Superfast Broadband: Evaluating its impacts & benefits for Cost Benefit Analysis

Dr. Philip B. Ball, Head of Business Cases and VfM, Corporate Strategy

And Amit Bhopal & Dina Dimou, Building Digital UK (BDUK) Benefits and Evaluation team, Department for Digital, Culture, Media & Sport
JASPERS CBA Forum on Broadband 15 May 2019
Introduction

• Building Digital UK (BDUK) delivers UK’s broadband infrastructure programmes
• In order to truly understand whether our programmes were successful or not, we need to evaluate them

WHY ARE WE DOING THIS?

• Digital infrastructure strategy - Delivering the UK Next Generation Network Infrastructure Deployment Plan - 3 Phases: 90% (2016); 95% (2017); 95%+
• Developing evidence base to inform CBA models of the impacts of rollout and demonstrating ‘additionality’
• Tracking benefits realisation (economic and wellbeing benefits) which are expected to increase with take-up
• Improving the quality of investment decision making - Informing internal BDUK model used for ex ante appraisal of investment proposals
• Procurement strategy innovation (clawback mechanism)
• Infrastructure Projects Authority (IPA) and European Commission mandates for evaluation

CORE SUPERFAST EVALUATION QUESTIONS

• What are the outcomes of the Superfast Broadband programme?
• What changed in individuals and organisations for these outcomes to come about?
• How effective and efficient has the delivery of the programme been?
• Was the investment cost-effective?
• What can we learn to improve future policy designs and implementation?

REDUCING THE DIGITAL DIVIDE (ADDICTIONALITY)

• To what extent has the aid resulted in increased access to NGA networks in white areas?
• Has the aid had a significant incentive effect on aid beneficiaries?
• To what extent has the target of the intervention been used and what speeds are available?

BDUK BENEFITS PLAN & FRAMEWORK

• Expected benefits of the programme - most of them are in scope of the evaluation
Key Findings

REDUCED DIGITAL DIVIDE (ADDITIONALITY)

- Superfast availability rolled out to 2.3m premises that would not have otherwise received access while 1.1m received access 1-2 years earlier
- Average additionality of 60% over 3 years
- OMR and Clawback mechanisms have raised VFM by 30% - relevant to other Government programmes

ECONOMIC IMPACTS

- Primarily reached lagging areas characterised by low productivity firms
- Significant local economic benefits - 49,000 jobs created and reduction in JSA claimants of 11,000
- Helped raise efficiency - closing productivity gap and delivering national GVA of £1.4bn by 2016

PUBLIC VALUE / WELL-BEING BENEFITS

- Sustained positive relationship between wellbeing and upgrade to superfast broadband in subsidised areas
- Comparable to the value of superfast broadband as reflected in house price changes
Superfast Programme

- Superfast is our most-well known intervention
- It aimed to deliver high speeds broadband internet (>24Mbps) to 95% of premises in the UK by December 2017

- Unique funding formula, using EU state-aid regulations: central gov’t funding matched by local bodies, totalling £1.7bn. Clawback mechanism.

- Open market review identified areas where there were no commercial plans to build Next Generation Access (NGA) networks.
- Around 50 live projects
- Now continues to deliver to last 2-3% of commercially difficult to reach areas
Benefits realisation framework for BDUK

- Starting point is the BDUK Benefits Realisation Framework which is based on the SQW UK broadband 2013 impact study
- It established five groups of benefits
  a. Productivity growth and employment
  b. Public sector efficiency
  c. Reducing the digital divide and providing public value
  d. Reducing impact on the environment
  e. Stimulating the broadband market
- With the Superfast evaluation (and other evaluations in BDUK), we are testing the validity of the framework
- We have evidenced benefits under ‘a’ and ‘c’ above

1. Productivity growth and Employment
   - Increased business productivity
   - New businesses established
   - Employment (safeguarded or new)
   - Increased ICT skills and wider educational attainment

2. Public sector efficiency
   - Delivery and access to public services
   - x-Govt learning for large procurement programmes

3. Reducing digital divide and providing public value
   - Reduced digital divide
   - Quality of life and wellbeing
   - Consumer savings

4. Reduced impact on the environment (out of scope)

5. Stimulating the broadband market
   - Stimulated private sector partnerships & investment
   - Market failure addressed through appropriate intervention
   - Increased competition in the market, including small suppliers
   - Innovation and knowledge of new technologies
   - Increased community capacity in procuring infrastructure

Legend:
- Scheduled for 2019/20 Evaluation
In 2016, a programme of work to evaluate Superfast Broadband and SuperConnected Cities Programme was established. SQW Scoping study (2016) proposed counterfactual methodologies to look at all outcomes from the programmes, including unintended benefits and disbenefits too (IV, RDD).

Aim to:
- substantiate the department’s narrative about the importance and value of improved connectivity;
- fulfil mandated requirements for evaluation;
- unique learning opportunity for cross-gov’t procurement learning.

Source of logic model (Ipsos MORI, 2018)
Assessing the Financial Standing of fund bidders
- Risk based approach (7 questions).
- Providers are a prime contractor or lead company in consortium
- Providers with turnover over two years of less than £20m, without appropriate guarantees, are disqualified (audited annual accounts)

Call-off of locally managed contracts
- Performance linked contracts subject to evaluation by local bodies
- Evaluation criteria: take-up, supplier cost overruns, cost/price inflation, project delay, and also the long-term sustainability of the network and associated wholesale marketplace

The role of Clawback & Open Market Review

- Open Market Review and public mapping process to minimise subsidy outside area of market failure

- Underspend and take-up clawback mechanisms to avoid over subsidy
  - A contractual arrangement in which the supplier shares cost savings from network build and profits with the Government when they exceed forecasts agreed at the outset.
  - The mechanism effectively reduces / recycles the public funding ex-post in recognition that the business model was better than anticipated.
  - Clawback managed over 7 years through contract mechanisms (to monitor take-up) and can result in increased coverage beyond original commitments

- Commercial Sustainability
Economic Impacts - Theory of Change

Inputs
- Net impact on superfast broadband coverage
- Net impact on available broadband speeds

Activities
- Take-up of superfast broadband
- Adoption of complementary technology
- Greater efficiency in management and administration
- Reallocation of commuting time to working hours
- Opening new channels to market
- Relocation of firms into programme area
- Safeguarding of local economic activity
- Re-entry to the labour market

Outputs
- Productivity growth
- Reduction in prices/improved quality
- Turnover growth (including, exports)
- Employed growth within firm
- Displacement from UK competitors
- Net increase in output (GVA)
- Crowding out
- Reductions in long-term unemployment
- Increase in labor market participation
- Increase in labor market participation
- Increased demand for labor and other factors
- Increased wages and prices

Impacts
- Core Focus

Superfast Programme Evaluation

• The evaluation plan brings together Additionality (Impact and Process evaluation), Benefits Realisation (economic and social outcomes) and Economic evaluation (cost-benefit analysis)
• These were merged into a comprehensive plan structured around the benefits framework

Methodology (Econometric approach)

• Comparing businesses before and after the subsidy (pipeline modelling, phased rollout)
• Taking businesses on a BDUK funded postcode and comparing them to businesses on similar postcodes which did not upgrade (Propensity Score Matching)
• Comparing businesses on either side of an subsidy border (Regression Discontinuity Design)

Data Sources
- Longitudinal Business Structure Database: enterprise and workplace level
- Annual Business Survey: 62,000 firms, mandatory large firm coverage mandatory, SME coverage relatively poorer
- C3 Reports: Delivery of SFBB coverage by BDUK contractors, postcodes, predicted upload and download speeds.
Key Outputs to review:

- To what extent has the aid resulted in increased access to an NGA network in white NGA areas?
- Has the aid had a significant incentive effect on aid beneficiaries?

The findings gave a range for the share of postcodes receiving subsidised coverage that would not have received superfast access in 2016 without the programme of between 39 to 62 percent. There was a reasonable degree of consistency across the results produced by the different analyses.
ACCELERATION EFFECT

- Estimate 73% premises enabled would not have NGA access after one year - OMR process effective
- Estimate falls to 50% at year two - implying 23% received NGA access 1 to 2 years more rapidly (too early to assess longer term effects)
- Suggests commercial plans changed - explained by improving commercial viability - as visible in levels of take-up gainshare
- Crowding-in also possible (though take-up on grey/black postcodes also likely influential)
- Minor cost of delayed coverage for some that would have received NGA anyway

ADDITIONALITY OVER TIME

AVERAGE ADDITIONALITY

- Average additionality estimated at 60 percent over 3 years – assumption used for cost-effectiveness analysis
Results:

The programme is estimated to have had positive economic impacts in those postcodes benefitting from subsidised coverage.

It is estimated that faster available download speeds increased:
- employment by 0.8 percent;
- turnover by 1.2 percent per annum;
- turnover per worker by 0.3 percent per annum

This equates to the creation over 49,000 jobs at the local level and an increase in turnover of £8.9bn

Subsidised coverage led to an increase in the number of firms located on relevant postcodes (by around 0.3 percent). The availability of superfast broadband appeared to be attractive to firms, though this carries the implication that there may have been offsetting effects in the areas from which they relocated.

A supplementary set of analyses were completed to explore the effect of the programme on firms that did not change location. These suggested that incumbent firms also benefited from subsidised coverage, and saw their employment increase by 0.2 percent, turnover grow by 0.6 percent per annum, and turnover per worker rise by 0.4 percent due to the upgrade. This suggests that local economic impacts have not solely been driven by the relocation of firms.
Labour Market Results:

It is estimated that the programme reduced the number of individuals claiming JSA by 8,800 and the number claiming JSA for more than 12 months by 2,500 by the end of 2016. However, there were no effects on the number of individuals claiming other types of out of work benefits.

Impact on wellbeing (from valuation):

- The valuation analysis found that subsidised coverage had a positive impact on subjective wellbeing.
- Effect equivalent to £222.25 per year per premised upgraded (effect persists for at least one year).
- Significant variation by age:
  - Much larger uplift for people aged 16-35
  - Negative impact for people aged 36-64
  - No effect on over 65s
- Wellbeing impact larger for frequent internet users.

This element of the evaluation explored the effect on subjective wellbeing:

- Wellbeing valuation using administrative datasets (Annual Population Survey and Understanding Society), matched to Ofcom Connected Nations & BDUK MI data; used in cost-benefit analysis.

Source (Ipsos MORI, 2018)
Cost-Benefit Analysis Findings
(First Commission: Evaluation in 2017/18)
Total Costs (by 2016):

£848m total spend
- £789m on residential
- £59m on businesses

Unit cost of £211 per premise

(Assume that unit cost of residential and non-residential delivery are equivalent)

ESTIMATED COSTS TO JUNE 2016

<table>
<thead>
<tr>
<th></th>
<th>Estimated Share of Premises Upgraded</th>
<th>Number of Premises Upgraded</th>
<th>Unit Cost (£)</th>
<th>Total Cost (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>93</td>
<td>3,738,048</td>
<td>211</td>
<td>789</td>
</tr>
<tr>
<td>Non-Residential</td>
<td>7</td>
<td>282,999</td>
<td>211</td>
<td>59</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>4,021,047</strong></td>
<td><strong>211</strong></td>
<td><strong>848</strong></td>
</tr>
</tbody>
</table>
Benefits of non-residential delivery

Benefit 1: Firm productivity

£691.7m value of GVA attributable to the programme

- Estimated at £1,390 per firm receiving access to enhanced connectivity per annum
- Turnover per worker productivity proxy
- Only applied to firms that do not relocate (spatially stable firms)
- Assume effects do not rise or fall with time post installation
- Assume 60 percent additionality

<table>
<thead>
<tr>
<th>Effects On</th>
<th>Estimate Gross Benefit (£m)</th>
<th>Additionality</th>
<th>Estimated Net Benefit (£m)</th>
<th>Present Value of Net Benefit (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Productivity</td>
<td>1153</td>
<td>0.6</td>
<td>770.8</td>
<td>691.7</td>
</tr>
<tr>
<td>Reduced L/T Unem.</td>
<td>62.8</td>
<td>0.6</td>
<td>63.0</td>
<td>37.7</td>
</tr>
<tr>
<td>Total</td>
<td>1389.7</td>
<td></td>
<td>833.8</td>
<td>729.4</td>
</tr>
</tbody>
</table>

Benefits of non-residential delivery

**Benefit 2: Reductions in Long-term unemployment**

£37.7m value of GVA attributable to the programme

- Evaluation results indicate for every 10,000 premises upgraded, the number of long term JSA claimants was reduced by 6 in the year of installation
- Assume annual GVA produced by workers equal to £14,500 per annum (average wage of 25th percentile worker)

### ESTIMATED BENEFITS OF NON-RESIDENTIAL DELIVERY TO 2016

<table>
<thead>
<tr>
<th>Effects On</th>
<th>Estimated Gross Benefit (£m)</th>
<th>Additionality</th>
<th>Estimated Net Benefit (£m)</th>
<th>Present Value of Net Benefit (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Productivity</td>
<td>1153</td>
<td>0.6</td>
<td>770.8</td>
<td>691.7</td>
</tr>
<tr>
<td>Reduced L/T Unem.</td>
<td>62.8</td>
<td>0.6</td>
<td>63.0</td>
<td>37.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1389.7</strong></td>
<td></td>
<td><strong>833.8</strong></td>
<td><strong>729.4</strong></td>
</tr>
</tbody>
</table>

Benefits of residential delivery

Benefit 3: Estimated consumer welfare gains

£923.3m value of GVA attributable to the programme

Evaluation found effect equivalent to £222.25 per year per premises upgraded (effect persists for at least one year)

<table>
<thead>
<tr>
<th>Effects On</th>
<th>Estimated Gross Benefit (£m)</th>
<th>Additionality</th>
<th>Estimated Net Benefit (£m)</th>
<th>Present Value of Net Benefit (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Welfare</td>
<td>1742.6</td>
<td>0.6</td>
<td>1,045.5</td>
<td>930.2</td>
</tr>
</tbody>
</table>

Value for Money (to 2016)

£1661.7m in benefits  
£848m in costs  

\[ \frac{£1661.7m}{£848m} = 1.96 \]

Notes:

We know this BCR underestimates the benefits as full extent of public value benefits are yet to be assessed/realised

We also know that Phase 2 contracts are still on-going, as well as ever increasing take-up

Lessons Learned

Successes of first commission:

• Approach worked well: we were able to evidence the economic and digital divide benefits (additionality), as well as produce a robust cost-benefit analysis.

• We also started exploring the social and wellbeing benefits, albeit at an early point. It looks as if social benefits take a while to materialise.

• We tried new, innovative methods that worked well on the whole (e.g. linking MI data to internet provider subscriptions).

• Report published in August 2018: received very good press coverage, and is used in a range of ways eg Impact Assessments, BDUK Benefits Model update, developing new programmes.

• In addition, we repeated the ‘additionality’ analysis in-house using 2017 data, which corroborated the overall findings of the evaluation.

Lessons for the next commission:

• The evaluation proved to be more data-driven than originally thought: supplier-level data can be difficult to obtain

• Qualitative research will be used further in the second phase of the evaluation to understand how and why some benefits occurred: in-depth research with households has already shed light on new benefits such as using broadband for school homework; or issues around reliability and speed; this needs to be tested further
Any questions?
Email: Philip.ball@culture.gov.uk

Useful links:
Building Digital UK Broadband Benefits
The Green Book: appraisal and evaluation in central government
More Information

For info or further questions on this seminar and the activities of the JASPERS Networking Platform, please contact the JASPERS Networking and Competence Centre at the following email:

jaspersnetwork@eib.org

JASPERS Networking Platform:
www.jaspersnetwork.org

JASPERS Website:
jaspers.eib.org