated within its local supply chain. The company's second-largest relative contribution to a region's GDP occurs in the South East.

Fig. 15: The gross value-added supported by Huawei in each region relative to its total GDP, 2018



Source: Oxford Economics

CASE STUDY 1: HUAWEI GLOBAL FINANCE



Since first establishing its financial base in London in December 2012, Huawei has grown rapidly. Now firmly rooted within the City of London, the company remains committed to the UK, playing its part in ensuring London’s pre-eminent position as a global financial capital.

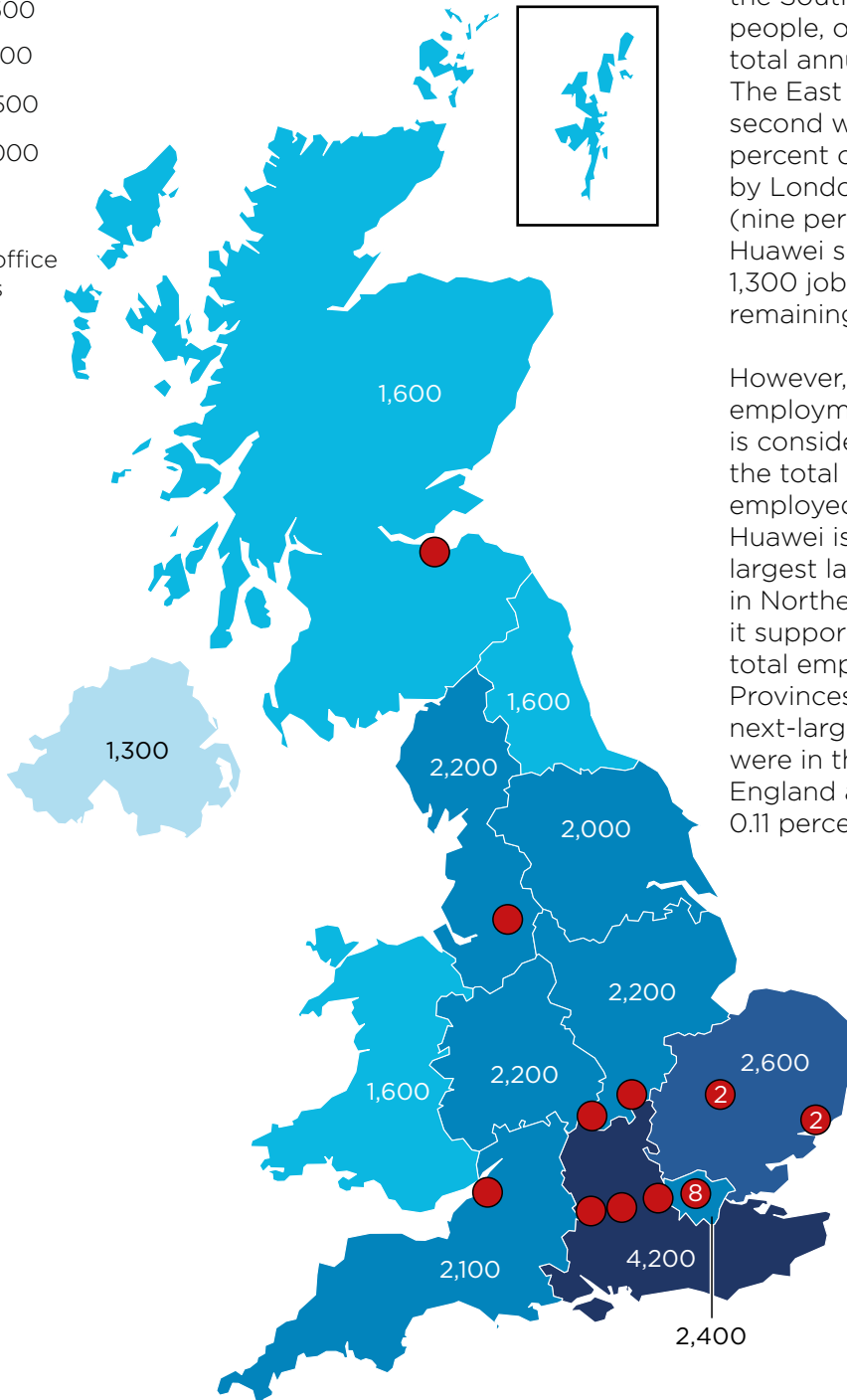
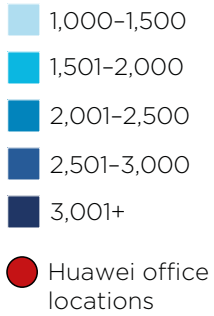
An independent legal entity, Huawei Global Finance (HGF), has been set up to provide the company with a wide range of financial services, from treasury services and foreign exchange transactions to risk management and credit control. HGF is the centre of excellence for all Huawei’s financial management of its international business, ensuring its operations

run smoothly and efficiently right across the globe. HGF does business with an array of UK-based financial institutions, including the major banks, asset managers, accountancy firms, consultancies, auditors, and legal representatives.

Huawei Global Finance was first drawn to the UK by London’s reputation as a global financial centre. By basing itself in the heart of the City, Huawei can recruit from the world’s finest talent and access the best financial institutions. To ensure the company retains its edge, it has established links with the UK’s leading universities, so the brightest graduates are aware of all the career opportunities at Huawei. Creating opportunities for talented financiers and hiring the services of the best companies in the City have been key factors in establishing HGF at the heart of the UK financial services sector—an integral part of the UK economy.

Fig.16: Huawei's total UK employment contribution by region, 2018

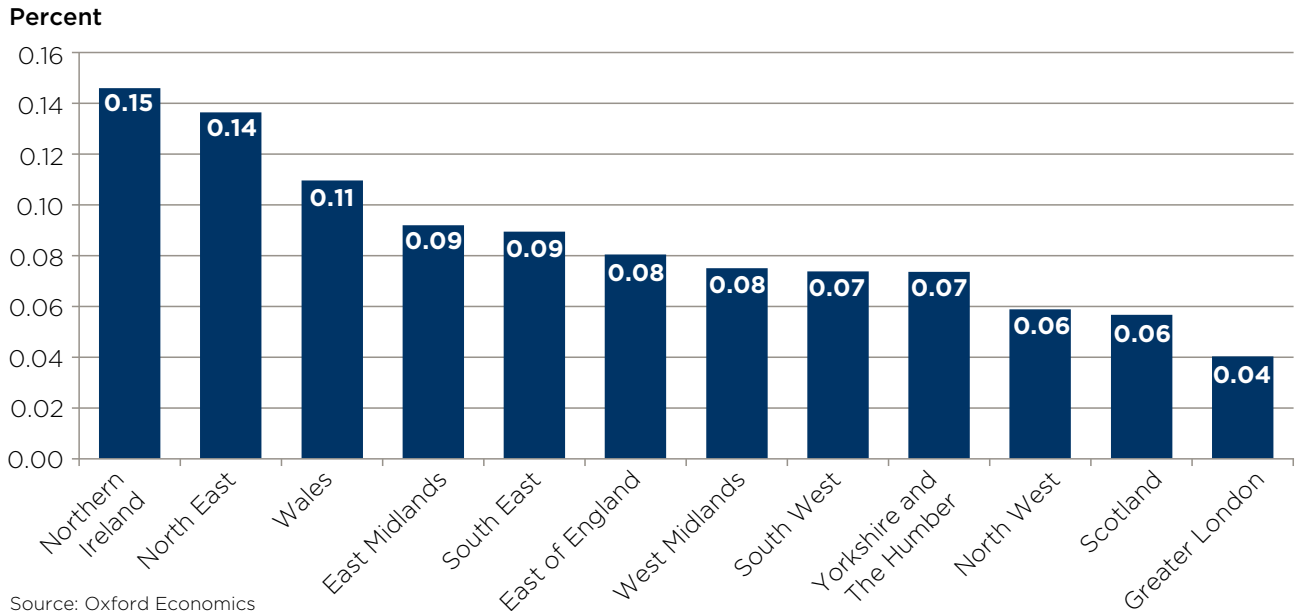
Headcount, 2018



Huawei also stimulates employment throughout the UK's nations and regions. In 2018, it supported most jobs in the South East—some 4,200 people, or 16 percent of its total annual figure (Fig. 16). The East of England ranked second with 2,600 jobs (10 percent of the total), followed by London with 2,400 jobs (nine percent). Elsewhere, Huawei supported at least 1,300 jobs in each of the UK's remaining nations and regions.

However, when its employment contribution is considered relative to the total number of people employed in each region, Huawei is found to have the largest labour market impact in Northern Ireland. In 2018, it supported 0.15 percent of total employment across the Provinces (see Fig. 17). Its next-largest relative impacts were in the North East of England and Wales, at 0.14 and 0.11 percent respectively.

Fig. 17: Employment supported by Huawei as share of total employment in each UK region, 2018



CASE STUDY 2: CONSUMER BUSINESS GROUP

As one of Huawei’s three business groups, Huawei Consumer Business Group is committed to delivering the latest technologies to consumers, covering smartphones, PC and tablets, wearables, mobile broadband devices, family devices and device cloud services.

In the smartphone arena, Huawei is now the second-largest manufacturer in the world, thanks to its innovative devices. These include the Mate 20 Pro, which is equipped with the world’s first 7NM chipset and reverse wireless charging; the P30 Pro, which has a 50X Digital Zoom; and the Mate X, a pioneering foldable smartphone (pictured).

Huawei’s innovation is not just limited to smartphones; its range of wearable devices, tablets, laptops and smart speakers provide an entire eco-system of advanced technologies that enhance consumers’ lives.



In the UK, Huawei has also demonstrated how Artificial Intelligence can come together with human expertise to make a positive impact on society. In the last year alone, Huawei’s AI has completed Schubert’s Unfinished Symphony, powered a ‘StorySign’ app that teaches deaf children how to read, and taught a Porsche Panamera how to drive unaided and swerve to avoid obstacles in the road.

Huawei’s Consumer Business Group has also supported a number of initiatives to help the UK public reach its full potential.

Last year, the company launched a number of bursaries to help aspiring entrepreneurs fulfil their ambitions.

These bursaries have helped to fund a number of ground-breaking projects, including the development of an app for mental health awareness and a media platform dedicated to women in business.

3. HUAWEI'S CATALYTIC IMPACTS

Huawei boosts the productive potential of the UK economy through its expenditure on R&D, and by investing in training its own staff, and undergraduates in STEM subjects via its Seeds for the Future programme. All three activities support the UK government's Industrial Strategy to enhance the country's productive capacity, as well as supporting UK science and providing high-skill jobs.

3.1 R&D INVESTMENT

Huawei is a major investor in R&D around the world, ranking fifth in the 2018 EU Industrial Investment Scoreboard.²¹ Its R&D efforts focus on fully connected networks, intelligent computing, and engineering capability improvement. In the UK, Huawei's six R&D sites, in Bristol, Cambridge (two), Edinburgh, Ipswich, and London concentrate on innovation, and collaboration with some of the nation's leading companies and universities. Huawei's R&D efforts enhance the UK's innovation ecosystem while increasing productive capacity and providing new technological solutions for UK consumers and businesses.

3.1.1 Huawei's UK R&D

Since entering the UK market, Huawei has substantially grown its R&D presence. In 2018, the company invested £112 million in R&D (a 65 percent increase on its 2014 spend in real terms), including its collaborations with UK universities and R&D

acquisitions (Fig. 18). The spike in expenditure in 2014 reflects Huawei's acquisition of the Internet of Things firm, Neul, and its equity investment in the semi-conductor manufacturer XMOS. In 2018, it employed more than 300 research staff in the UK—and this number is forecast to rise to 400 research staff in 2019.

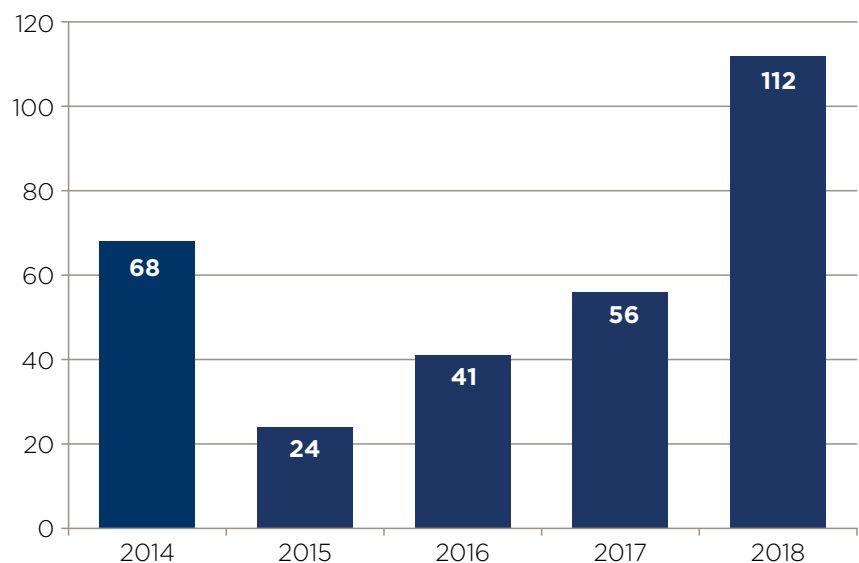
Private sector investment in R&D is important for the UK's economic future. Boosting productivity is considered "the only sustainable way of improving living standards in the long run", and the UK government identifies innovation as a key driver of productivity gains.²² With this in mind, the UK Government has a target to raise total R&D spending in the UK to 2.4 percent of GDP by 2027—up from the current figure of

less than 1.7 percent.²³ This is only likely to be achieved by a continued increase in R&D investment by the business sector.

Huawei often undertakes collaborative research with its carrier customers to improve their combined offering.

Where the company undertakes its own investment in R&D, the benefits do not just accrue to the company—it also enhances the productive capacity of the UK. For example, the in-country technology and process spill-overs arising from Huawei's R&D activity are greater when the research takes place locally, rather than at a site abroad. This may reflect the fact that it leads to greater UK opportunities for local suppliers to interact with a

Fig. 18: Real R&D expenditure by Huawei in the UK, 2014-2018
£ million (in 2018 prices)



Source: Oxford Economics

²¹ European Commission (2018), 'The 2018 EU Industrial R&D Investment Scoreboard; R&D ranking of the top 2,500 companies in the world', 14 December.

²² ONS, (2007), 'The ONS productivity handbook; A statistical overview and guide', page 19.

²³ HM Government, (2018), 'Industrial Strategy; Building a Britain fit for the future', 28 June. Page 66.

high-productivity multinational; greater possibilities for cross-industry collaboration; and more opportunities for the company’s workers to relocate to other firms, taking their high skill levels with them.

In 2018, Huawei undertook R&D at six sites across the UK with the aim of improving information & communications technology (ICT) infrastructure and the performance of smart devices.

In Cambridge, Huawei has two main sites: one specialising in Internet of Things (IoT) applications, the other focusing on software development for smartphone chips. The IoT System-on-Chip solutions rely on a technology

known as “Narrow Band—Internet of Things” (NB-IoT), originally developed by the UK startup Neul which Huawei acquired in 2014.

The second Cambridge team works alongside Huawei’s major technology supplier, ARM, on chip performance optimisation. It is the first Huawei team based outside China to specialise in this type of technology—consequently a major vote of confidence in the UK as a base for innovation. This type of work again has major impacts for consumers, with the potential for both performance improvements and lower prices.

In Ipswich, Huawei’s team of researchers work on the industrialisation of photonics

technologies. These can dramatically improve the hardware speeds required for fibre-optic communications, allowing anything from faster video downloads to better access to the Cloud.

The company’s London-based researchers concentrate on Artificial Intelligence solutions—one of the key challenges identified by the UK government’s Industrial Strategy. The team’s emphasis is primarily on machine vision, with potential applications in image quality and augmented reality. In addition, Huawei has an R&D site in Bristol which focuses on content security and data base technologies, and a recently opened facility in Edinburgh.

CASE STUDY 3: NEUL



The 2014 acquisition of Neul, a Cambridge-based startup, kicked off a substantial expansion of Huawei’s UK research and development programme, which

now takes place across six locations. From Neul’s perspective, the acquisition meant this Internet of Things pioneer was able to expand its influence around the world.

Neul was established in 2010 to take advantage of the ongoing switch-off of the UK’s analogue TV signals. Aiming to utilise the newly available spectrum, it quickly found that while its technology was competitive, progress was hampered by poor market access. But this changed when Huawei offered to expand a nine-

month partnership on IoT devices by formally acquiring Neul’s then 35-strong business.

In 2015, the new-look team reached an industry-wide agreement to use Neul’s technology as the basis to create a global standard for IoT devices, called NB-IoT. Neul’s innovations allow for the deployment of low-power sensors that can be detected over wide areas, allowing users such as local authorities to buy devices for smart systems in previously analogue areas such as water and parking systems.

The technology is buried and deployed for as long as a decade, meaning the provision of utilities can be much more efficient, and therefore cheaper, for local authorities and taxpayers. Today, more than 60 NB-IoT networks are deployed across the globe, with millions of new devices being installed every month.

3.1.2 Collaborations with universities

By 2018, Huawei had collaborated with 35 universities and research institutes throughout the UK. The company’s academic collaborations are funded with the longer term in mind, allowing academics to focus on truly innovative research that can lead to scientific and technological breakthroughs rather than merely short-term results.

One example is the collaboration between Huawei and UK telecommunications company BT to provide up to £25 million over five years to the University of Cambridge, for projects relating to photonics, digital network infrastructure,

and media technologies.²⁴ Part of the funding is intended to be used to support longer-term, “blue sky” research projects progressed by postgraduate students, which focus on generating benefits for industry and society at large.

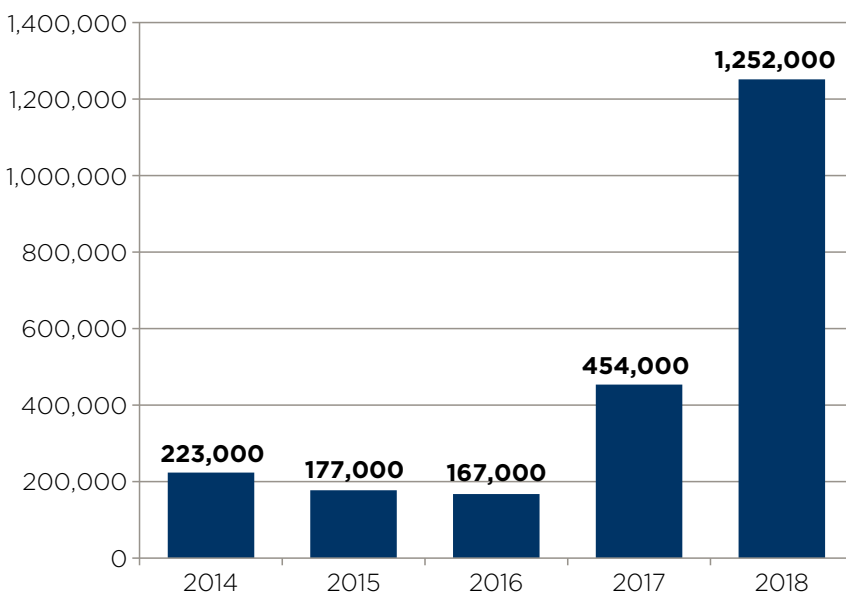
Huawei also has a three-year partnership with the University of Edinburgh to fund a laboratory for distributed data management and processing. This allows both parties to jointly explore new theories and technologies in data management, and provide direction for cutting-edge research into the next generation of information technology.

Huawei is also a longstanding partner of the University of Surrey, having been a founding member of its 5G Innovation Test Bed Centre. The company has invested over £5 million in this state-of-the-art facility, which houses more than 170 researchers investigating next generation mobile and wireless connectivity. The centre allows the telecommunications industry and other universities to test new applications and technologies in three areas: mobile broadband radio, fixed core networks, and service defined networks and the Internet of Things.

3.2 INVESTMENT IN UK SKILLS

Fig.19: Huawei’s expenditure on UK staff training

£ (in 2018 prices)



Source: Huawei

In 2018, Huawei spent almost £1.3 million on an All Staff Training initiative with a commitment to upskill all UK staff. This was nearly five times the amount it spent in 2014 in real terms. (Fig. 19). The number of training hours its UK staff received has increased six-fold.

Huawei’s training programme aims to build the skills of its workforce across a range of competencies. As well as technical training in ICT to help deliver the firm’s core offerings (in 4G, 5G, Cloud, etc), these include boosting skills in the different business functions located across its UK sites—such as finance, human resources, sales, and

customer relationships. Huawei also invests significantly in its graduate training scheme. Between 2015 and 2018 the company recruited over 40 graduates and invested £1.3 million.

Such commitment to training should benefit Huawei by boosting the productivity of its staff, and their ability to innovate. The individuals who receive training also benefit from higher earnings and better job prospects. There are also likely to be spill-overs to co-workers, as staff share ideas and the training programme serves as a forum for knowledge exchange. There may also be spill-overs to the rest of the UK economy, through knowledge

exchange when Huawei’s staff participate in industry forums, cooperate with other UK companies, universities, and research institutes, or when they move jobs.

Huawei also delivers technical training to young people in the UK via its Huawei ICT Academy. The Huawei ICT Academy is a global initiative which involves partnerships between Huawei and technical colleges around the world. In the UK Huawei has partnerships with 20 technical colleges, which delivers Huawei ICT training and encourages students to gain Huawei technical certifications. Huawei has developed a comprehensive range of ICT career certifications including Cloud Computing, Big Data, IoT

and AI. Last year over 100 UK students achieved the Huawei Certified ICT Associate (HCIA) certifications in Routing & Switching and HCIA Cloud. The value of this initiative for the UK is in upskilling young people with technical knowledge and practical skills for both the ICT industry and the wider community.

Huawei’s investment in technical training supports UK government policy as expressed in its 2018 Industrial Strategy, which states: “We recognise that people, and the skills they have, are a key driver of productivity. Having the right skills increases people’s earning power. Investing in our people across their lifetimes is fundamental to our shared success.”²⁵

CASE STUDY 4: SEEDS FOR THE FUTURE

Huawei also contributes more directly to the skills of the UK workforce through its flagship corporate social responsibility programme, Seeds for the Future. This is designed to cultivate local ICT talent around the world, enhance knowledge transfer, promote a more in-depth understanding of ICT, and encourage greater participation in digital communities.

In 2018, 50 STEM undergraduates from leading UK universities participated in a four-week trip to China featuring cultural, technical, and business training. To date over 250 UK students have benefitted from the Seeds for the Future programme since it began in 2011.

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

Huawei’s international business culture and values and spend time learning about Huawei’s products and solutions. In collaboration with the British Council, visits are also provided to other Chinese and western tech companies operating in Beijing and Shenzhen. Since the programme’s UK inception in 2011, Huawei has invested more than £1m in the UK Seeds for the Future programme.



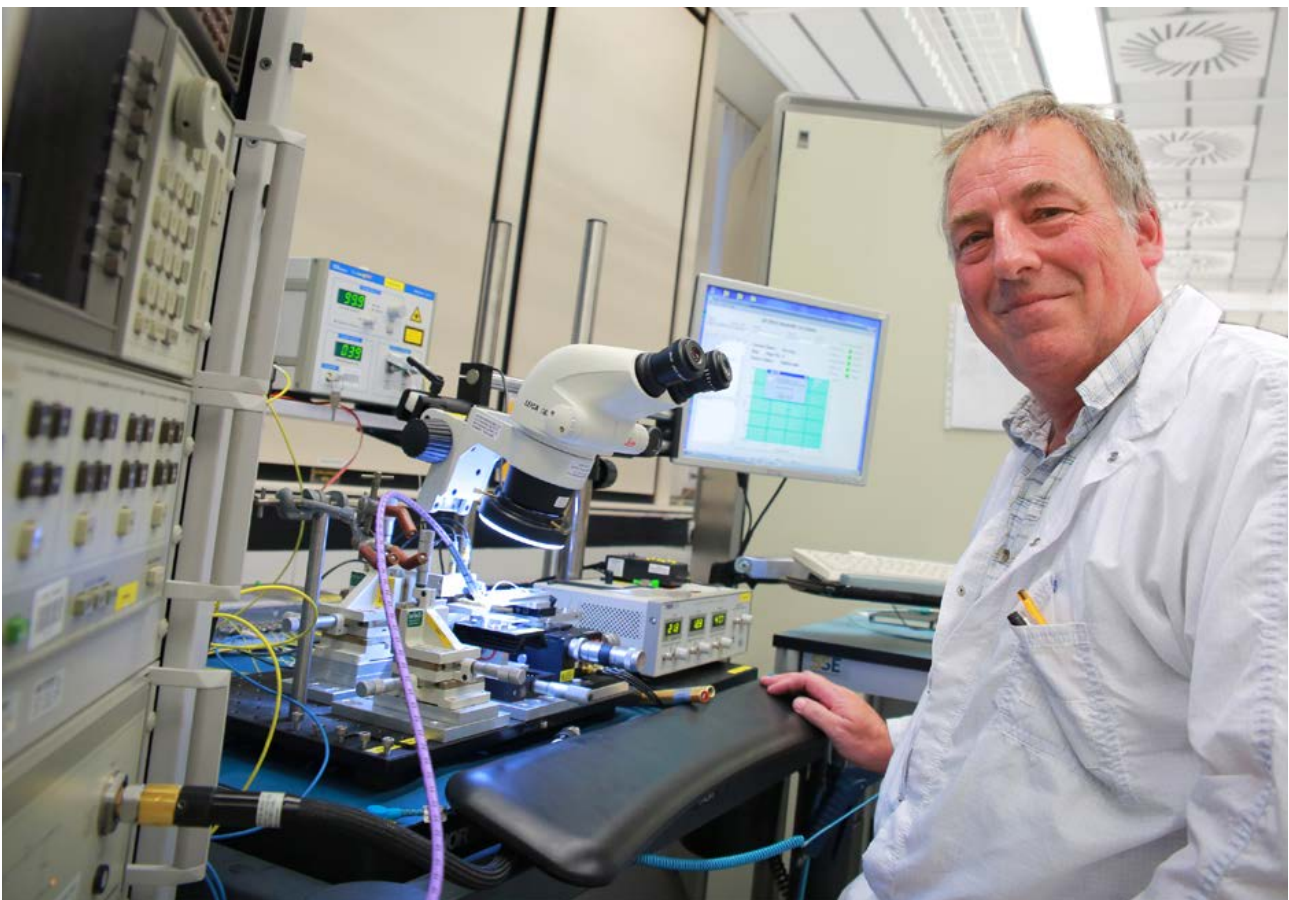
²⁵ HM Government, (2018), 'Industrial Strategy: Building a Britain fit for the future', 28 June. Page 95.

4. CONCLUSION

This report examines the major contributions Huawei has made to the UK economy between 2012 and 2018. In this period, it made commitments to invest and procure £1.3 billion in the UK between 2013-2017, and £3 billion between 2018-2022. Huawei's products have enhanced the UK's digital connectivity through improved fixed networks and wireless infrastructure. Latterly, its smartphones and tablets have improved its UK customers' digital experience across many aspects of their lives.

The report investigates the contribution the company's expenditure has made to the UK economy, through its operational spending, its procurement from UK suppliers and the boost its payment of wages brings to the consumer economy. It finds that at the end of that seven-year period, in 2018, Huawei stimulated a £1.7 billion gross value-added contribution to UK GDP, and supported some 26,200 jobs and £470 million in tax revenues. This impact was spread far and wide across the UK's nations and regions.

Huawei also has a positive impact on the UK's productive capacity through its R&D and upskilling of the UK labour force. In 2018, Huawei invested £112 million in R&D in the UK, including collaborating with 35 universities and research institutes. It invested £1.3 million in training its own staff, and in addition has sent more than 250 STEM undergraduates from leading UK universities to China, as part of its Seeds for the Future CSR programme.



APPENDIX

METHODOLOGY FOR CAPTURING DIRECT IMPACTS

The direct impact of Huawei—including gross value-added, 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 UK economy, using the latest official UK input-output table published by the ONS.²⁶

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 UK suppliers by Huawei's UK operations and the company's headquarters in China was provided by the company. The composition of their procurement was assumed to be the same as set out in the information provided by the company for our 2015 study. Each year's data was fed into the model to arrive at total sales throughout the UK supply chain, by sector of supplier for that year. The indirect gross value-added contribution to GDP was worked out from there, using

gross value-added-to-turnover ratios for each industry for that year. The indirect employment impact was calculated in turn from there, using gross value-added-to-jobs ratios for each industry for that year.²⁷

The induced sales figures for each year were worked out 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 UK 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 value-added and jobs impacts estimated from there.

Finally, tax contributions were estimated taking into account sales, value-added and employment by industrial sector, and applying various appropriate tax-to-expenditure and tax-to-income ratios, sourced from HM Customs and Excise and other official datasets.

²⁶ ONS, (2018), 'United Kingdom Input-Output Analytical Tables, 2015', 2 March.

²⁷ ONS, (2018), 'Supply and Use Tables, 1997-2016', July. ONS, (2018), 'UK Business Register and Employment Survey: provisional results 2017, revised results 2016', 27 September.

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May 2019

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