

Research by:



Unlocking the digital potential of rural areas across the UK



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About Rural England CIC

Rural England's mission is to build the strength and resilience of rural England by helping to inform and engender better rural policy making. It does this by encouraging informed debate, providing independent research and evidence, supporting information exchange and building a network that draws together all those who seek to improve the social, economic and environmental well-being of rural England. For more information visit: <https://ruralengland.org/>

The project research team from Rural England CIC were: Brian Wilson (research consultant and the project manager); and Dr Jane Hart (research consultant).

About Scotland's Rural College (SRUC)

SRUC supports innovation and sustainable development in agriculture and the rural sector in Britain and internationally. It is one of the UK's leading agriculturally-focused higher education institutions, offering a unique blend of research, education and consultancy. SRUC's research and education activities operate from six campuses and eight farms and research centres across Scotland. For more information visit: <https://www.sruc.ac.uk/>

The project research team from SRUC were: Dr Jane Atterton (policy researcher); Steven Thomson (senior agricultural economist); and Mike Spencer (data manager and researcher).

About Amazon

Amazon.com opened on the World Wide Web in July 1995. The company is guided by four principles: customer obsession rather than competitor focus; passion for invention; commitment to operational excellence; and long-term thinking. Customer reviews, 1-click shopping, personalised recommendations, Prime, Fulfilment by Amazon, AWS, Kindle Direct Publishing, Kindle Fire tablets, Fire TV, Amazon Echo and Alexa are some of the products and services pioneered by Amazon. For more information visit: www.amazon.co.uk/about

List of contents

Foreword	1
Summary	3
1 Introduction	10
2 The economy of rural areas	17
3 Digital take up and use	25
4 Benefits from going digital	35
5 Constraints to going digital	42
6 Unlocking digital potential	49
7 Conclusions and recommendations	64

Appendices:

A Creating a UK rural definition	72
B Survey of rural businesses	76
C Estimating GVA impact	82
Bibliography	83
Acknowledgements	90

Rural business case studies:

Sitekit (Isle of Skye, Scotland)	24
Clear Mapping (Cornwall)	34
Write Services (Norfolk)	41
Denhay Dairy Farm (Dorset)	48
Juma Communications (Derbyshire)	63

Foreword



The internet is changing the way we communicate and interact with one another, the way we discover and fulfil the experiences, the interests and hobbies we enjoy, and the way we find and buy the products and services that we want and need.

It is helping to create a better connected world – opening up new opportunities, empowering more people to start and run businesses like never before, and providing access to the information, tools and networks to fulfil both personal and career ambitions.

Yet this is just the beginning of the dialogue. That is why at Amazon, we often say it is still day one. There is so much more to come and this could not be truer than for rural communities up and down the country.

Rural businesses already contribute a hugely significant £299bn in Gross Value Added (GVA) to the UK economy according to Rural England and Scotland's Rural College, and there are over 750,000 rural businesses across the UK.

At Amazon, every day we see opportunities for rural entrepreneurs transformed through e-commerce, better delivery services and growing access to fast broadband. There are now more than 10,000 rural businesses selling on [Amazon Marketplace](#), including small businesses and individuals, to grow their business online. A great example is Karen Riddick from Dumfries in Scotland. She left her day job after 16 years of employment, when her Fairtrade home furnishings company [Second Nature](#) started to take off. Evolving from being a Fair Trade B&B owner, buying furnishings from wholesalers to then selling its own Fair Trade home furnishings, Second Nature now exports homeware products around Europe and generates roughly £350,000 in annual turnover. It's not just selling online where the opportunity for rural businesses is great.

It's also the ability to harness the power of cloud computing to innovate and boost productivity in rural areas. Take IceRobotics, which uses [Amazon Web Services](#), our suite of cloud computing services. IceRobotics provides data collection and analysis products for monitoring dairy cow behaviour. They moved their systems into the cloud and grew their business by collecting, storing, and analysing cow behaviour data in the cloud with AWS and now can access over 50 million 'cow-days' worth of data and use AWS to tap into a tremendous amount of analytic power. By using cloud computing, IceRobotics provides customer dashboards so farmers can see alerts and visualisations of how their cows are moving to manage their herds.

But it's not just rural businesses that are succeeding through the digital economy. Rural consumers are also benefitting from access to the same innovative content and services as people in urban areas. With Amazon Prime, customers benefit from next day delivery, which even just five years ago would have been out of the ordinary but is now increasingly the norm. Customers also get access to Prime Video and Prime Music with original content, and are able to use cloud-based voice assistants like Alexa to connect their homes to the cloud.

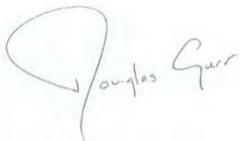
So it's clear to us what the benefits of the digital revolution can be for rural parts of the country – but it's still day one. We know where rural Britain can be, but the question is how do we get there? That is why we commissioned Rural England and Scotland's Rural College to undertake in-depth research looking at how to unlock the digital potential of rural areas.

As the report shows, there is an additional £12bn to £26bn of GVA waiting to be unlocked that can fast track the rural economy and ensure our country remains globally competitive.

We believe that realising this digital potential is the next chapter for rural areas, which will help to level the playing field between urban and rural areas. Digital services enable people living, working and running their businesses in rural areas to have the best of both worlds: the rural lifestyle with lower costs, less stressful commutes and beautiful scenery; combined with access to the same benefits as urban areas to cutting edge technology, business supplies and low-cost everyday essentials delivered to their door. That's why we launched the Amazon Academy programme with events dedicated to rural businesses to provide practical advice on how to use e-commerce to boost their revenue, productivity and exports. It's also why we support the Rural Business Awards, which is a great way to shine a spotlight on rural business success and ensure the sharing of best practices to enable more growth in rural areas.

So on behalf of Amazon, Rural England and Scotland's Rural College (SRUC) I would like to thank each and everyone one of the rural businesses up and down the country for helping to build the rural economy's digital future – it's great to see some of those rural businesses showcased in the report, who are innovating and pioneering to come up with new ways to make customer lives even better.

The ambition and entrepreneurial spirit is there right across our countryside, and we so hope to play our part in helping meet that ambition.

A handwritten signature in blue ink that reads "Doug Gurr". The signature is written in a cursive style with a large initial 'D'.

Doug Gurr
UK Country Manager
Amazon

Summary

Unlocking the digital potential of the UK's rural areas is important for rural businesses, for the future of rural communities and for the productivity of the UK economy as a whole.

The digital economy has clear potential to address certain inherent issues with rural geographies. Businesses can, for example, gain online access to wider markets and services, thus helping to improve their competitive position. However, to date, relatively little has been written about digital adoption by rural-based businesses in the UK.

So far most of the rural digital debate has centred on the issue of access to infrastructure: specifically, connectivity to broadband and mobile networks. What that debate has diverted attention from is questions about the take-up and use of digital technology, applications and services by businesses located in (the majority of) rural areas, where there is now reasonable infrastructure.

Research approach

The objectives of this research were: to better understand the rural digital economy as it currently stands (including business connectivity, use of digital devices and adoption of digital applications); to consider the benefits that accrue; to identify any key constraints to digital take-up; to assess the monetary digital potential within the rural economy; and to recommend actions that would help unlock that potential.

The research methodology had five main stages:

1. A literature review of existing information;
2. A rural analysis of relevant existing economic data sets;
3. A substantive survey of rural-based businesses (807 responses);
4. Interviews with rural business and technology experts; and
5. Estimating the economic impacts of the digital potential.

The four constituent parts of the UK each have their own (differing) rural definitions. In order to analyse data on a consistent basis, this project created for the first time a UK-wide definition of predominantly rural local authority areas, where at least half of the residents live in settlements containing fewer than 10,000 people. There are 117 local authority areas (out of 391) in the UK which fit this definition.

Rural business characteristics

Statistics were calculated about registered business units in predominantly rural areas of the UK (as defined by this project) from the 2016 Inter-Departmental Business Register, showing:

- There are almost 764,000 registered businesses in these areas¹;

¹ Using the ONS measure of 'local units', which counts different locations of multi-sited businesses. The alternative measure, which counts only business headquarters, understates rural activity.

- The rural economy has a similarly diverse mix of sectors as the whole of the UK. Exceptions are the higher proportion of agriculture/forestry/fishing businesses (14%) in rural than in urban areas, and the lower proportion of information/communications and professional/technical businesses;
- 90% of rural businesses are micro-businesses with 9 employees or fewer. There are proportionately fewer large and medium sized businesses in rural areas than elsewhere;
- However, more rural employees (29%) work in micro-businesses than do urban employees (19%);
- Furthermore, 22% of the rural labour force works from home, compared to 12% of the urban labour force;
- A high proportion of rural businesses (20%) have an annual turnover below £50,000 (UK figure is 17%) and a slightly low proportion of rural businesses (8%) have a turnover above £1 million (UK figure is 9%);
- In terms of productivity, predominantly rural areas contribute almost £300 billion to the UK economy, measured as Gross Value Added. However, at £20,500 per resident, productivity levels in rural areas are relatively low (UK figure is £25,400). This is reflected in low average wage levels in predominantly rural areas.

There is limited information available about unregistered businesses. Based on some Office for National Statistics figures, it is estimated there could be at least 900,000 in predominantly rural areas. These unregistered (for VAT or PAYE) businesses are additional to those in the statistics above.

Digital connectivity

Although not the main focus of this research, the extent to which businesses can access fast digital connections, particularly fixed broadband and mobile networks, is important.

Various initiatives, such as the Government's Superfast Broadband Programme, have provided substantial subsidy to extend the reach of digital networks into less commercially viable rural areas. Nevertheless, regulator, Ofcom, said that in 2017 almost a fifth of rural premises could not yet access a basic 10 Megabit per second (Mbps) internet connection.

According to the survey for this research the majority (59%) of businesses had a standard broadband connection. Almost one in five (19%) had a superfast connection. Many of the businesses rated their connectivity poorly for its speed (37%) or its reliability (25%). Fewer held positive views about these two attributes. Reliability is an issue which has not attracted as much policy attention as it probably warrants.

Research from Ofcom found that satisfaction with internet coverage was lowest amongst businesses located in remote rural areas and amongst people whose jobs require them to travel.

“With social media listing every flaw of modern day tourism businesses, and poor wi-fi being our guests’ main complaint, it is very clear to potential future bookers to give us a miss if good wi-fi is essential.” (Rural business quote)

Digital adoption and use

The survey for this research showed that the most important device for rural businesses was a smartphone (82%), closely followed by a laptop (79%). Most businesses rely upon a range of device types.

The survey also showed that rural businesses typically use digital for a wide variety of applications, most commonly for email and internet browsing. Other very widely reported uses are for online business banking, submitting business returns and accessing public services or information.

A majority use digital to promote their products or services, most commonly via social media. Some 22% are online sellers, either directly through their own website or indirectly through third party platforms. It is notable that cloud computing is used by 62% of respondents.

“The cloud has made flexible working a reality. I am not tied to the office.” (Rural business quote)

Almost a quarter (24%) of the businesses surveyed had exported during the previous year, with the EU the most common destination. The use of e-commerce for exports is growing, with 83% of exporters using it for at least some of their exports and 41% for all of their exports in the last year.

Rural businesses see digital as important to their future, there being strong agreement (for example) with statements about wanting to make more use of digital connectivity and its take-up being crucial to their business growth. Developments such as cloud computing, 5G mobile and the Internet of Things are widely considered relevant to future business growth.

There were some notable variations within the rural UK, including:

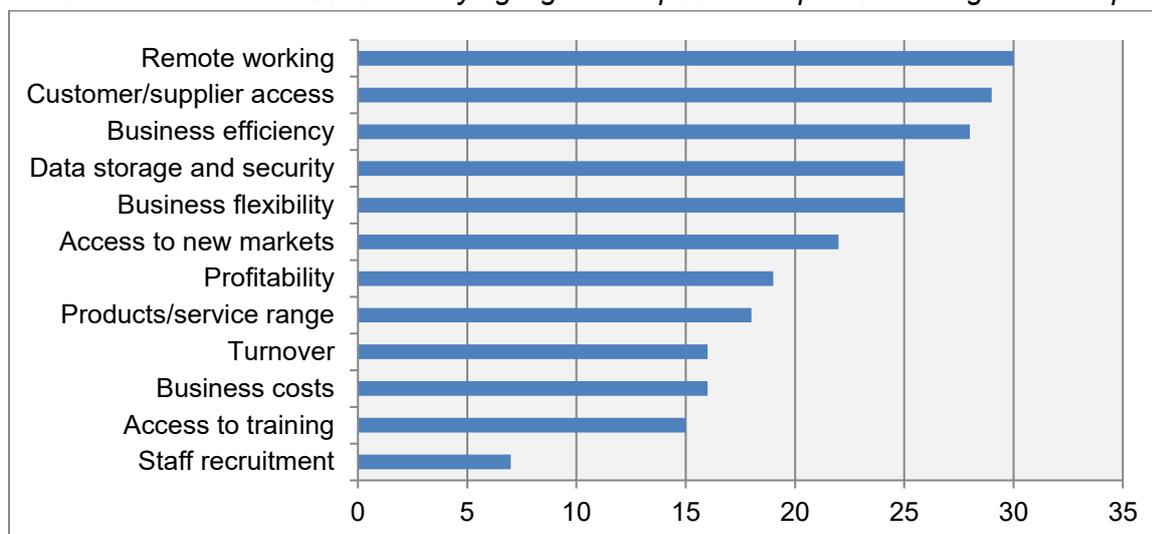
- Micro-businesses (but not one person businesses) are the least likely to have superfast connectivity;
- Superfast connectivity is most common in the insurance/finance and information/communications sectors and least common in the agriculture/forestry/fishing sector;
- The proportion of businesses with a superfast connection is lowest in Northern Ireland and Scotland. Adoption of applications such as cloud computing and remote working is lowest in the north of England.

Benefits of going digital

Survey respondents report a wide range of business benefits from their digital take-up. Across all of the impacts asked about, there are more rural businesses identifying a significant positive impact than identifying a significant negative impact.

Impacts most frequently mentioned as bringing significant benefit are: assisting remote working (30% of rural businesses), improving access to customers/suppliers (29%), improving business efficiency (28%), improving data storage and security (25%) and enabling more business flexibility (25%). A fair proportion of respondents also identified significant benefits in terms of business costs (16%), turnover (16%) and profitability (19%).

Per cent of rural businesses identifying significant positive impacts from digital take-up



Two factors, in particular, appear to influence the extent of business benefits. Those rural businesses which have superfast connectivity are much more positive (than those without) across the range of benefits. The other factor is size, with large and medium businesses (i.e. at least 50 employees) being more positive about the benefits than smaller businesses.

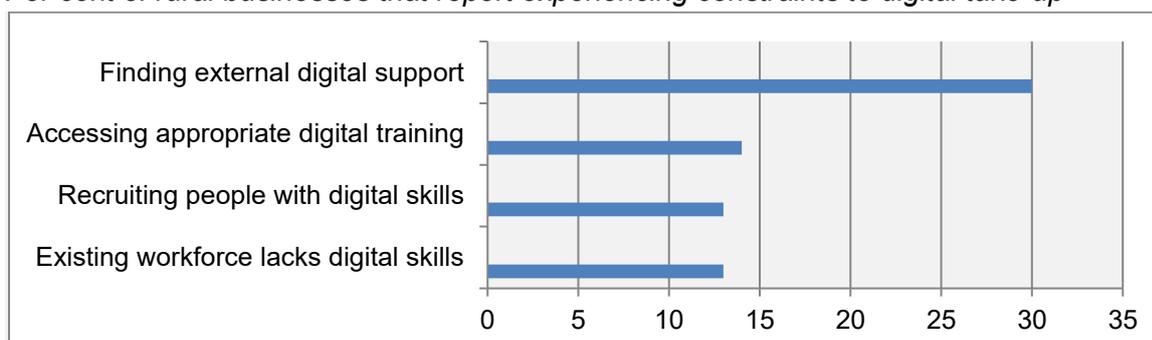
“Selling via online galleries gives me a huge marketplace that before the internet I could in no way have accessed. It also allows me to network, to find materials at the best prices and arrange couriers economically and quickly. I simply could not do without it.”
(Rural business quote)

Constraints to going digital

More than half the surveyed businesses (52%) reported that they had experienced one or more of the following constraints, reducing their ability for digital take-up:

- Difficulty in finding external/outsourced digital connectivity support (30%);
- Difficulty in accessing appropriate external digital/IT training (14%);
- Difficulty recruiting people with appropriate digital skills (13%);
- Their existing workforce lacking sufficient digital skills (13%);
- Other constraints (10%).

Per cent of rural businesses that report experiencing constraints to digital take-up



Business size was again influential. For micro-businesses finding external or outsourced digital connectivity support was a particular constraint. For medium and large businesses (who would be more likely to have in-house digital support) the main constraint is recruiting people with the required skills. Interestingly, one person businesses are less likely to be facing any constraints than micro-businesses.

Connectivity also made a large impact on the level of constraints that respondents reported, with businesses which have slower connections saying that they face more constraints to digital take-up.

Other issues raised by businesses on account of having slow or unreliable connections include reputational harm to their business, lost time or added stress experienced, an inability to work flexibly or on the move (because of poor mobile signals) and, in some cases, lost customer sales.

Unlocking digital potential

Digital potential across rural areas of the UK is estimated to be:

- At least £15 billion of additional business turnover per annum;
- At least £12 billion of additional Gross Value Added per annum.

Previous studies² have identified that businesses can be categorised across a wide spectrum in terms of their digital maturity, from 'digital pioneers' through to 'disconnected doubters'. Most businesses fall between these extremes, though are still either 'basic browsers' or 'tentative techies'.

This research project has similarly found that digital maturity varies among rural businesses. When estimating potential it is important to take this into account. Moreover, it should be acknowledged that any work to estimate benefits from greater digital take-up is subject to (data and method) limitations and must make various assumptions.

However, considerable effort was taken to ensure that estimates produced are reasonable. To that end, some earlier studies (not rural) which sought to place a value on digital benefits were examined, as comparators, with their results recalibrated to apply to predominantly rural local authority areas. Those studies include a high estimate, where businesses become world digital leaders, and a low estimate, where the sole improvement is an extension of superfast broadband networks. The estimates produced by this project (based on its survey data) reassuringly fall well within the range of the (recalibrated) earlier studies.

The estimates were based on data from the surveyed rural businesses, which was scaled up to the known business profile in predominantly rural local authority areas of the UK. In all, six different estimates were produced. Three of them were based on rural businesses' perceived recent turnover loss from digital constraints and three were based on their expected turnover gain if such constraints were removed. In each case the three estimates took account (respectively) of the profile of the businesses according to their size (number of employees), their turnover and their sector.

² Such as the Scottish Government's Digital Maturity Index (2015), which uses the terms quoted e.g. digital pioneers, basic browsers.

The six estimates all seek to measure the increase in annual business turnover in rural areas, if digital constraints could be overcome. They indicate that annual business turnover is likely to grow by at least £15 billion. The six estimates range from £15 to £34 billion.

Multiplier effect tables from the Office for National Statistics were then used to convert the turnover figures into estimates for the likely impact on GVA (productivity) in rural areas. Doing so indicates that GVA could increase by at least £12 billion per annum. The six estimates range from £12 to £26 billion. This would amount to a significant productivity boost to the UK economy.

Recommendations

This research concludes that rural businesses have, to a considerable degree, adopted digital technology as an integral part of their operations and most recognise the importance of going further in future. However, their ability to make more use of digital has been held back by certain constraints.

The public and private sector can help address these challenges and boost rural productivity by working together to deliver the actions below, which fall under five themes.

They take account of two key research findings. First, the greatest potential from increasing digital adoption in rural areas is to be had by assisting the bulk of ordinary small and micro businesses to up their digital game. Whilst technology-driven businesses should certainly not be overlooked, it is increasing digital adoption across sectors such as agriculture, retail, tourism, construction, leisure and business services which will pay the highest rural productivity dividend. It therefore makes sense to target support broadly and across sectors.

Second, the benefits from the public sector's sizeable investment in superfast and mobile networks will only be properly realised if other identified constraints to digital adoption are addressed in parallel. As noted above, setting aside the much-discussed connectivity issues, over half of rural businesses face some other type of constraint to digital take-up, which is holding back their performance.

The recommendations also acknowledge that various digital policy initiatives and programmes exist already. However, these tend to be nationwide and are not rural-specific. Rather than creating similar rural structures, the aim should be to ensure the existing national initiatives and programmes take full account of rural business needs – a process sometimes referred to as 'rural proofing'. This would overcome their tendency to be urban-focused or to overlook rural opportunities.

Recommendations for the private and public sectors to support the rural digital economy.

Theme: Simpler signposting to digital support and information

- i. Help businesses to find digital or IT support, by creating local directories of those who offer such services.
- ii. Help businesses to find appropriate local guidance and support about their digital needs (e.g. connectivity, training, e-commerce), by ensuring it is on a single portal. One good model is the Business Gateway DigitalBoost website.

Theme: Better access to support, including digital enterprise hubs

- iii. Create more digital enterprise hubs in rural towns which businesses can use or visit for better connectivity, start-up workspace, hot-desk space and digital training.
- iv. Encourage more small businesses to export, by promoting the opportunities afforded by e-commerce, including the option of using third party e-commerce websites.

Theme: Smarter digital training and skills development

- v. Help businesses to recruit to meet their digital needs, by local collaboration between employees and education providers, and by improving retraining opportunities.
- vi. Raise the level of digital skills within SMEs, by making short training courses and online tools more readily available to small business owners.
- vii. Encourage rural businesses to set aside resources for digital training for their employees, in order to improve productivity.

Theme: Faster business adoption of digital connectivity

- viii. Raise superfast broadband take-up by rural businesses, by reinforcing efforts to promote the business benefits.
- ix. Encourage businesses already using superfast broadband to champion it to their peers, providing real world examples of the benefits.

Theme: Stronger rural targeting by existing policies and strategies

- x. Ensure that rural businesses benefit fully from the Economic, Digital and Industrial Strategies as they are implemented across the UK. Examples of how this could be achieved include: having rural representatives sit on the Productivity Council and Digital Skills Taskforce; testing the Digital Catapult Centre model in a rural location; and designing the National Productivity Investment Fund so it targets rural areas.
- xi. Make support for digital growth a key objective within future (post-Brexit) rural business support programmes. There should be a dedicated rural strand within the Government's proposed Shared Prosperity Fund, capable of supporting digital skills and growth. This would recycle existing public funding.
- xii. Encourage larger technology-driven businesses to adopt policies promoting digital take-up in rural areas, by sharing their good practice and giving practical support to smaller businesses.

1. Introduction

1.1. Rationale for the research

Economic geography is changing. Any notion that the rural economy is dominated by land-based industries and by businesses serving local markets was always a simplification and is increasingly out-of-date. Equally, the idea that businesses selling into wider markets will struggle if they are not town or city based, where most of their suppliers and customers are, is increasingly questionable.

The growth of the digital economy has the potential to reduce, if not overcome, traditional rural constraints, such as distance from markets, poor access to business services and lost economies of scale. Rural based businesses may no longer be at the competitive disadvantage they once were.

Take, for example, Second Nature in Dumfries, Scotland. That B&B business evolved into a Fairtrade home furnishings company, which now exports homeware products around Europe through its online presence and generates some £350,000 in annual turnover. Similarly, Juma Communications is another thriving business, which imports and supplies specialist audio products such as earpieces, radio interfaces and military standard headsets from a converted farm building in the Derbyshire Dales.

There are also potential productivity benefits if rural businesses can generate efficiency gains by adopting digital technologies and applications. This could boost the rural economy, as well as the rural contribution to the nation's wealth.

So far, most of the rural digital debate has centred on the issue of access to infrastructure: specifically, connectivity to broadband and mobile networks. The roll out of such networks has been slower in (less or un-commercial) rural areas, with many premises still unable to access network speeds or reliability necessary for practical everyday use. Despite Government funded initiatives, such as the Superfast Broadband Programme, this continues to be a significant policy concern, as evidenced by current plans to introduce a broadband Universal Service Obligation (USO).

What that debate has diverted attention from, however, is questions about the take-up and use of digital technology, applications and services by businesses located in (the majority of) rural areas, where there is now reasonable infrastructure. Given the potential implications for business location, competitiveness and growth – not to mention any wider implications for job opportunities and productivity – this is perhaps surprising. It should be of significant policy interest, if the ambition in the UK Government's Digital Strategy (DCMS, 2017) is to be realised, that *every* business should be helped to become a "digital business".

1.2. Research aim and questions

This research focuses on businesses located in rural areas of the United Kingdom. Its overarching objectives are: to better understand the current position with respect to the rural

digital economy; to consider what additional economic value could be generated if digital potential were better exploited; and to identify key actions which could assist that journey.

Questions which this research seeks to explore include:

- How many rural businesses are connecting to fast digital networks?
- What are those businesses using digital technologies and applications for?
- What have been the business benefits that result from this digital take-up?
- How far are rural businesses engaged in e-commerce, including for exports?
- Are digital opportunities enabling businesses to relocate to or set-up in rural areas?
- Are digital opportunities enabling more flexible or home-working from rural areas?
- What, if any, are proving to be the main constraints to digital take-up in rural areas?
- What economic value might be released if those constraints could be removed?
- Does the picture vary significantly across business types, sectors or locations?

1.3. Research methodology

The evidence gathered for this research project was drawn from a number of primary and secondary sources. Its main elements were as follows:

Literature review: a literature search was undertaken, based upon existing knowledge within the research team, material recommended by external contacts and online document searches. This identified a fair-sized body of material, some of it from government or the public sector, some from academic or consultancy work, and some from other sources. That said, little existing information was identified which related specifically to digital adoption by rural-based businesses. Findings of a more general (non-rural) nature were nonetheless noted.

Data analysis: a rural definition for the UK as a whole was developed. This was applied to various existing datasets to generate some statistics describing the UK's rural economy and the degree of connectivity. The datasets in question were:

- Inter-Departmental Business Register, which contains information about the characteristics of UK businesses that are registered for VAT or PAYE (source, Office for National Statistics);
- Regional Gross Value Added data, which includes estimates for economic productivity at the local authority area level (source, Office for National Statistics);
- Connectivity data, which provides information about access to broadband networks for premises i.e. homes and businesses (source, Ofcom).

Business survey: a survey questionnaire was developed to collect evidence directly relevant to the research questions. This was targeted at owners and managers of all rural-based businesses. It was promoted by a large number of organisations and networks in England, Scotland, Wales and Northern Ireland, who have direct or indirect contact with the business community. These are gratefully acknowledged at the end of this report. Considerable use was also made of social media to publicise the survey to a wide cross-section of businesses. The online survey was hosted by YouGov and ran from 23rd July to 8th September 2017. In all 807 complete survey responses were received, which came from an appropriate cross-section of business sizes, sectors and locations.

Interviews: telephone interviews were conducted with twelve experts from across rural interest organisations and those involved with the tech industry. These interviews provided a chance to get behind the statistics, to explore the research questions and to hear about select local initiatives. The experts are acknowledged at the end of this report.

Case studies: a number of rural-based businesses that currently make use of digital connectivity and applications were interviewed. These have been written up as short case studies, which appear throughout the report. They are primarily intended to illustrate the research findings.

Economic impact: survey findings have been used about the current and potential values that rural businesses ascribe to their take-up of digital. This information and other data sources have been analysed to create quantitative estimates for the latent potential within the rural economy, if constraints to digital take-up could be overcome and if digital adoption was then enhanced. Capital Economics provided independent verification of this element of the research.

1.4. Definition of rural areas

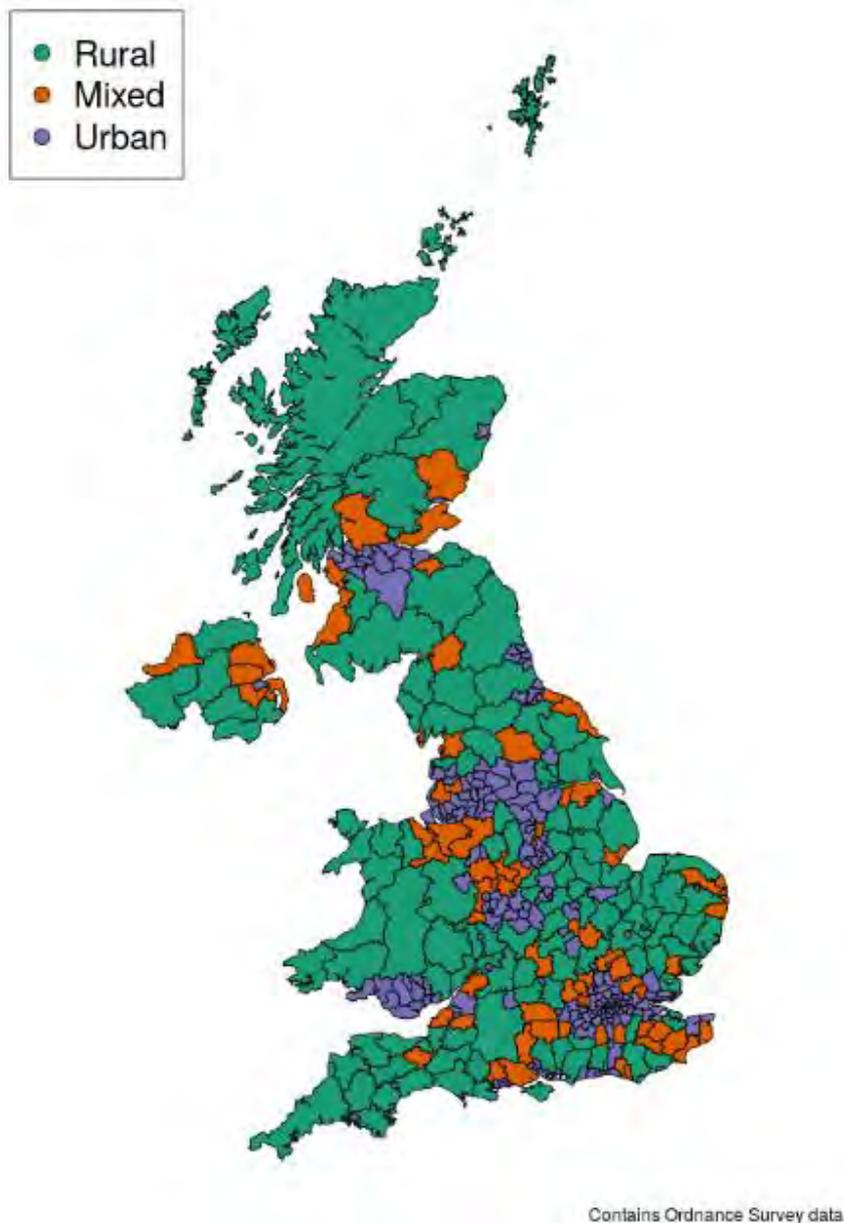
There is no official UK-wide definition of rural areas. The four different parts of the UK (England, Scotland, Wales and Northern Ireland) tend to refer to their own separate definitions and statistics. Although these offer a helpful start point, for the purposes of this research it was important to construct a UK wide definition. This has enabled the analysis of data sources on a consistent basis³.

The rural definition used for this research project is those local authority areas where at least 50% of residents were living in settlements with a population of fewer than 10,000 at the time of the 2011 Census. This population threshold covers isolated dwellings, hamlets, villages and small towns. There are 117 such local authority areas (out of a total 391) which meet this definition in the UK. These 'predominantly rural' areas are shown in green on the map below. Almost 14.6 million residents live in these areas, according to 2015 population estimates produced by the Office for National Statistics.

The areas shown on the map as 'mixed' have mostly urban populations, but the population living in smaller settlements is still significant, being between 26% and 49% of the total. The areas shown on the map as 'urban' have no more than 25% of their population living in smaller settlements.

³ One inconsistency remains in this approach, which is the inclusion of so-called 'hub towns' within the rural definition in England. This is explained further at appendix A.

Map 1: Local authority areas which have been defined as predominantly rural



It is accepted that local authority areas cover fairly large expanses which typically include both rural and urban settlements. However, they are the smallest geographic scale at which data analysed by this research is readily available. Defining those which are 'predominantly rural' in terms of their population and settlement pattern is thus a practical solution.

More information about the rural areas definition created for this research project can be found at appendix A.

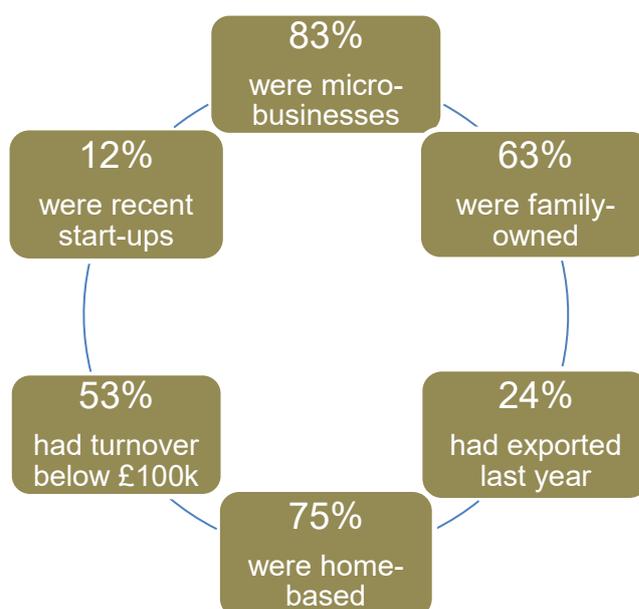
1.5. Survey definition of rural businesses

For the purposes of the survey specifically, responses were sought from businesses that identified themselves as being located in a rural area. These could be from any sector, including land-based businesses, but also covering those in retail, manufacturing, financial services, the creative sector and others. Responses were also encouraged from businesses

of different types (from PLCs to social enterprises), of different sizes (from sole traders to larger enterprises) and of different ages (from recent start-ups to established firms).

Businesses responding to the survey may differ from those covered by the rural analysis of existing data sets described at 1.3 and 1.4 above, in two respects. First, they will include some businesses at rural locations within local authority areas that are not classified as predominantly rural. Second, they include many businesses that are unlikely to be registered for VAT or PAYE given their small size. The Office for National Statistics estimates that 55% of all UK businesses are unregistered.

1.6. Characteristics of business survey respondents



Characteristics of the businesses responding to the research survey were as follows:

- **Industry sectors:** the largest share came from agriculture/forestry/fishing (15%), professional/technical services (13%), accommodation/food services (10%) and information/communication services (10%);
- **Employees:** a third (33%) consisted of just the owner. An additional 50% were also micro-businesses, with no more than nine employees;
- **Turnover:** just over half (53%) had a turnover below £100,000 in the last financial year and just over a quarter (27%) had a turnover below £25,000. However, 10% had a turnover of at least £1,000,000 in the last financial year;
- **Age:** the businesses had existed for varying periods of time. 12% were start-ups created in the last two years, whilst 43% had existed for up to ten years and 11% had been operating for at least fifty years;
- **Ownership:** a clear majority (63%) were family-owned businesses – a figure which includes sole traders;
- **Working base:** moreover, a very clear majority (75%) described themselves as home-based businesses;
- **Exporting:** almost a quarter (24%) exported goods or services in the last year;

- *Relocation*: 16% had relocated their business during the last five years, though many of the moves were fairly local; and
- *Geography*: businesses came from right across the UK, including Scotland, Wales, Northern Ireland and all regions of England. Unsurprisingly, a large majority of responses came from businesses in England.

Overall, these survey respondents represent a broad mix of businesses. Indeed, in many key respects they represent a similar mix to the total population of rural-based businesses, according to official statistics.

As well as details about the businesses, individual respondents provided some demographic characteristics about themselves:

- *Position*: a clear majority (72%) were either business owners or partners, with directors making up much of the remainder;
- *Gender*: slightly more of them (54%) were male than were female; and
- *Age*: more came from older than from younger working age groups, with the largest group (50%) being those aged 55 or over.

More detailed information about the survey can be found at appendix B.

1.7. Definition of the digital economy

“The digital economy refers to an economy that is based on digital technologies, although we increasingly perceive this as conducting business through markets based on the internet and the world wide web.” (The Chartered Institute for IT)

In practical terms, for this research project the digital economy has been taken to include:

- Digital connectivity: largely through businesses accessing fixed broadband and mobile infrastructure networks;
- Digital technologies: through the use of devices (hardware) such as PCs, laptops, smartphones and tablets; and
- Digital applications: through uptake of processes or means such as website development, social media, online selling or e-commerce, cloud computing and holding virtual meetings.

Clearly businesses can engage with the digital economy at very different levels. Those in the tech sector may represent one end of this spectrum while businesses only using email and internet searches may represent the other end.

1.8. Research team and acknowledgements

This research was undertaken by a joint project team from Rural England CIC and Scotland’s Rural College (SRUC). It was commissioned by Amazon UK. The questionnaire survey was hosted by YouGov. Further advice was received from Professor Sally Shortall at the University of Newcastle (who has significant knowledge of Northern Ireland) and from staff at the Countryside & Communities Research Institute at the University of Gloucestershire.

Particular thanks are due to the interviewees from rural-based businesses, rural stakeholder organisations and the tech sector. Also, to the many organisations who helped promote the survey and the businesses who spent time completing the survey. A more complete set of acknowledgements appears at the end of this report.

2. The economy of rural areas

2.1. Business numbers

Data from the 2016 Inter-Departmental Business Register (IDBR) was analysed to generate statistics about local business units in the local authority areas defined as predominantly rural. This allows comparison with the two other types of local authority area: i) those defined as urban; and ii) those defined as mixed.

As noted earlier, the IDBR covers only businesses which are registered either for VAT or for PAYE. It thus excludes very small businesses which are neither VAT registered nor employ any staff. The statistics presented here relate to 'local business units'. Businesses may have more than one local unit if operating from multiple sites (though the great majority only have one unit)⁴.

The analysis for this research project shows there were 763,900 local units of registered businesses located in predominantly rural areas of the UK. They comprise a quarter of all such businesses across the UK.

Table 1: Number of local units of registered businesses, by area type (2016)

Type of area	Number	Proportion (%)
Rural	763,900	25%
Mixed	429,010	14%
Urban	1,817,150	60%
UK total	3,010,060	100%

Source: IDBR data from Office for National Statistics. Figures may not add exactly due to rounding.

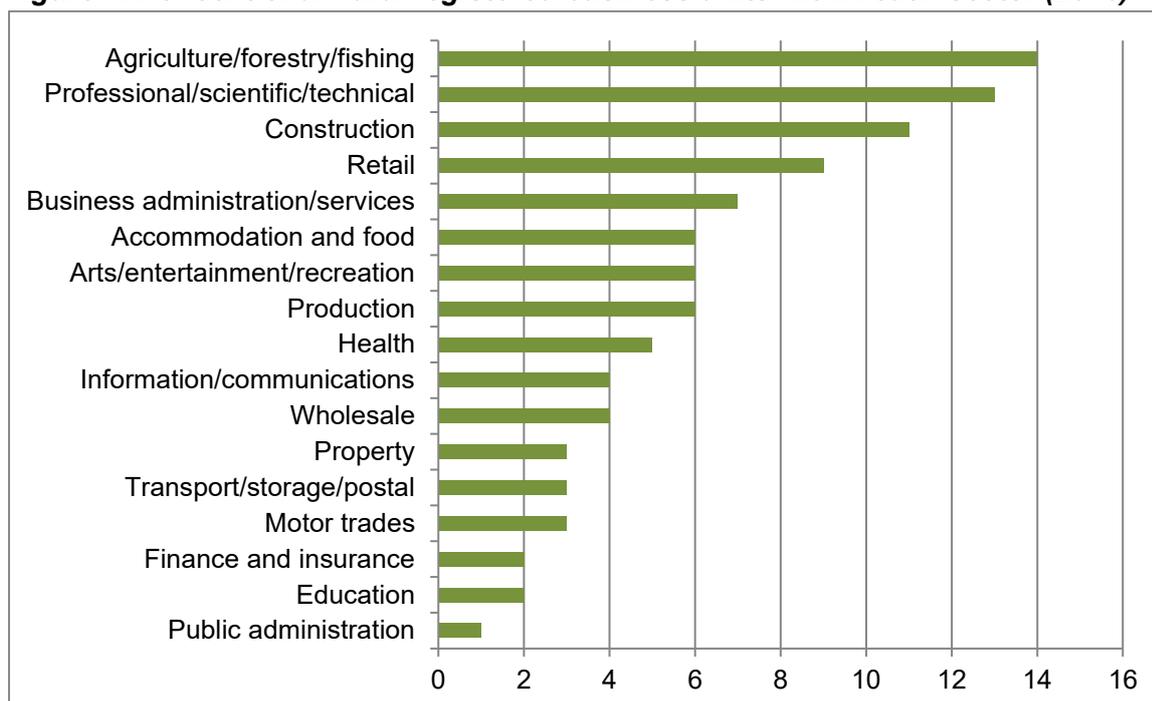
There is no comprehensive record of unregistered businesses. The Office for National Statistics has, however, estimated that 55% of all businesses are unregistered. Given that estimate, there could be in the order of 900,000 further unregistered businesses in predominantly rural areas.

2.2. Industry sector

The analysis of IDBR data shows that the rural economy is diverse. It consists of businesses from across the different economic sectors, as illustrated by figure 1 below. Agriculture/forestry/fishing is the sector with the most units in predominantly rural areas (14% of the total). It is closely followed by other sectors, namely: professional/scientific/technical (13%); construction (11%); and retail (9%).

⁴ 'Local units' is arguably the most appropriate IDBR measure, since multi-site businesses may be headquartered in urban areas, whilst having local units in rural areas. It thus ensures that such businesses and their rural employment are captured in the statistics.

Figure 1: Per cent of all rural registered business units within each sector (2016)



Source: IDBR data from Office for National Statistics. Figures may not add exactly due to rounding.

This sectoral mix of business units is not dissimilar to that for the UK as a whole. As such:

- The only sector which (by comparison) is notably over-represented in predominantly rural areas is agriculture/forestry/fishing; and
- The only two sectors which (by comparison) are notably under-represented in predominantly rural areas are information/communications and professional/scientific/technical.

2.3. Size by employee numbers

The rural economy of the UK is heavily dominated by small businesses. Some 90% of all local units of registered businesses can be classified as micro-businesses. That is, they have a maximum of nine employees. Only 0.2% of them would be too large to classify as SMEs (or small and medium sized businesses with a maximum of 249 employees).

Table 2: Local units of registered businesses, by number of employees (2016)

	Predominantly rural	All of the UK
Micro (up to 9)	89.9%	89.1%
Other small (10 to 49)	8.6%	8.9%
Medium (50 to 249)	1.2%	1.6%
Large (250 or more)	0.2%	0.4%
	100.0%	100.0%

Source: IDBR data from Office for National Statistics. Figures may not add exactly due to rounding.

As table 2 shows, this is not so very different from the wider UK picture. Micro businesses are slightly more important and larger businesses are slightly less important in predominantly rural areas than they are elsewhere.

There is, however, a more obvious rural-urban difference if (rather than counting businesses) we count the proportion of employees who work in small businesses. Defra analysis for England finds that 29% of rural employees work in micro businesses, the urban comparator being just 19% (Defra, 2017). Scottish Government (2015) analysis shows that 39% of employees work in micro-businesses in remote rural parts of Scotland.

The IDBR figures also mask the significance of businesses with no employees (or just an owner). Analysis of the Longitudinal Small Business Survey by the University of Newcastle (Phillipson et al, 2017) found that around three-quarters of SMEs may have no employees. This high figure includes many unregistered businesses including sole traders. Potentially, this has implications for digital uptake, if such businesses lack sufficient skills, time or funds.

2.4. Home working

Working from home would appear to be a feature of particular importance to the rural economy. Analysis of England (only) data from the 2013 Labour Force Survey looked at those who work from home for at least half their working week. It found that almost one million people worked from home in rural areas or 22% of the rural labour force (Defra, 2017). This compares with just 12% of the urban labour force.

Indeed, according to the Defra analysis, the highest levels of home working – 33% of the labour force – are to be found in the smallest rural settlements, which are hamlets and isolated dwellings. It also appears that home working has been growing at a faster rate in these very small rural settlements than elsewhere.

These figures are similar to those quoted in Rural Scotland Key Facts 2015, which show 21% home working in accessible rural areas and 27% home working in remote rural areas.

This prevalence of home working could be seen as underlining the importance of digital connectivity in rural areas and the digital potential within the rural economy.

2.5. Turnover

The typically small size of rural businesses is mirrored by their financial turnover. IDBR data for registered businesses shows that 42% of them had a turnover of less than £100,000 in the previous financial year. At the upper end, almost 8% had a turnover which exceeded £1 million in their previous financial year and just 1% had a turnover exceeding £10 million.

Table 3: Local units of registered businesses, by turnover in last financial year (2016)

	Predominantly rural	All of the UK
Up to £49,999	20.0%	17.0%
50,000 to 99,999	22.1%	23.6%
100,000 to 499,999	43.0%	43.2%
500,000 to 999,999	7.1%	7.1%
1,000,000 to 9,999,999	7.0%	7.8%
10,000,000 or more	0.8%	1.2%
	100.0%	100.0%

Source: IDBR data from Office for National Statistics. Figures may not add exactly due to rounding.

Table 3 shows that, whilst businesses in predominantly rural areas are not so very different from those across the UK, they are somewhat more likely to have a small turnover and somewhat less likely to have a large turnover.

2.6. Productivity (GVA)

The Office for National Statistics produces productivity data in the form of Gross Value Added or GVA⁵. Estimates of GVA up to 2015 have been published at the local authority level, so this research has been able to analyse GVA for the predominantly rural areas.

It finds that GVA in predominantly rural areas of the UK was almost £300 billion during 2015. Just over £200 billion of GVA was additionally allocated to mixed local authority areas, which contain significant rural parts.

By this productivity measure predominantly rural areas were responsible for roughly 18% of the UK economy. This was an important contribution. Nonetheless, it was less than the (22%) share of UK population living in predominantly rural areas, indicating there is scope to increase that contribution if productivity can be brought nearer to the national average.

Table 4: Gross Value Added productivity measure, by area type (2015)

	GVA in £ billions	Share of UK GVA
Rural	£299 bn	18.1%
Mixed	£207 bn	12.5%
Urban (including London)	£1,145 bn	69.4%
Urban (excluding London)	£766 bn	46.4%
UK total	£1,651 bn	100.0%

Source: Office for National Statistics productivity data. Figures may not add exactly due to rounding.

One other way to explore this data set is to look at GVA per head (i.e. per resident) in the predominantly rural areas. That was almost £20,500 during 2015. This is less than in mixed and (especially) urban areas, and was nearly £5,000 below the GVA per head figure for the UK as a whole. That said, both urban and UK figures are boosted by particularly high GVA levels found in Greater London. If London is taken out of the equation, the rural productivity gap narrows, but it does not disappear.

Table 5: Gross Value Added per head, by area type (2015)

	GVA per head (£s)	GVA per head rise 2005-15 (%)
Rural	£20,472	+25.4%
Mixed	£22,959	+23.0%
Urban (including London)	£27,587	+26.1%
Urban (excluding London)	£23,349	+21.9%
UK total	£25,351	+25.8%

Source: Office for National Statistics productivity data. Figures may not add exactly due to rounding.

⁵ GVA is the value of goods and services produced, minus the value of materials and inputs used in their production.

This 'rural productivity gap' is no doubt one explanation behind the lower than average wage levels that analyses find in rural areas (see, for example, Defra 2017).

Table 5 above also shows that GVA per head has risen by a quarter in predominantly rural areas over the decade 2005 to 2015. At first glance this appears to be just off the pace of GVA growth in urban areas and the UK as a whole. However, again, if Greater London is removed from the equation predominantly rural areas can be seen to have performed fairly well, outpacing GVA per head growth in both mixed and urban areas.

2.7. Connectivity

"It's like the coming of the Victorian railways. That's how important [digital connectivity] is: that's the analogy. But it will happen in a very much shorter period."
(Graham Long, Broadband for Rural Devon and Somerset)

A much debated topic has been connectivity in rural areas or, more specifically, the extent to which businesses and households can access fast broadband and mobile networks.

Commercial roll out of broadband networks has focussed on urban centres, where economies of scale can be achieved by the network providers. Rural areas, where network infrastructure must stretch over longer distances and where it serves fewer customers, have proved financially challenging. The most significant public sector intervention has been the Superfast Broadband Programme, managed by Broadband Delivery UK within the Department for Digital, Culture, Media and Sport (DCMS). Under this, £1.7 billion has been invested to subsidise roll out into uncommercial areas. The target has been to make superfast download speeds (of at least 24 Megabits per second or Mbps) available to 95% of premises by the end of 2017 – a target which has now been hit.

The main mechanism for extending the reach of mobile phone networks has been the licensing agreements negotiated in 2014. Under these agreements all four UK providers (EE, O2, Three and Vodafone) must provide mobile voice services across 90% of the UK land mass by 2017⁶. The 4G coverage licence that O2 purchased states that its 4G coverage should reach 98% of all premises.

According to the Connected Nations 2017 report from telecoms regulator, Ofcom, around 1.1 million or 4% of UK premises could not at that stage access a standard (or 10 Mbps) broadband connection – a download speed it considers to be the minimum to fulfil basic online needs. These premises were largely in rural areas, where Ofcom said that almost a fifth were unable to access such a connection. In Scotland the picture was particularly challenging, with 27% of rural premises unable to get 10 Mbps.

As Ofcom explain, there are two underlying issues for rural connectivity. One being that networks have not yet been broadband-enabled in all areas. The second is that, even where they have been, there can be premises located far from a network exchange or street cabinet. However fast the signal on the fibre network running to these nodes, that speed decays after given distances if it travels onwards by copper wire to individual premises. The

⁶ Users may experience coverage nearer to 80% or 85%, due to local features that can block signals.

number of premises far from an exchange or street cabinet is particularly high in rural parts of Northern Ireland.

The Connected Nations report also presents findings about mobile coverage. It is noted that both voice service and mobile data service coverage has improved markedly. There are, however, particular coverage issues in Scotland and Wales with their large rural land masses. There are also problems with the indoor signal in many rural areas, where half of all UK rural premises cannot get a voice service from all four network providers. Table 6 is based on 2016 figures, as the rural figures published for 2017 are more limited in scope.

Table 6: Connectivity statistics for rural areas of the UK (2016)

Key connectivity measures	Per cent
Proportion of premises with superfast broadband available	59%
Proportion of premises with standard broadband available	75%
Proportion of premises with mobile indoor voice service from all four operators	50%
Proportion of geographic area with mobile voice service from all four operators	64%

Source: Connected Nation 2016 report from Ofcom

The specific issues for those in highly rural locations were highlighted in a 2016 survey of its members by the National Farmers Union (NFU). They reported that only 6% could access superfast download speeds, whilst more than half (56%) were getting speeds of less than 2 Mbps. On a more positive note, the NFU found that mobile phone coverage had improved, with 75% of members surveyed having 4G coverage (albeit, in many cases, only on parts of their farm). The expansion of mobile networks is equally seen by rural stakeholder organisations as bringing particular benefits to the tourism sector.

“We are a tourism business. Our international trade has increased by 40%, bringing trade to the UK. But our digital signal is so appalling guests just cannot believe it or understand it. They want to stay in touch with family and friends while they travel, and to share their experiences – plus watch their favourite programmes and films through devices.”
(Business survey respondent)

The policy challenge, now, is how to deliver broadband access to the final 5% of premises⁷. At UK Government level DCMS plans to introduce a Universal Service Obligation (USO) giving all premises the right to request provision of a 10 Mbps connection, though in locations with a high connection cost the requesting business or household would need to contribute. This would not involve public funding, though the Government has recently made some further funding available for broadband infrastructure through its Rural Development Programme. In Scotland the Reaching 100 programme aims to deliver full superfast broadband coverage by 2021.

Those interviewed for this project expressed some differing views about the severity of the rural connectivity issue. Most, though, considered it a constraint for businesses across various sectors. As one put it, for many rural businesses connectivity enables visibility to a

⁷ DCMS say it is likely to be less than 5%, due to recent investment by various providers and to re-invested income where take-up has been high in areas networked as a result of public subsidy.

large enough customer base. Two further messages came through from those expert interviews. First, a widely held view that rural access to broadband and mobile networks will continue to improve. At least one interviewee felt that the roll out of 4G (and, in due course, 5G) mobile networks could be really important in this regard. Second, that said, many acknowledged that while the different levels of connectivity in rural and urban areas ought to shrink, it was unlikely they would ever disappear.

Case study: Sitekit, Isle of Skye

Interview with Madelon (or Maddie) Kortenaar (Marketing Manager)

Sitekit is a technology company with its headquarters in Portree, Isle of Skye. It provides consultancy and software development services around identity, inter-operability and digital health.

Sitekit's founder and Chief Executive, Campbell Grant, is from the Isle of Skye and the company traces its roots from Bambi Engineering, which was established in Portree in 1989 providing computer control systems for the oil industry. From those small beginnings the business grew and evolved. It now employs over 50 people and has offices in Portree (its headquarters with around 20 employees), Banbury, Edinburgh and London.

Many of Sitekit's clients have come from the health sector, for which it provides a number of specialist products including:

- The 'eRedbook' – a digital version of the Personal Child Health Record given to new parents in the UK, to manage the health and development of their child in partnership with health professionals;
- The Clinical Knowledge Support Portal – which offers quick access to essential clinical information and imagery for GPs and other clinicians; and
- The Self Care Digital Platform – a digital network that securely connects citizens, carers and health professionals.

Cloud technology has enabled the company to grow quickly over the last year and its client base has expanded to include large national and international organisations, national and local government, finance and professional services. Much of that growth has been in its urban offices which offer close proximity to major clients, superfast broadband, and where it can be easier to recruit skilled personnel. However, "improving connectivity to the Islands" also enables the company to remain committed to Portree where its headquarters and customer support services are based.

By providing master classes in local schools they demonstrate to the local community the benefits and opportunities presented by digital technology and thereby hope to attract more local young people into the sector.

Maddie says that its Isle of Skye roots remain very important to this fast-growing company. "We're proud of where we come from and also proud of where we've got to!"

3. Digital take up and use

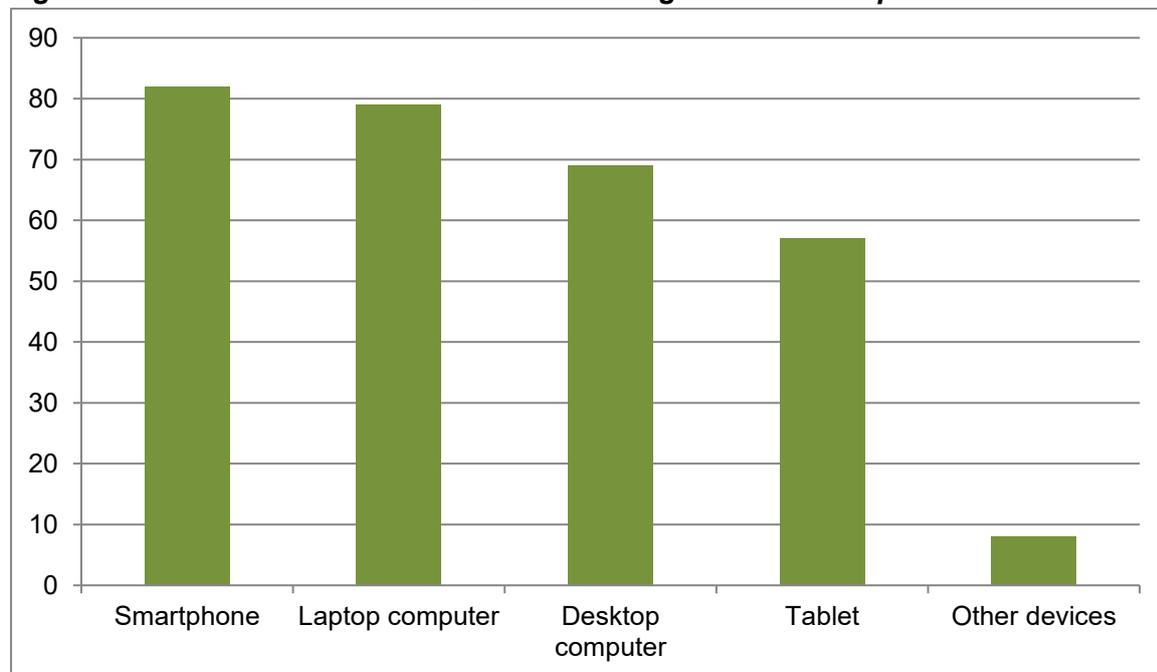
“The business relies on connectivity for communications, transactions and often for the preparation of products, such as reports, data and information. It wouldn’t function efficiently without connectivity and digital technologies.” (Business survey respondent)

3.1. Digital devices used

Respondents to our survey were asked which digital devices were important to the success of their business (figure 3).

The most important device for them was a smartphone (82%), followed closely by a laptop computer (79%). Clearly, though, many of these rural businesses rely upon a range of technologies and attach importance to three, four or even five types of digital device.

Figure 2: Per cent of rural business considering devices as important to their success



Source: project survey of UK rural businesses. Base: 807 responses

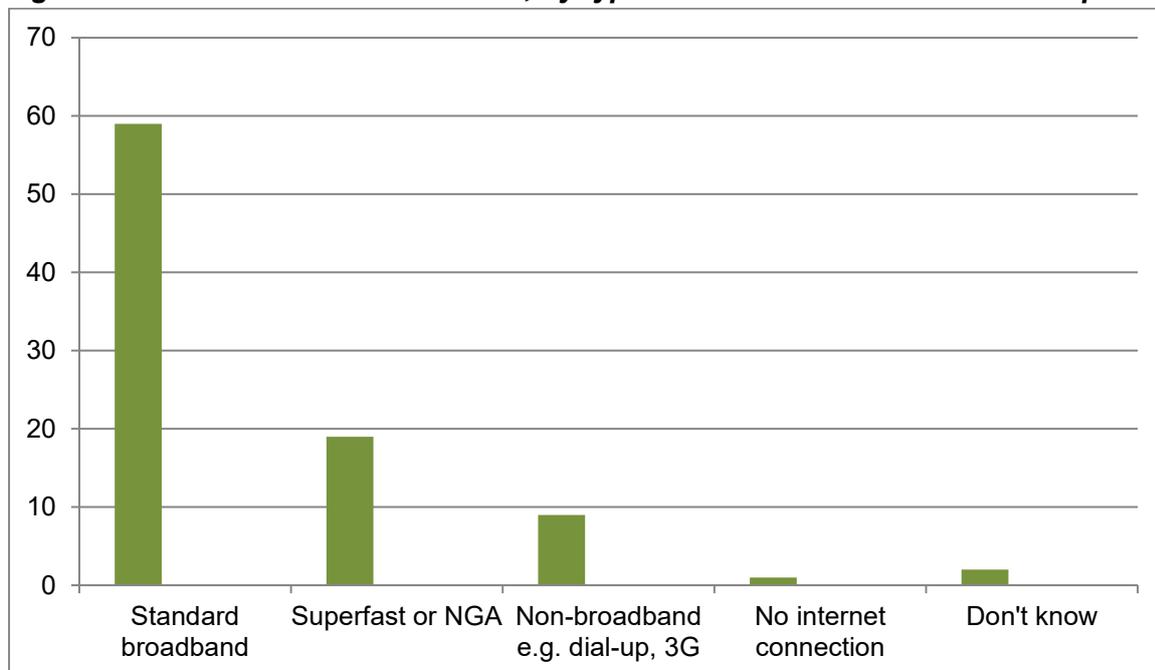
3.2. Type of internet connection

Survey respondents were also asked about the type of internet connection that their business had at its main premises (figure 4).

By far the most common type for these rural businesses was a standard broadband connection (59%). Respondents will doubtless have interpreted the phrase ‘standard broadband’ in slightly varying ways, though the question wording specifically differentiated it from superfast or NGA connections and from slow dial-up connections. In most cases respondents were likely referring to internet connections that come with standard packages from telecoms providers.

Almost one in five (19%) of the respondents said that their business premises had a superfast or NGA internet connection of at least 24 Mbps. This is very close to the 18% superfast broadband take-up figure which was reported for rural businesses in Ofcom's Connected Nations 2016 report.

Figure 3: Percent of rural businesses, by type of internet connection at main premises



Source: project survey of UK rural businesses. Base: 807 responses

Other literature on this topic indicates that uptake of superfast connectivity is related to business size. For example, the evaluation of the Broadband Wales Programme (SQW, 2016) found that take up of superfast broadband had grown quite quickly as infrastructure in rural areas was upgraded, but that this trend was more marked for larger than for smaller businesses. The survey for this research paints a more nuanced picture, with single person businesses taking up superfast connectivity to a surprising degree, but other micro businesses (with up to 9 employees) falling behind.

The evaluation of the Superfast Cornwall programme (SERIO, 2015) provides some insight as to why businesses do not upgrade to superfast connectivity when it becomes available. The two main reasons given were that: they did not think it was yet available in their particular area; and they did not consider they needed such a high-spec connection. Interestingly, only one respondent said lack of awareness of superfast broadband was the reason.

Arguably, the findings in the SERIO report mirror the view articulated by some of the experts interviewed in this study, that for most rural businesses a standard broadband connection is probably sufficient. Most are not carrying out online tasks that actually require superfast speeds. However, other experts cautioned that expectations and applications are evolving fast and the infrastructure in rural areas needed to be future proofed.

Some further findings about connectivity appear in the later chapter about constraints to digital take-up.

3.3. Quality of internet connection

The surveyed rural businesses were also asked to rate the quality of their internet connections, in terms of both speed and reliability. This was irrespective of whether those connections were made via a fixed (phone) line, from a mobile or some other means e.g. wi-fi, satellite.

Using a scale from +5, for very good, through to -5, for very poor, a sizeable proportion of respondents (37%) rated their internet connection speed as either a lowly -5 or a -4. This can be compared with a much smaller 13% who rated their internet connection speed particularly positively, as either a +5 or a +4. Nonetheless, the largest group were those who did not award a particularly positive or negative rating, scoring their connection speed in the range +3 to -3.

Turning now to views about internet connection reliability, a quarter (25%) of the respondents rated this as a significant concern, as either -5 or -4. This compares with 15% who rated the reliability of their internet connection particularly positively, as either +5 or +4. Once again, the largest group were those who gave more neutral ratings for reliability, in the range from +3 to -3.

The policy focus has tended to focus upon connection speed. This survey indicates that, whilst that remains the larger issue, there is also concern about reliability. This is likely to include concerns about connections that drop and connection speeds that fluctuate. Indeed, this point is one backed up by our interviews with rural stakeholder organisations.

“Good digital connectivity allows rural businesses to compete in the UK and globally, but in reality differential provision always results in winners and losers.”
(Gerwyn Evans, Visit Wales)

One interesting finding from a report for Ofcom by Jigsaw Research (2017) was that satisfaction with internet coverage and reliability was lowest among businesses located in remote rural areas and among people whose jobs require them to travel.

3.4. Main digital connectivity uses

The project survey also asked what rural businesses are using their digital connectivity for. Their answers show it is typically used for a wide range of activities which span management processes, product promotion and sales. Indeed, most types of connectivity use asked about in the survey question were relevant to most of the responding businesses.

Unsurprisingly, the most common use of all is for email and internet browsing. Other very common uses are online business banking, submitting business returns (not least to HMRC) and accessing public services or information. If the three types of website use that were

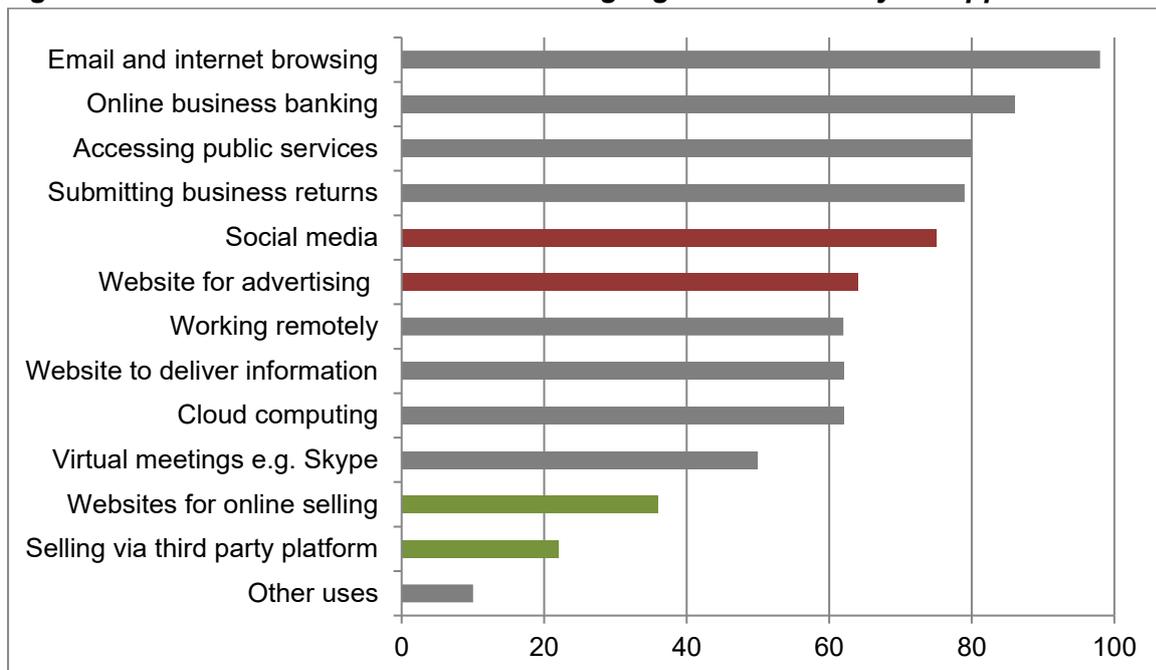
measured (for advertising, for information provision and for selling) are combined, we can say that 81% of the rural businesses have their own website.

A majority of these rural businesses use connectivity for activities which promote their products or services (shown in red on the chart below). It is notable that the most common of these is use of social media, which comes in ahead of advertising on business websites.

Whilst it is a minority that engage with online selling – directly through a business website or indirectly through third-party platforms (shown in green on the chart below) – such activity still represents a sizeable share of the survey respondents, not least since it will only be of relevance to some of them.

The remaining digital uses (shown in grey on the chart below) relate largely to operational or management processes, which save time with communications, information searches, form filling and financial transactions. The inference is that, as much as anything, digital take up is driving business efficiency.

Figure 4: Per cent of rural businesses using digital connectivity for applications



Source: project survey of UK rural businesses. Base: 781 responses

One particular result worth highlighting is that 62% of the rural businesses now use cloud computing as a means for storing files or processing tasks. Whilst this figure cannot be disaggregated too far, the use of cloud computing appears to be most common in sectors such as business support services, information/communications services and public administration.

“The cloud has made flexible working a reality. I am not tied to the office.” (Business survey respondent)

A cutting edge and previously written-up example is IceRobotics, a business which provides cloud computing services to the farming sector, collecting and analysing data about dairy cattle. By using cloud computing alongside sensor technology they are able to monitor cow fertility and health, providing alerts and visualisations so that farmers can manage their herds more productively.

Another survey result of interest is the 22% of rural businesses who sell via third party websites (such as Ebay, Amazon, Etsy, notonthehighstreet.com, Gumtree, Airbnb, TripAdvisor and Alibaba), rather than selling directly to customers themselves. A good many of these fall within the retail sector, the accommodation/food sector and the arts/entertainment/recreation sector.

These rural survey results are broadly in line with findings from a national report published by the former Department for Business Innovation and Skills (2015). It found that almost all SME businesses used emails and that use of e-commerce (online selling) was growing, though was still only used by 22%. However, our survey results show higher digital use than the 2015 Digital Economy Maturity Index produced by the Scottish Government. It may be that it's lower percentages for business websites, social media and cloud computing can be explained by expanding use in two years since work on the index was undertaken.

3.5. Exporting with e-commerce

Almost a quarter (24%) of the businesses surveyed had exported (outside the UK) during the last year. The most common destinations for their exported goods and services were the European Union (exported to by 84% of these businesses) and the USA (by 45%).

These exporting businesses were asked about their use of electronic commerce or e-commerce. The extent to which they had employed digital applications – such as a website, third party platform, email or a mobile app – to trade or facilitate trade in their goods and services. The survey found that in the last year:

- 83% of them had used e-commerce for at least some of their exports; and
- 41% of them had used e-commerce for all of their exports.

Almost a third (31%) of these exporting businesses said the proportion of their exports which happened via e-commerce had increased over the previous year. Only 13% said that the proportion of exports involving e-commerce had reduced.

Furthermore, these rural businesses expect that trend to continue. Some 42% expect the proportion of their exports involving e-commerce to grow next year (whilst just 10% expect it to shrink).

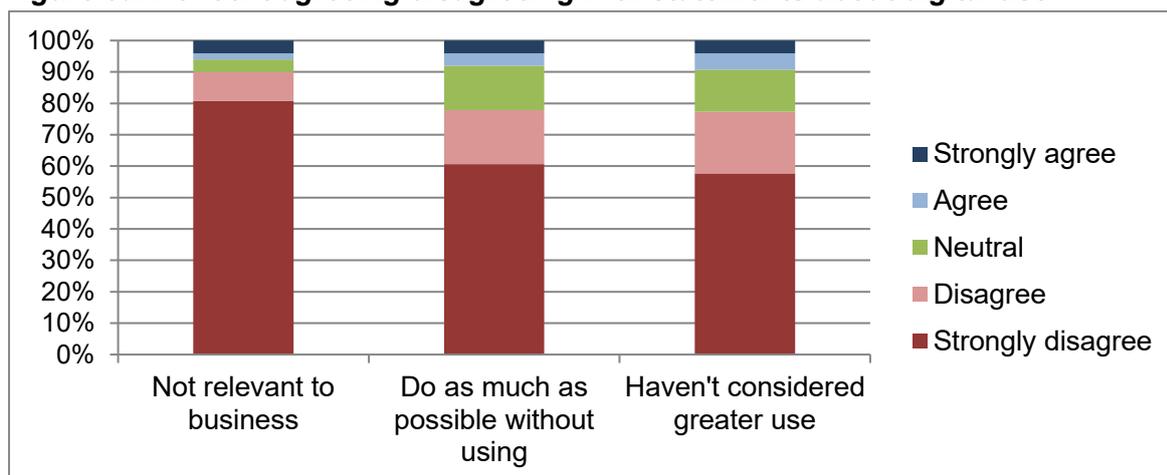
3.6. Future digital uptake

Finally, the survey asked respondents how they perceive the importance of digital to their businesses and how relevant some leading edge digital technologies will be to them.

The results show that most have little doubt about the importance – if not critical importance – of digital to the future of their business. There was strong disagreement with statements put to them that: digital connectivity is not relevant to their business; they prefer doing as much business as possible without using digital connectivity; and they had not really considered greater use of digital connectivity. Conversely, there was strong agreement with other statements put to them that: they would like to make more use of digital connectivity; and increasing digital connectivity use will be critical to the future growth of their business.

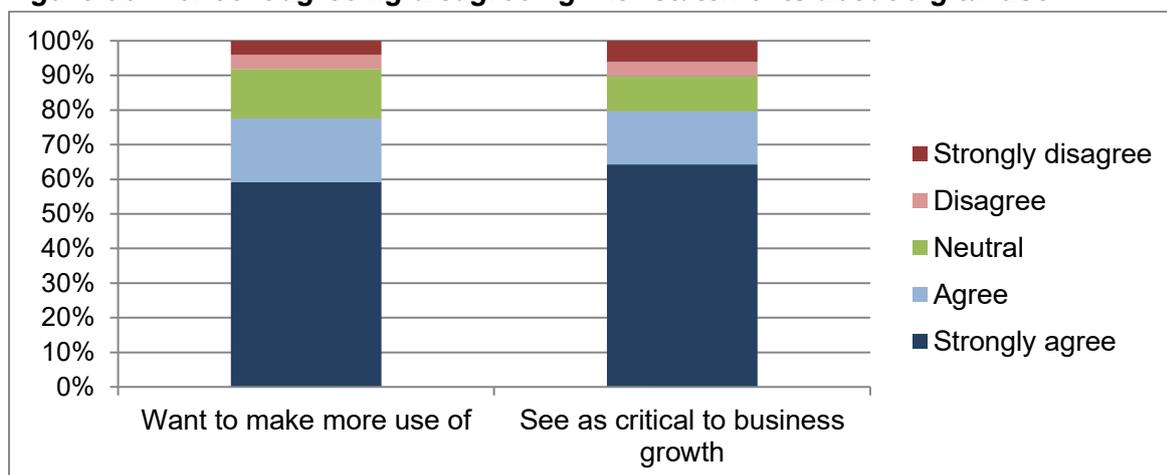
Their views, from strongly agree through to strongly disagree, are shown in the two charts below (figures 5a and 5b). To emphasise the message the chart containing the positive statements is presented in the opposite direction to the chart containing the negative statements.

Figure 5a: Per cent agreeing/disagreeing with statements about digital use



Source: project survey of UK rural businesses. Base: 807 responses

Figure 5b: Per cent agreeing/disagreeing with statements about digital use

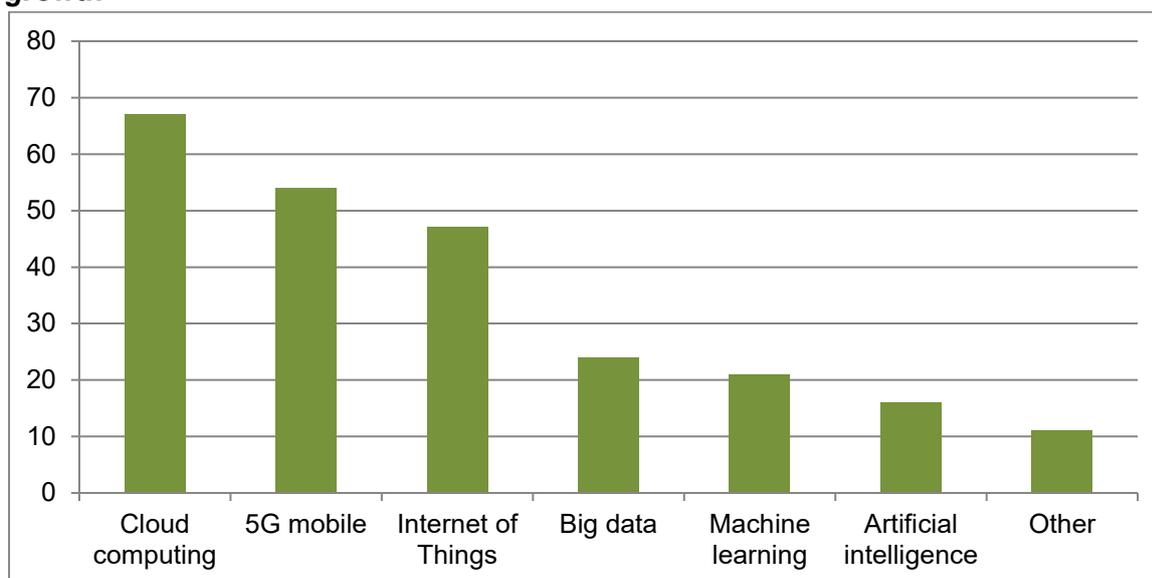


Source: project survey of UK rural businesses. Base: 807 responses

A 2017 report by Jigsaw Research found some evidence which – whilst it should not be over-interpreted – could be read as meaning digital use is of particular importance to rural businesses. SMEs in remote rural areas spent an average of £1,550 annually on communications services, compared with a lower £1,131 for SMEs in other types of area.

The survey for this research project found that rural businesses, perhaps to a surprising extent, see various digital developments as relevant to them and their future growth. It would be fair to say that those developments which are more widespread already and so better understood are seen as the most relevant. They include cloud computing, 5G mobile networks and the Internet of Things.

Figure 6: Per cent who think digital developments will be relevant to their business growth



Source: project survey of UK rural businesses. Base: 807 responses

Those developments which are more cutting edge and which require more technical knowledge or skills to adopt were seen as rather less relevant. They include artificial intelligence, machine learning and big data. Nonetheless, roughly one in five rural businesses consider that such developments could prove relevant to their future growth.

The very short term may prove a little more prosaic. One national report in 2015 found that whilst a good quarter of SMEs planned to make digital improvements over the coming year, the most common improvement cited was still upgrading or introducing a website.

3.7. Uneven digital take-up and use

According to the Scottish Digital Economy Maturity Index (2015) the profile of businesses that are 'digital champions' is slanted towards larger firms, younger firms (though not start-ups) and sectors such as communications and manufacturing. Conversely, the profile of the least digital businesses is slanted towards smaller firms, older firms and sectors such as retail, agriculture and construction. This uneven pattern may well have implications for the rural economy, given its business profile.

Our rural business survey provides some confirmation for this picture. Whilst it does not find huge variation in digital uptake or use, it does identify some notable differences.

Business size: medium and large businesses are the most likely to have superfast connectivity, though intriguingly the least likely to have superfast are the micro businesses (rather than businesses which are just individuals). The use of digital devices shows only limited variation across different sizes of rural business, though laptops appear to be of particular importance to those which are individuals. Medium and large businesses would appear to be the ones which are most engaged with online selling.

Business sector: take up of superfast connectivity is highest among businesses in the finance/insurance and information/communications sectors, and is lowest among those in the agriculture/forestry/fishing sector (where it may not be an option for many). Again, the use of digital devices does not vary by much, though a tablet appears to be most useful to those in the health and education sectors. Perhaps unsurprisingly, those sectors engaged most with online selling are accommodation/food, retail and arts/entertainment/recreation.

Business location: take-up of superfast connectivity is highest among businesses in the north of England and is lower in Scotland and (especially) Northern Ireland. Little variation in the use of digital devices can be seen. Engagement with online selling appears to be high in Scotland, Wales and Northern Ireland. The frequency of some other applications is relatively low in the north of England e.g. cloud computing, virtual meetings and working remotely.

The rural survey also finds – reassuringly – that those with superfast connectivity are easily the most positive about the speed and reliability of their connection. Some 49% of superfast rural businesses give very positive scores (+5 or +4) for speed and 46% give very positive scores for reliability. These figures compare favourably with the 13% and 15% respectively for the whole survey sample.

That said, there is little evidence that these superfast connected rural businesses are more likely to engage with types of digital use e.g. online selling, cloud computing, social media.

Our interviews with rural stakeholder organisations indicate that the take-up of digital opportunities is in-part about the entrepreneurial attitude of the owner or manager. So-called lifestyle businesses are considered less likely to embrace digital take-up than are businesses that are growth oriented.

It is to the benefits – or value – of digital that this report now turns. As a report from the Department for Business Innovation and Skills (2015) noted, enhancing connectivity access is not sufficient for all firms to benefit, since some will struggle to adopt new technology and extract value.

Case study: Clear Mapping Co, Cornwall

Interview with Caroline Robinson (Founder)

Clear Mapping Co is a successful and ambitious cartographic design consultancy based in Penryn, Cornwall.

Caroline, who has a background in Product Design, CAD and GIS, started the business in 2011 working from home “in the dining room with a laptop”. Since then the business has grown steadily and she now employs three other people, delivering projects in the UK and overseas. Clear Mapping Co occupies a studio overlooking the Penryn River which “combines the benefits of being in a rural location with the professionalism of a proper office environment”.

The business, which uses digital technology and VoIP phones extensively, has benefited from the substantial broadband infrastructure investment in Cornwall and since 2016 has enjoyed superfast connectivity. Clear Mapping Co can deal with huge amounts of data, both uploading and downloading large files for its clients. Their work is very varied, but relies on broadband infrastructure to share illustrative material. Recent examples include a major mapping project for the government of Qatar, the PopChange population data project with the University of Liverpool and illustrations to accompany a planning application for a hotel and golf course.

Whilst Clear Mapping benefits from excellent internet connectivity, Caroline is very aware that many of their rural clients face challenges with download speeds. To overcome this difficulty the business often uses WeTransfer, a system that enables large files to be transferred in parcels whilst appearing as a seamless process to the client. Other issues do occasionally arise “as, with any communication device, you need to be compatible at both ends. Skype video, for example, can suck at your bandwidth, whereas voice can be better for long-distance meetings – even conference calls – and is kinder to your bandwidth.”

Caroline describes the benefits of working in Penryn, Cornwall as:

- An awesome view from the office. You can see the tide rising and falling;
- Everyone who works here lives nearby, so there’s a real sense of community;
- Caroline enjoys a 15 minute walk to work; and
- Compatibility with family life. “We can all go for a swim after work!”

However, this beautiful rural location does present two distinct challenges. That it can take a long time to travel to clients is perhaps unsurprising, but more unusual is a problem with power cuts. Caroline explained that storms often result in the loss of wifi /mobile and even electrical power, which can cause some disruption. The VoIP phones may stop working, but most electricity supply is from solar and they have invested in additional battery backup for their computer systems to ensure that they can keep working. “You just have to work round these issues. There’s nowhere else I would want to be.”

4. Benefits from going digital

“Being connected digitally has enabled me to run my own business. Selling via online galleries gives me a huge marketplace that before the internet I could in no way have accessed. It also allows me to network, to find materials at the best prices and arrange couriers economically and quickly. I simply could not do without it.”

“As a micro-business I have been able to connect with skills training and CPD at an affordable level which would not have been available without good digital connectivity.”

“Digital connectivity is fundamental to our business which sells to 150 countries and has development and production in China, India, Mexico, Ukraine and USA ... it has enabled us to develop new products and sell them to new markets.”

“Time saving, postage cost and paper saving, speedier downloading, increase in efficiency, flexibility, especially in [the] amount of travel and travelling off peak.”
(Business survey respondents)

4.1. Introduction

These quotes and others later in this chapter give a flavour of the wide range of positive impacts that respondents to the survey reported from their digital connectivity and use. They include direct benefits, in terms of selling new products in new markets. They also include indirect benefits, such as changes to ways of working which generate cost savings, new collaborative relationships and better working practices.

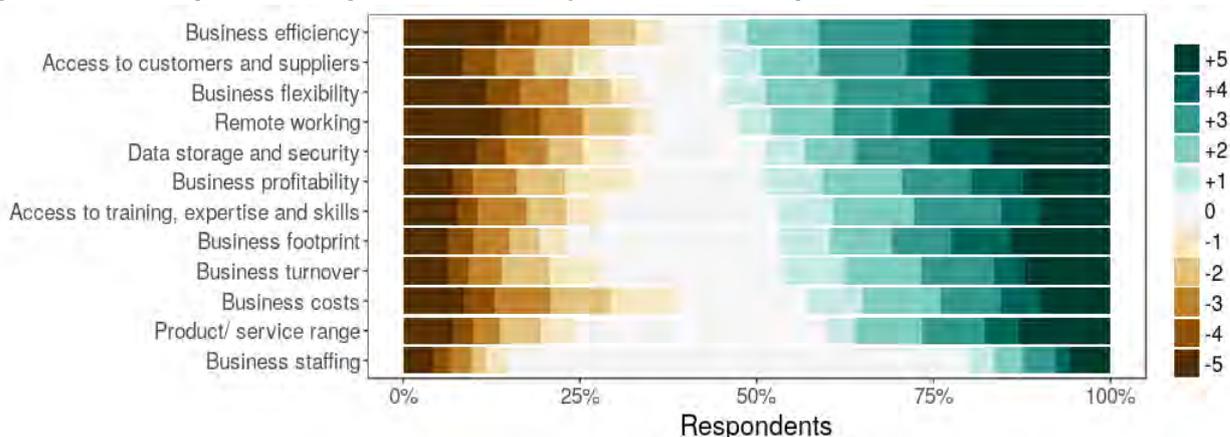
For some businesses digital connectivity is vital to keep pace with developments in their sector, while for others it increases the efficiency with which they can do something or improves their market reach and profile. The impacts referred to by survey respondents echo those reported in previous research, including communication, networking (through email and social media), collaboration, marketing, promoting and selling goods and services, and reaching markets, as well as participating in digital society more broadly. Indeed, digital connectivity may help to alleviate some of the ‘rural penalty’ that rural businesses can experience, not least from distance to markets and essential resources (Royal Society of Edinburgh 2010; Stenberg et al 2009; Townsend et al 2015).

The quotes derive from an open question which asked respondents to describe the impacts of digital connectivity and use on their business. In addition to this, a closed survey question asked them about a specified list of potential impacts. These results form the basis of the discussion in this chapter.

4.2. Impacts of digital connectivity for businesses

Respondents were asked to indicate how significant the impacts of digital connectivity and use had been for each aspect of their business listed, on a scale from -5 (significant negative impact) through to +5 (significant positive impact) over the last five years.

Figure 7: The impacts of digital connectivity on different aspects of the business



Source: project survey of UK rural businesses. Base: 781 responses

Figure 7 shows the positive and negative impacts of digital connectivity on the various aspects of respondents' businesses. It is clear that, overall, higher proportions report positive impacts. The most positive impacts were reported in terms of business efficiency, access to customers and suppliers, remote working and business flexibility. Interestingly, some of these impacts (namely remote working, business efficiency and business flexibility) were also among the aspects where the highest proportion of respondents cited negative impacts. This suggests that, while digital connectivity and adoption helps to speed up some processes/activities, it can also create inefficiencies e.g. if connectivity is problematic.

Positive examples are businesses commenting that staff could enter data straight into a cloud-based system rather than creating a paper copy and another where it made flexible working (no longer tied to the office) a reality. Negative examples include a business which could not plan client calls with any certainty and another lost time through dropped connections and failed internet uploads or downloads. It is worth adding that few respondents noted any impacts, positive or negative, in terms of business staffing.

"[Digital connectivity] enables us to promote home working, making us more attractive to potential staff and more efficient in our operations." (Business survey respondent)

Table 7 below summarises the information about positive impacts from digital connectivity and use in a different way. Those businesses which gave a +4 or +5 score are described as 'perceive significant benefit'. On that basis, the highest proportion of businesses perceiving significant benefits relate to:

- Remote working;
- Customer and supplier access;
- Business efficiency.

The right hand column in table 7 indicates what can be called ‘net significant benefit’ of digital connectivity on these different aspects of the businesses. It was ascertained by calculating the proportion of respondents who gave a +4/+5 rating (i.e. a significant positive impact) and subtracting from that those who gave a -5/-4 rating (i.e. a significant negative impact). Here, it can be seen that digital connectivity has had a net positive impact on all aspects of the business listed (albeit only a small net impact in terms of staffing/recruitment, access to training/skills and business costs). The largest net significant benefits can be seen in terms of customer/supplier access, access to new markets and remote working.

Table 7: The impacts of digital connectivity on aspects of the business

Aspects of the business	Perceive significant benefit (%)	Net significant benefit (%)
Remote working	30%	11%
Customer/supplier access	29%	17%
Business efficiency	28%	9%
Data storage and security	25%	8%
Business flexibility	25%	9%
Access to new markets	22%	12%
Profitability	19%	9%
Product/service range	18%	8%
Turnover	16%	7%
Business costs	16%	4%
Access to training/skills	15%	4%
Staffing/recruitment	7%	1%

Source: project survey of UK rural businesses. Base: 781 responses

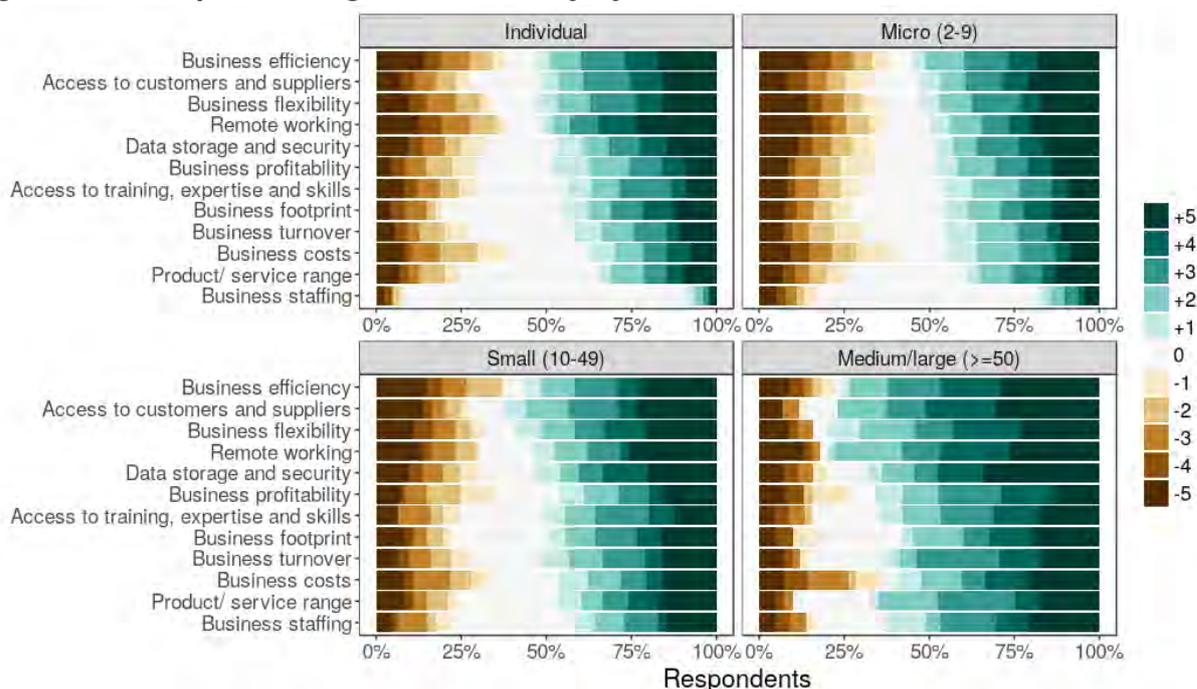
The analysis in chapter 3 found that 62% of survey respondents use cloud computing in their business. It seems likely that this is related to the one in four respondents who identify a significant digital benefit in terms of data storage and security.

In-depth analysis of the responses to the question on impacts was undertaken to explore any differences in responses with regard to a range of different variables, including business size, location, sector, etc. Comparing responses for businesses of different sizes and for those with different connection types produced the most interesting findings.

4.3. Impacts and business size

Figure 8 below shows the responses broken down by number of employees in a business. Categories are individuals (e.g. sole traders), micro- businesses, small businesses and medium or large businesses (grouped together).

Figure 8: The impacts of digital connectivity by size of businesses



Source: project survey of UK rural businesses. Base: 781 responses

Overall, medium/large businesses are the most positive about the impacts of digital connectivity on their business, and especially so in terms of remote working, business efficiency, access to customers/suppliers and business flexibility. For micro and small firms the picture is less positive, with more respondents in this group citing negative impacts, for example in terms of business efficiency, remote working and access to customers/suppliers.

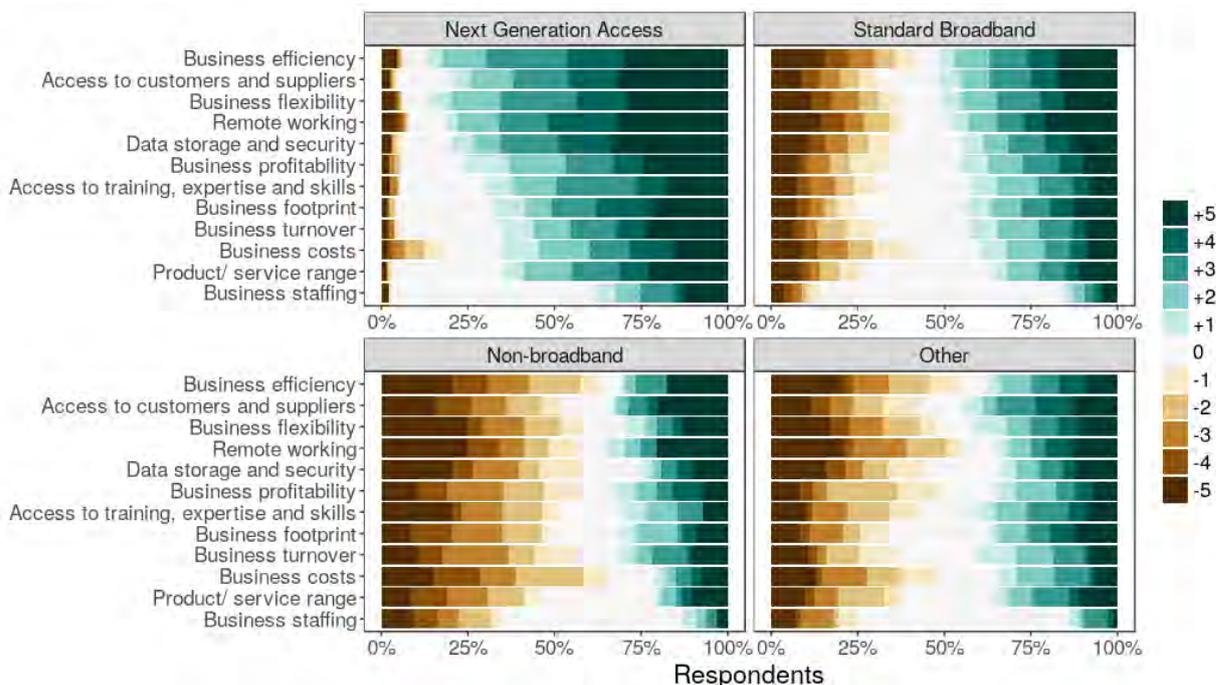
While it is hard to discern a clear pattern, the picture for individuals (one person businesses) is perhaps slightly more positive – and certainly no worse – than it is for small and micro businesses.

It is also worth noting that a higher proportion of medium/large businesses reported impacts (in both directions) for staffing, when compared to other businesses in the sample.

4.4. Impacts and connection type

Figure 9 shows the breakdown of survey responses according to businesses' connection type (or speed). This very clearly shows the positive impacts experienced by those which have superfast broadband (i.e. Next Generation Access), with large proportions citing benefits for their business across the range of aspects measured. Whilst this might be as expected, it nonetheless confirms the benefits that can flow to rural businesses from having a fast online connection. One point of further interest is that a relatively large proportion of those with superfast access report negative impacts in terms of business costs. This presumably reflects the usually higher cost of upgrading to a superfast connection.

Figure 9: The impacts of digital connectivity by connection type at the business



Source: project survey of UK rural businesses. Base: 781 responses

There is a more balanced picture of positive and negative impacts for those that have standard broadband speeds and a much more negative picture for those businesses that cannot access any broadband. As such, we can say that having a slow internet connection (whether through choice or because something faster is not available) clearly has negative impacts on the operation and performance of these rural businesses.

Results from this particular analysis were looked at for respondents in different parts of the UK. They suggest that there is a more negative picture in Scotland than in England, Wales and Northern Ireland i.e. more respondents from Scotland report that they have experienced negative impacts from digital connectivity on their business. This must be interpreted with caution, since the number of Scottish survey respondents is modest, yet it is one that may warrant further research.

The survey findings reported in this chapter support those of previous studies on the topic. For example, work by Townsend et al (2015) and the Royal Society of Edinburgh (2010) demonstrated how a growing urban-rural digital divide was of concern to business owners operating in rural areas that depend on connectivity to communicate, to network and collaborate, to market or promote and to sell their services into wider markets, as well as to participate in digital society more broadly. Physical distance makes it harder to access markets and essential business resources, and digital access can potentially alleviate such rural penalty concerns. Stenberg et al (2009) also suggested that there is higher growth amongst businesses with broadband compared to those without.

“My audience range is much higher due to my online presence. I can connect with other food producers which helps me to learn good practice.” (Business survey respondent)

4.5. Conclusion

In summary, the survey findings identify a wide range of benefits that accrue to rural based businesses from their digital connectivity and use. Those aspects where the most businesses report significant positive impacts are remote working, customer and supplier access, and business efficiency. The impacts (whether positive or negative) are related to the size of a business and its type of connection. Larger businesses, with 50 or more employees, are more positive about the impacts they derive from digital connectivity and use. Those businesses which have superfast broadband are much more positive about the impacts they derive across all aspects of their operation.

These differences are important to bear in mind when considering the shape of future policies to support rural businesses.

Case study: Write Services, Norfolk

Interview with Angela Lambert (Owner)

Angela is a self-employed digital marketer operating from home in the small Norfolk village of Feltwell. She is a member of the Chartered Institute of Marketing and for nineteen years was employed by a local turf growing business, helping to promote the company's products.

Describing herself as "from the generation in the middle", Angela made the decision to set up her own business 18 months ago, so she could have the flexibility to help her children with their child care and be available in the event that her parents might need support.

Her former employer was her first client and since then she has attracted another 7 clients, "mostly by word of mouth recommendations". Many of these clients are themselves self-employed. "I seem to have found a gap in the market ... some of my clients only want, say, a couple of hours a week ... I charge by the hour which enables them to buy just the amount of help they need".

Angela describes her work as highly varied, including placing advertisements in local papers and newsletters, maintaining a sponsored advertisement profile on a third party marketing platform, updating websites and running social media promotions.

Angela has a domestic broadband connection. She regularly uses a laptop and smartphone, and occasionally a tablet. Although broadband speed can be a bit unreliable at times, she has found connectivity sufficient to set-up and run a largely digital business from a very rural location.

Looking ahead Angela says that she is not super-ambitious and certainly not looking to build a big business, but it is important to her to "be able to afford holidays and be able to see the grandchildren". She is aiming to increase her turnover by around 50% over the next two years, both to improve cash flow and to create a more robust business model.

Angela explains that it is almost impossible to find flexible part-time work locally and that her business supports her chosen lifestyle commenting, "it's good and I'm happy". As well as having established herself in self-employment, the business brings wider benefits through her contribution to the growth of at least eight local businesses and, by helping to care for grandchildren, also helping her children to work to progress their chosen careers.

5. Constraints to going digital

5.1. Introduction

The rural business survey asked respondents to provide information about constraints that they had experienced in the last five years, which had impacted on their ability to take advantage of digital connectivity. Based on a review of existing literature (for example, SQW, 2013) four constraints were listed, with businesses asked to indicate any that applied to them. They could also indicate that they had not experienced any such constraints. Respondents who indicated that their business had experienced a constraint were additionally asked to rate its significance.

It should be stressed that none of these four constraints are about access to broadband and mobile networks. They are factors over and above such considerations.

5.2. Key constraints on businesses' digital connectivity

First, it should be noted that 40% of respondents reported they had not experienced any such constraints on their businesses' ability to take up digital connectivity. In other words, for two in every five of the survey respondents issues such as skills, training, external support and recruitment were not considered to be constraints.

Table 8: Key constraints to businesses' ability for digital connectivity

Constraint	Per cent who had experienced it (%) ⁸
Difficulty finding external or outsourced digital connectivity support for the business	30%
Difficulty accessing appropriate external digital or IT training for existing workforce	14%
Difficulty recruiting people with appropriate skills	13%
Business' existing workforce lacking sufficient skills	13%
Other constraint(s)	10%
No constraints experienced which have worsened the ability for digital connectivity	40%

Source: project survey of UK rural businesses. Base: 781 responses

However, more than half (52%) of respondents reported that they had experienced one or more of the listed constraints. The most common constraint encountered, by almost one in three respondents, was finding external or outsourced digital support for their business (30%). Similar, but smaller, proportions of respondents had experienced the other three constraints relating to difficulties finding appropriate training, recruiting people with

⁸ The column does not add to 100% because respondents may experience more than one constraint. The 8% of respondents who answered 'don't know' to this question have been removed.

appropriate skills and appropriate skills within their existing workforce. In terms of the latter, several respondents said that such skills affected their ability to adopt digital technologies effectively, to fix (digital) problems when they arose and to tackle cyber-security concerns.

On training, several respondents referred to a need for more specialist and tailored one-to-one training, which could be delivered online but ideally would be face-to-face in the local area. While several respondents commented on the high average age of business owners and skill shortages in this demographic, one respondent commented that poor connectivity may exacerbate the long-established trend of youth out-migration from rural areas.

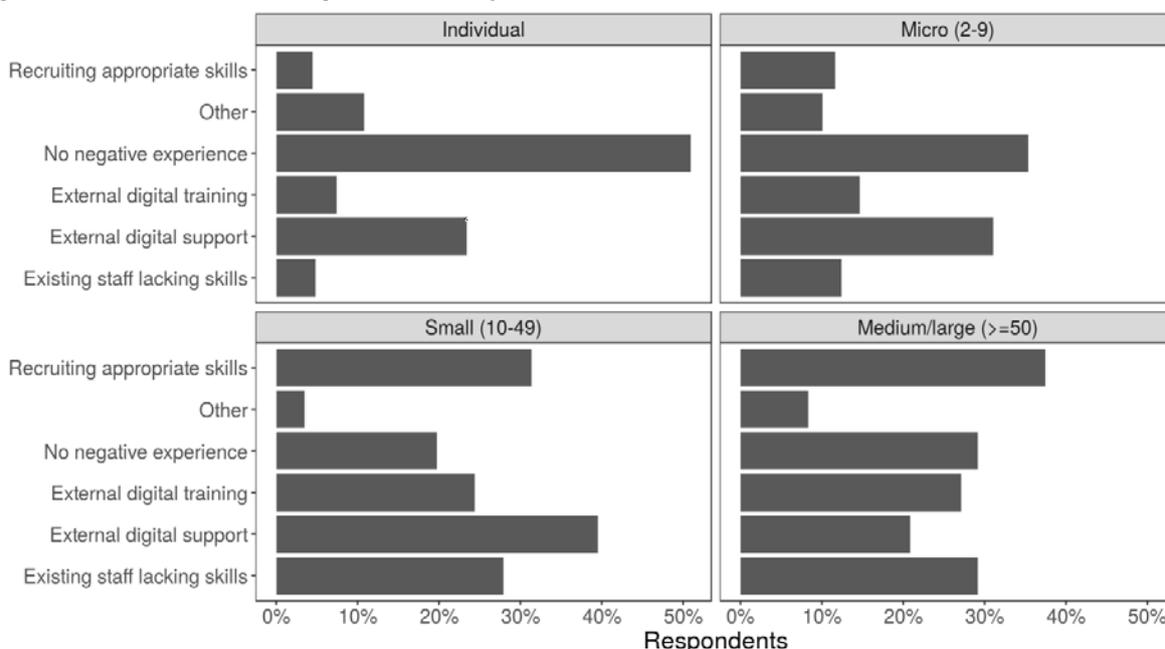
“... the inability to access the internet and the digital world is a real constraint on hiring young and dynamic workers.” (Business survey respondent)

Again, further in-depth analysis of the data was carried out to explore whether any differences could be determined between respondent types e.g. different business sizes, sectors, locations, respondent ages, genders. The two that produced the most interesting findings were, once again, comparing responses for businesses of different sizes and for those with different connection types.

5.3. Constraints experienced by business size

As figure 10 shows, it is individuals (e.g. sole traders) and micro-businesses which are most likely to report having experienced no such constraints in the last five years – 51% of individuals and 35% of micro-businesses had experienced none.

Figure 10: Constraints experienced by size of business⁹



Source: project survey of UK rural businesses. Base: 781 responses

⁹ Percentages are of each plot e.g. 51% of single person businesses have no negative experience.

Workforce issues are less of an issue for this group (understandably so for individuals). For both individuals and micro-businesses the most commonly experienced constraint was difficulty finding external or outsourced digital support for the business (23% and 31% respectively). At least a quarter of these also stated that the impact of this constraint upon their business had been very significant. Accessing appropriate external digital training also emerges as a constraint for a fair number (15%) of micro-businesses and, where it does, its impact is very significant for some.

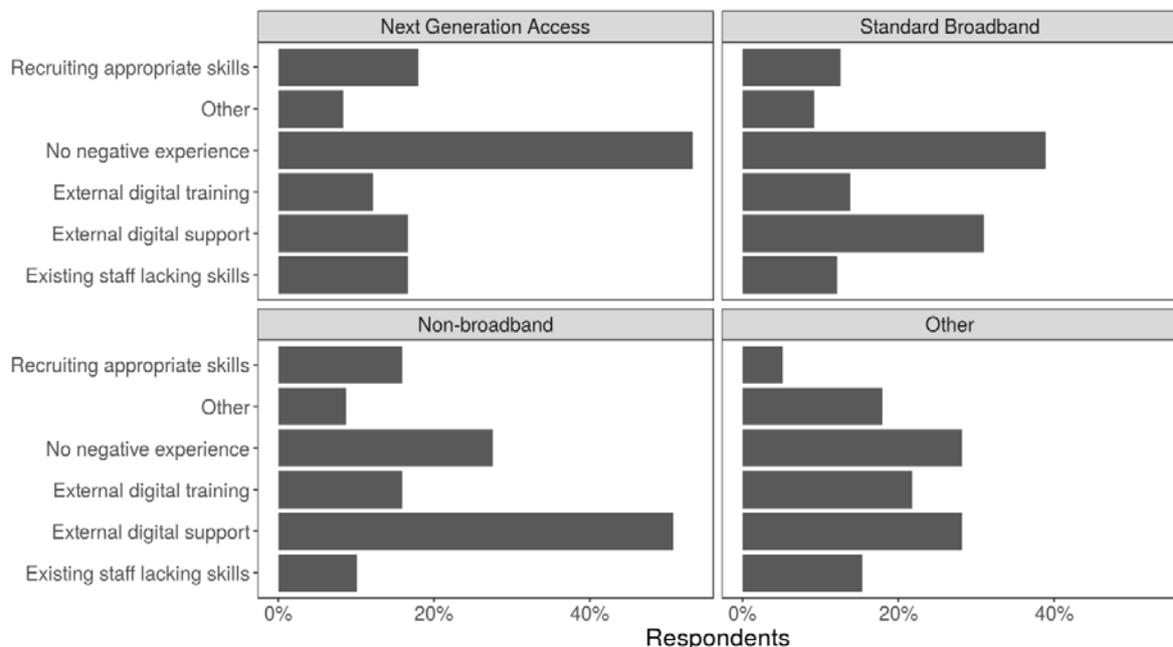
Small and medium/large businesses were less likely to say that they had experienced no constraints (20% and 29% respectively). For medium/large firms, with 50 or more employees, the most frequently cited constraint was difficulty recruiting people with appropriate digital skills. Almost one in three medium/large firms also said that their existing staff lacked appropriate skills and that they had had problems accessing digital training.

So business size determines the types of constraints that businesses experience when seeking to take advantage of digital connectivity. In all cases these constraints are likely to be holding back business performance and would benefit from being addressed.

5.4. Constraints experienced by connection type

Figure 11 shows respondents' experiences of the different constraints according to their connection type. Those respondents with superfast (or NGA) broadband were most likely to report that that had not experienced any of these constraints in the last five years (51%).

Figure 11: Constraints on digital connectivity by business connection type



Source: project survey of UK rural businesses. Base: 781 responses

Nonetheless, a relatively high 17% to 18% of rural businesses with a superfast connection report experiencing problems with recruitment, accessing digital support and existing staff skills. This perhaps reflects that, as a result of their good connectivity, they are seeking to make greater use of digital applications and hence their skills, training and support needs

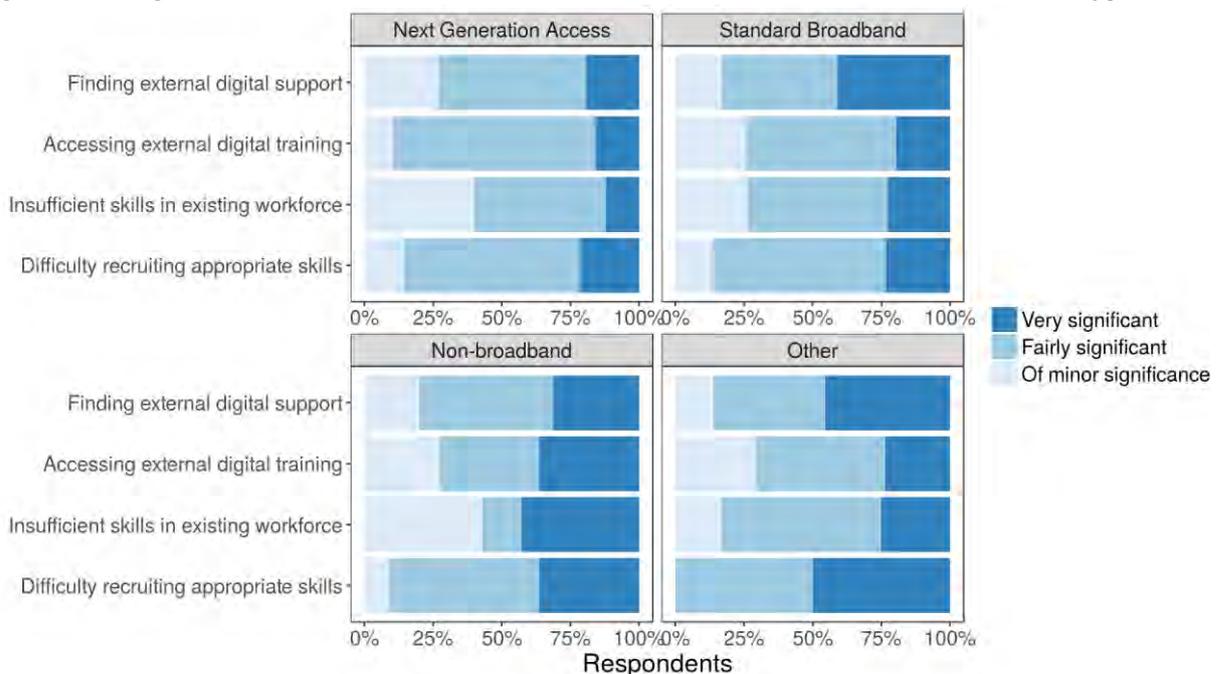
are higher. The fact that so few larger businesses see access to external digital support as a constraint is probably because many have that support in-house.

A smaller proportion of the respondents with standard broadband say that they have experienced no such constraints (39%). However, that is still the most common answer given by this group. Accessing external digital support is the most frequently cited constraint for this group.

For respondents without any broadband, difficulty accessing external digital support was by far the most frequently cited answer (affecting 51% of them). In this group, only 27% of businesses said that they had experienced none of the constraints listed.

Figure 12 shows that the significance of these constraints is also related to connection type. Those who have experienced such constraints are more likely to have found them to be 'very significant' (in terms of impact on the business) if they lack a superfast connection.

Figure 12: Significance of constraints for businesses with different connection types



Source: project survey of UK rural businesses. Base: 550 responses

5.5. Other constraints – cost and infrastructure

The survey also asked respondents to indicate their agreement or disagreement with a set of statements (on a scale of 1 to 5, where 1 is strongly agree and 5 is strongly disagree), which were about the cost of digital connectivity and the quality of their internet connections.

Almost 70% of the survey respondents agreed or strongly agreed with a statement that their internet connection is too slow or unreliable. Although infrastructure issues are not the main focus of this research project, they clearly remain a key concern for rural businesses. Indeed, this survey finding together with those reported in chapter 3.3 paint a picture of real

world experience which seems decidedly worse than that indicated by the connectivity statistics (analysed in chapter 2).

Comments from the surveyed businesses reveal both the importance of fast and reliable broadband and, conversely, the negative impact of poor speed and reliability. Negative impacts can be indirect, such as damage to the reputation of a business or presenting an unprofessional image if they cannot participate in a Skype call due to an intermittent connection. The following quotes from survey respondents illustrate well the disadvantages.

“Speed and reliability problems do not present my business in a good light.”

“Because our connection is so poor we gear up our business to avoid having to use digital connectivity. So we don’t ever consider new developments.”

“They assume you are a hill-billy company working in a hay shed and think twice about doing any more business with you.”

As a result of poor infrastructure, one respondent had had to move his business out of a rural area, while two others were considering significant changes.

“I have had to relocate a multi-million pound operation from Somerset to London, impacting several staff and increasing costs as the internet services were too slow – and more importantly – too unreliable to continue. This is shocking.”

“My poor connectivity... has led to my main client suggesting I relocate. However, this would have an impact on my turnover and would also mean that I’m no longer able to work from home.”

“We are seriously considering moving the business from a home office set-up to an office space for better connectivity. This will have a huge negative impact on work-life balance, profitability and employee satisfaction.”

Businesses were also asked whether they agreed or disagreed with three statements about digital costs. The cost of (monthly) subscriptions or payments seems to be the most important concern for rural businesses, with approximately 45% saying they agreed/strongly agreed that these were too expensive. Smaller proportions (strongly) agreed with statements concerning the cost of digital hardware and training. It is worth adding that previous research has also highlighted cost as a constraint on businesses’ digital connectivity (ONS 2014a; Scottish Government 2014). Some of the survey businesses referred to high costs associated with having to use satellite or microwave broadband connections.

5.6. Mobile phone coverage as a constraint

Finally in this chapter, it is noteworthy that many respondents to the survey flagged the importance of having good mobile phone coverage alongside fixed broadband coverage. For many businesses the two go hand-in-hand, with their mobile smartphone effectively serving as a back-up when the fixed connection is not available for emails an internet

access. According to comments made, poor mobile phone coverage serves as a constraint in a number of ways:

- If the mobile signal is poor businesses must have a landline connection. This is a cost and it ties them to the office, reducing their scope to work flexibly or remotely;
- A poor mobile signal had lost some businesses sales, if they could not speak to a client at the right time or they missed calls/messages;
- There can be a time penalty if business people have to visit a client or another branch of their business in person rather than speaking over the phone;
- A weak mobile signal can mean not being able to take card payments, which is a growing consideration when fewer and fewer payments are made by cash;
- For employees, a poor mobile phone signal has potential to add risk, if they are travelling or working alone.

5.7. Conclusion

The analysis in this chapter has outlined the range of constraints that rural businesses can face in terms of their ability to benefit from digital connectivity and take-up. Connectivity issues – both in terms of fixed and mobile networks – are certainly significant. Many businesses rely heavily on both fixed and mobile connectivity for their working model.

However, even if connectivity is put aside, more than half of the surveyed rural businesses have faced another constraint to their ability to go digital. For smaller businesses the key challenge is accessing external digital support, whilst for larger businesses it is recruiting staff with appropriate digital skills. This implies that a differentiated policy response is required to target the constraints experienced by businesses of varying sizes.

For some, the costs of digital take-up were also important constraints, particularly the cost of subscriptions which some rural businesses saw as a kind of ‘rural penalty’ when speed and reliability were poor. This seems particularly likely to affect the more financially marginal businesses.

Case study: Denhay Dairy Farm, Dorset

Interview with George Streatfield (Director)

Denhay Farm is a long established farming enterprise located at Broadoak, some three miles north of Bridport in west Dorset. The business comprises two parts – milk and bacon production – which together have a turnover in excess of £10m.

The farm has invested in a bespoke line-of-sight internet dish system, which provides broadband from a fibre node in Taunton via a number of relay stations. This delivers a dependable broadband speed of around 30 Mbps. Mobile connectivity is, however, quite patchy and, although some parts of the farm have 4G, other parts have very poor signal which is a significant issue on a large farm.

The farm has four dairy herds totalling 1,100 milking cows and extensive use is made of digital technology. It has used computers since the early 1970s and use of digital technology is considered “an essential part of what we do”. Today, tablets, computers and smartphones are routinely used. Whilst milk is not marketed over the internet, all Defra returns are completed digitally, as are the vast majority of communications with suppliers and customers.

The economics of milk production are currently very challenging and, in addition to the benefits to farm safety and efficiency resulting from mobile communications, the farm has adopted a number of digital options which “greatly assist its viability and competitiveness”. These include:

- A digital plate meter, which records grass height and cover as the operator walks over a field. The information enables a better utilisation of pasture through controlled grazing and, by enabling better placement of fertilisers to improve pasture yield;
- GPS on some tractors, which enables the efficient distribution of fertilisers and sprays and thereby avoids waste; and
- GPS on mowers, which helps to avoid missed areas or overlapping areas, again contributing to efficiency of the farming operation.

Looking ahead George can see how other digital technologies have potential to be of benefit. He expects that within the next five years the farm will be routinely reading cows’ ear tags. Each cow will have individual transponders which will enable them to identify, for example, when a particular cow is coming into season or showing early symptoms of illness. Although described as “quite expensive at the moment”, this is a technology with potential to bring significant economic and welfare benefits across the dairy industry.

George also sees real potential for drone technology (for example, to identify those areas on the farm where it would be most beneficial to spray). If GPS linked, this could enable a highly detailed record to be kept of the effectiveness of specific actions on the farm.

6. Unlocking digital potential

This chapter looks at the economic benefits which would accrue if constraints to digital take-up were addressed and if digital potential was unlocked. It includes estimates for the additional business turnover and the productivity gain in predominantly rural areas.

“Digital has had a positive impact on marketing and business growth ... and on communication between businesses and customers.” (Business survey respondent)

6.1. Digital maturity of businesses

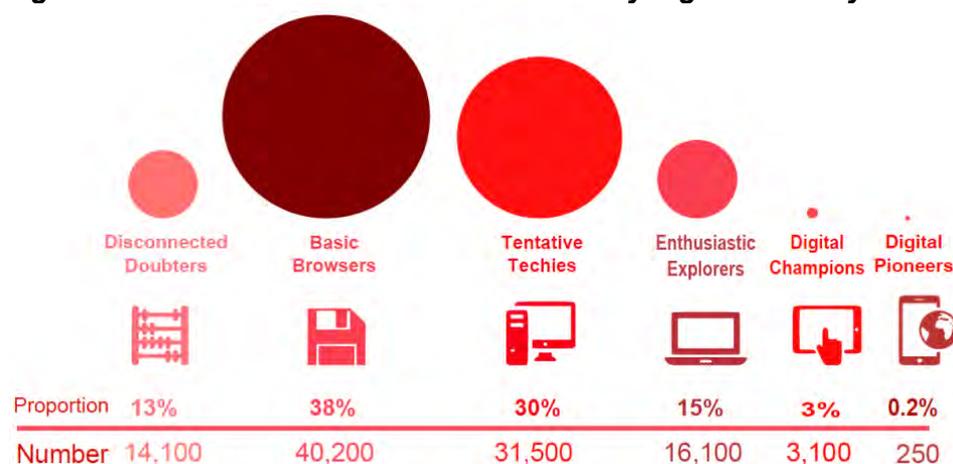
There is a growing interest in the concept of digital maturity of businesses from both the private sector (e.g. Lloyds annual survey of business maturity in small businesses and charities) and the public sector (e.g. Scottish Government Digital Maturity Index, BIS review of digital capabilities in SMEs, Department for Digital Culture Media & Sport policy paper on helping British businesses become digital, UK Commission for Employment and Skills).

The concept is important when considering the economic value of digital improvements, since where a business sits on the maturity spectrum will determine the extent of benefit it could derive from increasing its take-up of digital technology. Both Lloyds (2017) and the Scottish Government (2015) assess businesses against various aspects of digital technology adoption, usage, benefits and skills, to come up with a weighted score which classifies their digital maturity.

Digital Maturity Classifications	
Scottish Government	Lloyds
<i>Disconnected doubters</i>	<i>Passive</i>
<i>Basic browsers</i>	<i>Getting started</i>
<i>Tentative techies</i>	<i>Established</i>
<i>Enthusiastic explorers</i>	<i>High</i>
<i>Digital champions</i>	<i>Advanced</i>
<i>Digital pioneers</i>	

In Scotland the majority of businesses are classed as ‘basic browsers’ (38%) or ‘tentative techies’ (30%), with only a few classed as ‘digital champions’ (3%) and very few as ‘digital pioneers’. The basic browsers and tentative techies tend to have broadband and have adopted a few technologies, but lag behind in adopting more advanced technologies such as cloud computing, management software or the internet of things. However, they have started the digital journey, so less impetus is probably needed to take them to the next level.

Figure 13: Scottish business classification by digital maturity



Source: Scottish Government (2015)

The 13% of businesses classed as ‘disconnected doubters’ tend to be smaller, not exporting, less likely to have a website and more likely to be in sectors such as construction, agriculture, wholesale and retail. Low adopters may face greater barriers using digital technology, though the benefits for them could be great if the barriers were overcome.

Lloyds (2017) estimated that 41% of UK businesses lack basic digital skills, although many were close to having those skills. They also report a correlation between digital skills and business performance, with small businesses that have high skill levels being two and a half times more likely to experience a recent turnover increase. Lloyds estimate that digital technology adoption leads to significant labour savings – saving almost a fifth of their working week. More advanced digital users report positive business impacts in terms of saved time, saved costs and more overseas trade. In particular, Lloyds report that sole traders have a significantly lower uptake of digital technologies.

In order to cross-up the survey results from this research they were aligned with data from the Inter-Departmental Business Register (IDBR) data, which profiles businesses in predominantly rural areas in terms of their size (employees), turnover and sector. As would be expected from the findings set out in chapters 3 and 4, there are variations in the digital maturity of the surveyed rural businesses, when measured for their take-up, use of and benefit from digital technology. These variations are broadly similar to findings from earlier studies. For example:

- Medium sized businesses have a higher use of digital devices and a higher take-up of superfast connectivity, whereas micro-businesses have a lower use of digital devices and a lower take-up of superfast connectivity;
- Business service sectors are most likely to use applications such as virtual meetings and working remotely, compared with lower use in the retail, transport and accommodation/food sectors;
- The perceived benefits from digital adoption are clearly related to business size. Micro and small businesses consistently score the benefits from digital technologies lower than medium or larger businesses;

- Business service sectors generally perceive the greatest benefit from digital adoption, whereas the primary, manufacturing and construction sectors generally perceive less benefit.

These findings from the surveyed rural businesses are illustrated in the following spider diagrams, where points close to the centre of each graphic indicate relatively low digital use, adoption or benefit and points furthest from the centre indicate relatively high digital use, adoption or benefit. Figure 14 is by business size (employees), figure 15 by turnover and figure 16 by sector. It should be noted that business sectors have been grouped (four groups) for presentational and statistical reasons.

Figure 14: Digital maturity of rural survey respondents by business size, according to digital infrastructure, use and benefits

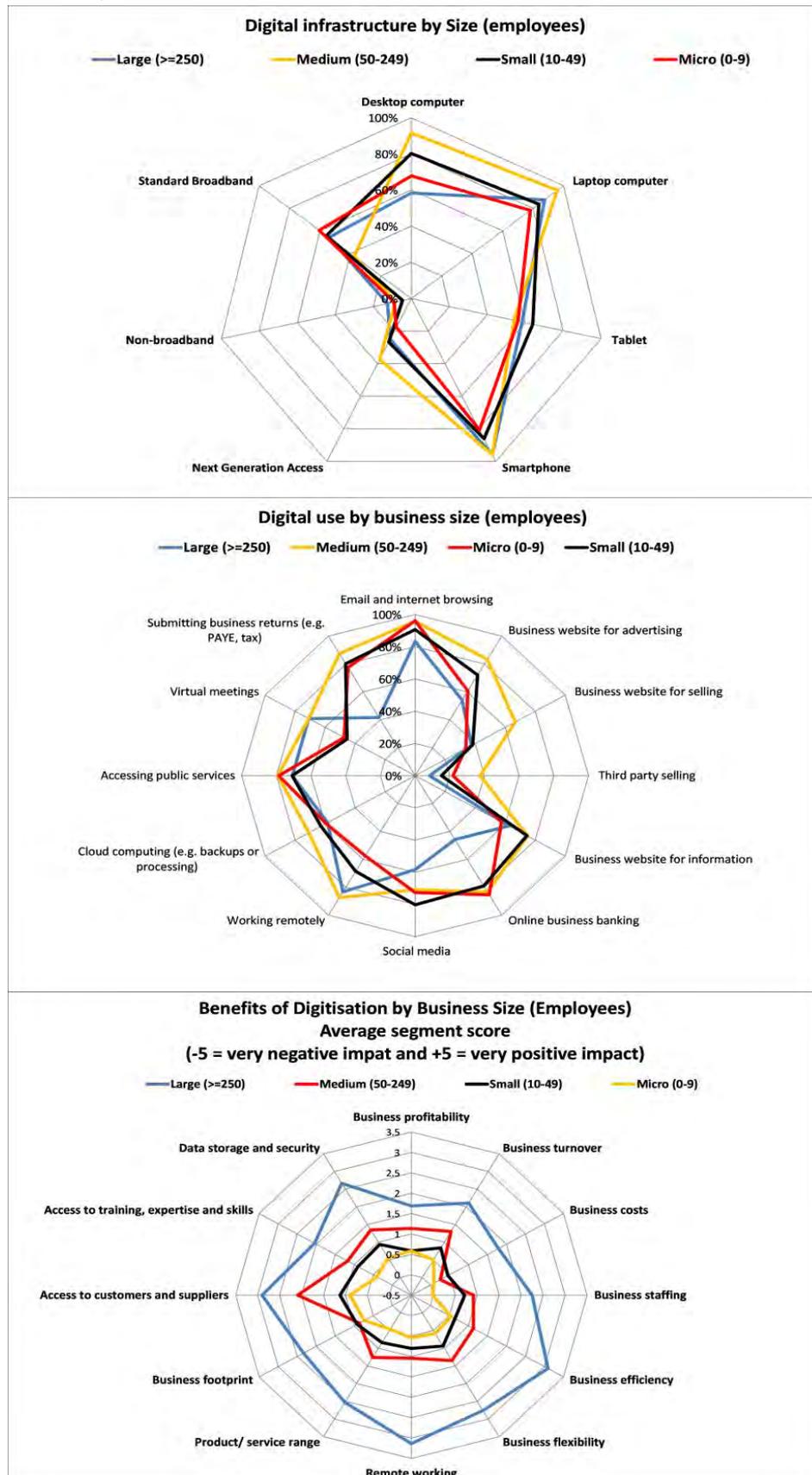


Figure 15: Digital maturity of rural survey respondent by business turnover, according to digital infrastructure, use and benefits

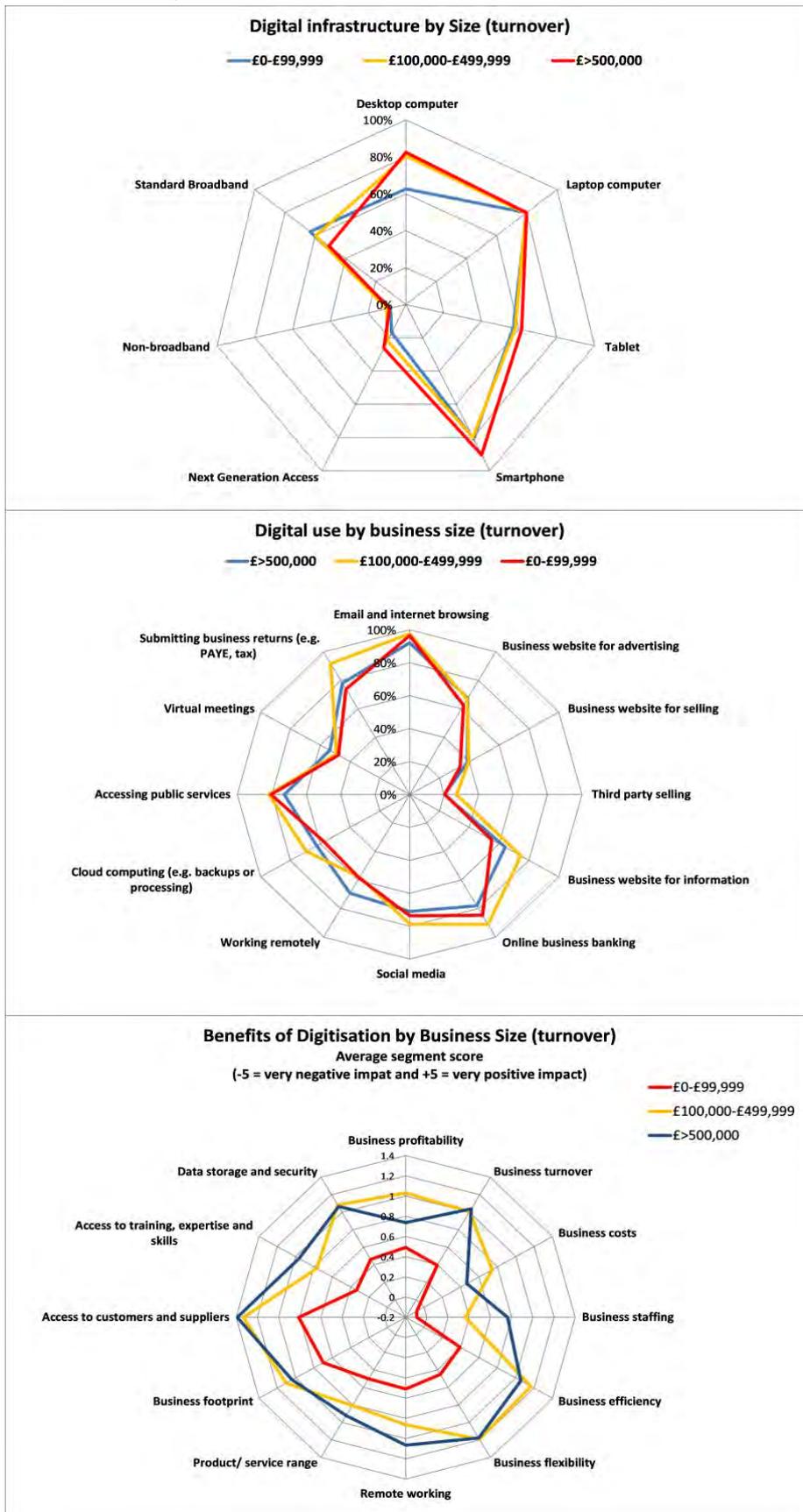
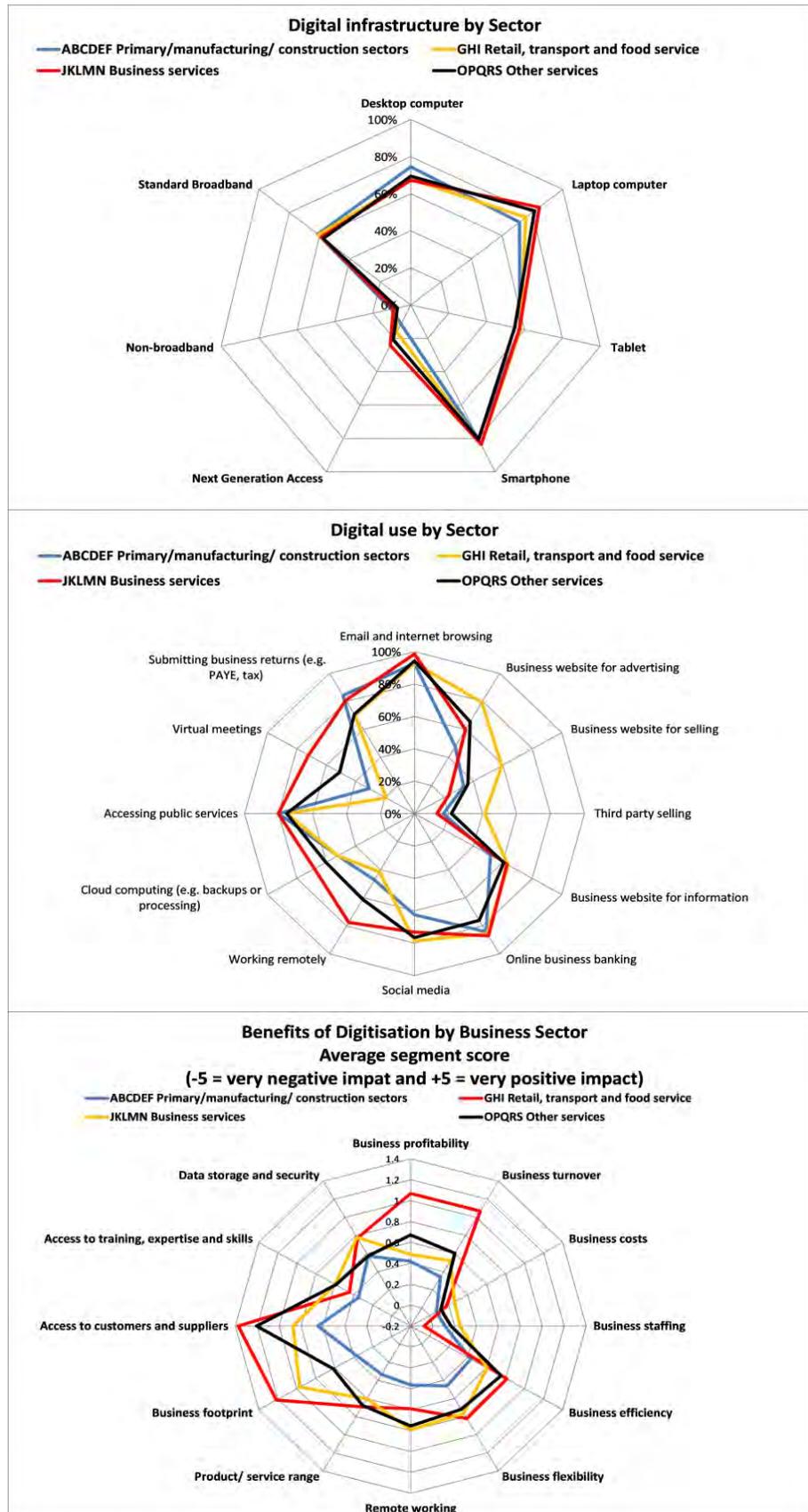


Figure 16: Digital maturity of rural survey respondents by business sectors (aggregated), according to digital infrastructure, use and benefits



such they can be treated as providing a ceiling and a floor. Any estimates produced from the rural business survey ought to fall well within that range. The studies are presented, here, from the most to the least optimistic.

Study 1, Deloitte (2015): estimated that if Scotland were to become a world leader in digitisation¹⁰ it could increase its Gross Domestic Product (GDP) by £13 billion by the year 2030. This highly ambitious scenario represents a 9.8% increase compared with a base year of 2014 and could create 175,000 new jobs. If, on the other hand, there was only an incremental improvement in the adoption of digital technologies (from the current trajectory) the increase in GDP could be £4 billion.

Interestingly, this particular study included some estimates for rural Scotland. It concluded that as digitisation increases a greater proportion of the benefits accrues to rural businesses, as well as small and home-based businesses, due to their existing digital take-up being lower. Deloitte estimate that for rural areas of Scotland, turning into a world digital leader could increase GDP by £1.7 billion by 2030 (a 15% increase compared with 2014).

Using Deloitte's predicted changes to Scottish GDP as a proxy for Gross Value Added¹¹ (GVA) and extrapolating for predominantly rural local authority areas of the UK using the IDBR data, it is estimated that the economic impact if those rural areas were to become a world digital leader would be worth an extra **£45 billion** by 2030. Note that current GVA in the predominantly rural areas of the UK is £299 billion.

Study 2, EU Commission (2014): work by Lorenzani and Varga for the EU Commission reported that improved digital skills are associated with efficient allocation of resources, whilst greater take-up of high speed broadband and e-commerce both lead to higher total factor productivity (TFP). It estimated a 1% short-term productivity gain and a longer-term increase in GDP of over 3%. The Commission estimated that this potential was worth Euro 415 billion to the EU economy by 2025.

Using the EU Commission estimates and extrapolating them to the predominantly rural areas of the UK using the IDBR data, it is estimated that the impact of increased digitisation in those rural areas would be in the region of **£9 billion** of additional GVA by 2025.

Study 3, Oxford Economics: estimated that the digital capabilities of UK businesses were generating £123 billion or 3.4% of GDP in performance improvements. If digital technology was further embraced this could lead to one million additional jobs and could lead to a further £92 billion (2.5% of GDP). These findings were based on a survey of 1,000 businesses which reported a 4.4% increase in revenue and a 4.3% fall in costs in the

¹⁰ The study's definition of 'world leader' in digitalisation involves (amongst other things) progressive fibre broadband roll out, the development of significant new digital business clusters, 98% of SMEs using cloud based services and students of all ages learning new digital skills for the workplace.

¹¹ GDP is GVA plus taxes and minus subsidies.

previous year due to digital technologies. Almost half the gain was expected to occur in London and it was expected to impact most on the professional and tech services sectors (£27 billion per year), wholesale and retail (£17 billion per year), financial services (£9 billion per year), manufacturing (£9 billion per year) and transport/storage (£8 billion per year).

Using the Oxford Economics figures and extrapolating them to the predominantly rural areas of the UK using the IDBR data, it is estimated that the impact of increased digitisation may be in the region of **£7.5 billion** of GVA.

Study 4, SERIO et al (2015): conducted an economic impact study in Cornwall. They reported that 80% of the Cornish businesses which had taken up a superfast broadband connection perceived it to have benefited their business. Nearly half said that it had allowed them to generate new sales and access to new markets. Almost four-fifths reported that it saved them time and money.

SERIO also reported that average turnover rose over two years by about £91,000 for superfast connected businesses, compared with just £21,000 for other businesses. Overall, they estimate that 1,079 (net, new, full-time equivalent) jobs in Cornwall were attributable to this superfast connectivity, which equates to £61.3 million of GVA. They value this as an increase in the county's GVA of 0.63% per annum.

Using the SERIO figures for impacts from greater superfast broadband connectivity and extrapolating them to the predominantly rural areas of the UK using the IDBR data, it is estimated that the same initiative would add in the region of **£1.8 billion** to GVA (assuming similar broadband starting speeds elsewhere).

Study 5, Scottish Government (2017): applied a KPMG model of elasticity of GDP (per capita) to look at changes in internet speed. They estimated that BT's planned investment to deliver ultrafast broadband infrastructure could have an annual economic impact in the range of £3.6 to £6.2 billion additional GDP by 2025. This represents a GDP gain in the range 0.22% to 0.38%.

Using the KPMG figures for BT's investment in ultrafast broadband infrastructure and extrapolating them to the predominantly rural areas of the UK using the IDBR data, it is estimated that such actions could increase GVA by roughly **£0.7 billion** by 2025.

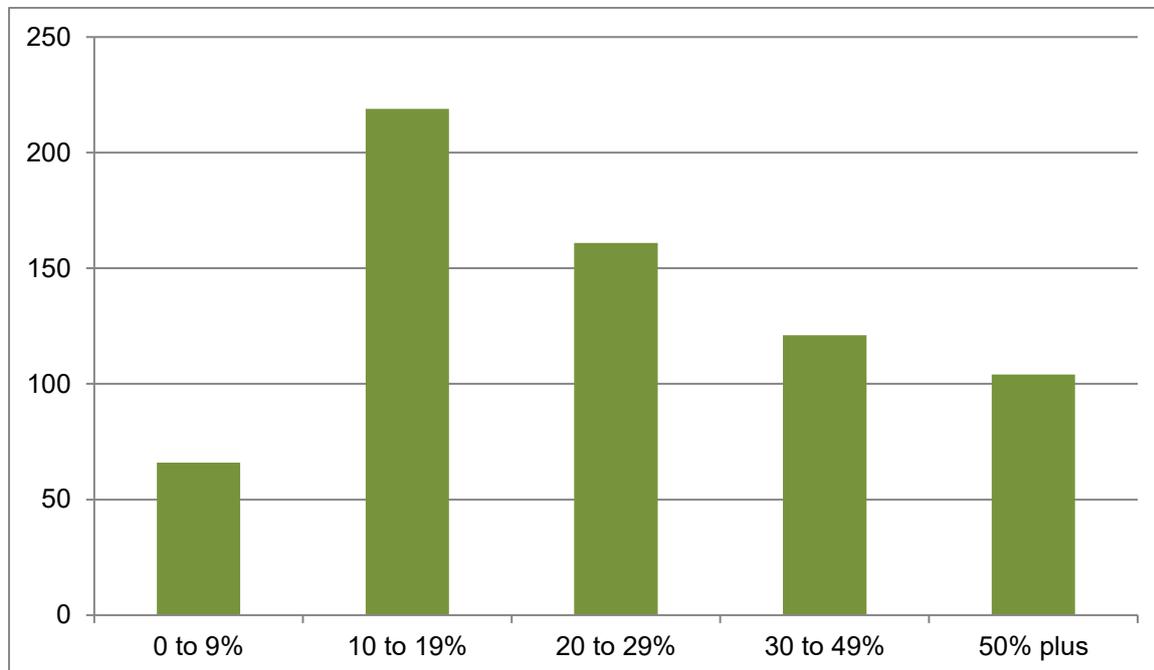
6.3. Estimating impact from the survey data

The survey which was part of this research project asked the rural businesses to estimate:

- The amount of turnover they had lost in the previous year due to digital constraints; and
- The change to their turnover that would result if digital constraints could be removed.

Figure 18 shows what additional turnover the surveyed businesses thought they would gain if digital constraints were removed.

Figure 18: Per cent increase in their turnover estimated by businesses if digital constraints were removed



Source: project survey of UK rural businesses. Base: 671

All economic impact work needs to be undertaken and interpreted with a degree of caution. In order to gross up the data from these survey questions, a number of assumptions have had to be made. They include that:

- The maximum turnover which could have been lost is capped at 100%;
- The maximum turnover which could in future be gained is capped at 100%;
- Turnover of businesses is assumed to be the mid-point within their turnover band;
- Except for the smallest (less than £25,000 band) where a turnover of £20,000 has been assumed and the highest (above (£1 million band) where a turnover of £1 million has been assumed;
- Businesses have made a reasonable estimation of the impact of digital constraints;
- Digital potential could be realised by all businesses. In practice early adopters may realise the highest gains and there could be diminishing marginal gains thereafter.

It should also be repeated that the estimates produced are for predominantly rural local authority areas (where more than half the population lives in small/rural settlements). By definition they can therefore include some larger/urban settlements and conversely local authorities not defined as predominantly rural can include some small/rural settlements.

Table 9 shows the median and mean responses to the questions about turnover lost and potential turnover gain for rural businesses in the different sectors, turnover bands and employee sizes. It can be seen that these average are affected by some larger values within

the body of survey responses. This explains why the median figures are consistently less than the mean figures.

It is also notable that the figures given for lost turnover last year are less than those for turnover gain if constraints could be removed. For example, businesses in the agriculture/ forestry/ fishing sector estimated that they lost 5% of turnover (median value) last year, but consider they could add 10% to their future turnover if digital constraints were removed.

Table 9: Median and mean turnover potential from digital constraints last year and from removing digital constraints

	Lost turnover last year		Turnover gain potential		Populations used in calculation		
	Median	Mean	Median	Mean	Survey (n)	Survey %	IDBR %
Agriculture/forestry/fishing	5%	13%	10%	19%	118	17%	14%
Manufacturing	10%	18%	20%	24%	30	4%	6%
Construction	10%	15%	20%	22%	17	2%	11%
Motor trades	10%	12%	20%	22%	5	1%	3%
Wholesale	8%	13%	20%	22%	6	1%	4%
Retail	10%	14%	20%	23%	42	6%	9%
Transport + storage	10%	13%	20%	19%	8	1%	3%
Accom + food services	10%	15%	20%	21%	80	11%	6%
Information/comms	15%	24%	20%	29%	79	11%	4%
Finance + insurance	4%	8%	10%	19%	14	2%	2%
Property	5%	10%	10%	15%	19	3%	3%
Professional/tech/science	10%	12%	10%	20%	103	15%	13%
Business admin/support	10%	14%	20%	22%	57	8%	7%
Public admin + defence	1%	7%	0%	7%	18	3%	1%
Education	10%	12%	10%	22%	32	5%	2%
Health	8%	15%	20%	33%	18	3%	5%
Arts/entertainm't/recreation	5%	10%	10%	15%	59	8%	6%
<i>Above sectors grouped:</i>							
Primary/manuf/construction	5%	14%	10%	20%	149	21%	31%
Retail, transport, food	10%	15%	20%	21%	122	17%	25%
Business services	10%	15%	20%	23%	238	34%	29%
Other services	5%	13%	10%	18%	198	28%	15%
<i>Turnover:</i>							
£0 to £99,999	10%	15%	10%	22%	426	60%	42%
£100,000 to £499,999	10%	14%	20%	21%	169	24%	43%
£500,000 plus	5%	11%	10%	17%	114	16%	15%
<i>Size (employees):</i>							
Micro (0 to 9)	10%	15%	10%	21%	665	83%	90%
Small (10 to 49)	8%	12%	10%	17%	86	11%	9%
Medium (50 to 249)	8%	11%	10%	19%	24	3%	1%
Large (250 plus)	8%	15%	10%	19%	24	3%	<1%

Sources: project business survey and Inter-Departmental Business Survey

The figures above have been applied to IDBR data about the profile of businesses in predominantly rural local authority areas, to estimate the digital potential in the rural economy of the UK. Six estimates have been produced all of which relate to the additional turnover that businesses in these rural areas might realise. Two estimates have been calculated using turnover data, two have been calculated using business size (employees) data and two have been calculated using data about sectors. In each of these three cases there is one estimate based on what surveyed businesses said they lost last year as a result of digital constraints and one estimate based on what surveyed businesses considered they might gain if digital constraints were removed.

As the three tables below show, the estimates for digital potential range from £14.9 billion up to £34.1 billion of additional business turnover. We can therefore conclude that if digital constraints are removed and the unlocked digital potential is realised it would generate an estimated £15 billion or more in additional business turnover.

Table 10: Digital cost and digital potential extrapolated to predominantly rural areas using business turnover

Turnover band	Digital constraint last year		Digital potential in future	
	Survey average	Rural UK est.	Survey average	Rural UK est.
£0 to £49,999	£3,821	£0.5 billion	£5,537	£0.7 billion
£50,000 to £99,999	£9,936	£1.5 billion	£15,286	£2.3 billion
£100,000 to £249,999	£26,329	£5.3 billion	£38,468	£7.8 billion
£250,000 to 499,999	£50,302	£4.2 billion	£69,181	£5.8 billion
£500,000 to £999,999	£57,500	£2.7 billion	£100,000	£4.7 billion
£1,000,000 plus	£119,872	£6.2 billion	£184,615	£9.6 billion
Total predominantly rural UK areas		£20.4 billion		£30.9 billion

Table 11: Digital cost and digital potential extrapolated to predominantly rural areas using business size (employees)

Employees	Digital constraint last year		Digital potential in future	
	Survey average	Rural UK est.	Survey average	Rural UK est.
Micro (0 to 9)	£15,767	£9.4 billion	£23,344	£14.0 billion
Small (10 to 49)	£80,809	£4.6 billion	£121,171	£6.9 billion
Medium (50 to 249)	£80,286	£0.7 billion	£170,595	£1.4 billion
Large (250 plus)	£133,667	£0.2 billion	£172,556	£0.3 billion
Total predominantly rural UK areas		£14.9 billion		£22.6 billion

Table 12: Digital cost and digital potential extrapolated to predominantly rural areas using business sectors (grouped)

Sectors	Digital constraint last year		Digital potential in future	
	Survey average	Rural UK est.	Survey average	Rural UK est.
Primary, manuf., construction	£29,049	£6.9 billion	£53,767	£12.8 billion
Retail, transport, food	£34,677	£6.7 billion	£49,955	£9.6 billion
Business services	£21,467	£4.8 billion	£33,756	£7.5 billion
Other services	£29,397	£3.3 billion	£37,409	£4.2 billion
Total predominantly rural UK areas		£21.6 billion		£34.1 billion

The turnover figures can be converted into estimates for GVA impact by applying the GVA multiplier effect in the UK Input-Output table produced by the Office for National Statistics (ONS). This can take some account of the particular mix of business sectors in predominantly rural areas. However, one limitation should be noted. Namely that the multipliers provided by ONS for different sectors are not available at the level of SIC code divisions (used by the IDBR). This could be important as the multipliers vary considerably, from 0.163 in the refined petroleum products sector to 1.000 in the domestic services sector. In other words, an additional £1,000 of turnover could generate between £163 and £1,000 of additional GVA depending on the particular industry.

With that note of caution, the estimates for additional GVA are shown in the three tables below. The six estimates provide figures in the range £12.0 to £26.4 billion of additional GVA (derived from the six figures above for turnover). We can therefore conclude that if digital constraints are removed and the unlocked digital potential is realised it would result in an estimated £12 billion or more of additional GVA.

Table 13: Estimated GVA loss or gain extrapolated to predominantly rural areas using business turnover

Turnover band	Estimated GVA	Digital constraint last year	Digital potential in future
		Lost GVA	GVA potential
£0 to £49,999	£2.8 billion	£0.4 billion	£0.6 billion
£50,000 to £99,999	£8.9 billion	£1.2 billion	£1.8 billion
£100,000 to £249,999	£28.1 billion	£4.2 billion	£6.1 billion
£250,000 to 499,999	£24.3 billion	£3.4 billion	£4.6 billion
£500,000 to £999,999	£27.8 billion	£2.2 billion	£3.7 billion
£1,000,000 plus	£41.3 billion	£5.1 billion	£7.7 billion
Totals	£133.2 billion	£16.4 billion	£24.5 billion

Table 14: Estimated GVA loss or gain extrapolated to predominantly rural areas using business size (employees)

		Digital constraint last year	Digital potential in future
Employees	Estimated GVA	Lost GVA	GVA potential
Micro (0 to 9)	£59.0 billion	£7.5 billion	£11.0 billion
Small (10 to 49)	£31.9 billion	£3.8 billion	£5.6 billion
Medium (50 to 249)	£5.7 billion	£0.5 billion	£1.1 billion
Large (250 plus)	£1.2 billion	£0.2 billion	£0.2 billion
Totals	£97.8 billion	£12.0 billion	£17.9 billion

Table 15: Estimated GVA loss or gain extrapolated to predominantly rural areas using business sectors (grouped)

		Digital constraint last year	Digital potential in future
Sectors	Estimated GVA	Lost GVA	GVA potential
Primary, manuf., construction	£47.6 billion	£4.7 billion	£8.6 billion
Retail, transport, food	£40.6 billion	£5.3 billion	£7.7 billion
Business services	£31.6 billion	£4.1 billion	£6.4 billion
Other services	£22.0 billion	£2.9 billion	£3.6 billion
Totals	£141.9 billion	£16.9 billion	£26.4 billion

As an indication, if the lowest estimate (£12.0 billion) or the highest estimate (£26.4 billion) of additional GVA were to be apportioned among the different regions or parts of the UK according to the share of rural businesses located in each region or part, it would give the figures in the following table.

Table 16: Apportionment of estimated GVA increase to regions or parts of the UK

Regions and parts of the UK	Share of rural businesses	Share of additional GVA (lowest estimate)	Share of additional GVA (highest estimate)
North East	3.9%	£0.5 billion	£1.0 billion
North West	3.7%	£0.4 billion	£1.0 billion
Yorks & Humberside	4.8%	£0.6 billion	£1.3 billion
East Midlands	11.4%	£1.4 billion	£3.0 billion
West Midlands	7.5%	£0.9 billion	£2.0 billion
Eastern	14.3%	£1.7 billion	£3.8 billion
South East	13.6%	£1.6 billion	£3.6 billion
South West	18.4%	£2.2 billion	£4.9 billion
Scotland	9.6%	£1.2 billion	£2.5 billion
Wales	7.1%	£0.9 billion	£1.9 billion
Northern Ireland	5.7%	£0.7 billion	£1.5 billion
UK Total	100.0%	£12.0 billion	£26.4 billion

Footnote: GVA figures add to very slightly over £12.0 billion and £26.4 billion due to rounding.

Case study: Juma Communications, Derbyshire

Interview with Richard McLachlan (Director)

Juma Communications supplies specialist parts for communication systems, with products ranging from simple earpieces and microphones to military standard headsets and radio PTT (push to talk) interfaces. Richard explained it more simply as, “supplying highly technical things that plug into radios”.

The business operates from converted farm buildings at a rural location in the Derbyshire Dales, five miles from Ashbourne and ten miles from Derby. This thriving business has been operating for five years and now has a turnover approaching £2m. It employs three full-time and two part-time people. The employees have many years of experience within the communications and audio accessories industry and three of them are family members.

The business is totally dependent on the internet, as all communications with suppliers and customers are via laptops and iPhones. Their previous premises had a local microwave based system which “was OK, but a little flaky” and the fact that “fibre passes the door” was a key reason for the firm’s relocation to its current premises in July 2017. The IT system is now all cloud based, which has been a major benefit to the business, particularly in facilitating an improved accounting system. Although mobile communications are described as “not particularly brilliant locally”, this has not proved to be too much of an issue.

The business imports products, mostly from the United States and the Far East, and sells them to organisations with specialist communications needs, including the police, fire service and security guards. About half of the sales are within the UK and half are exported, predominantly to Europe. The products are so specialist that the business knows who its customers are and operates on a person-to-person basis, rather than through wider advertising. Although there is not a need to sell directly online, they have a website which lists their products, which they manage from within the business.

The business is conveniently located for its employees, none of whom has more than a ten mile commute. Whilst there were some alternative locations available on business parks, the rural ambience is important to Richard to the extent that he says the business would not have been set-up in an urban location. Their rural premises are well-suited to the business’s current and foreseeable needs and are less expensive than many urban options. “More pleasant, cheaper and a lot less hassle”, as Richard succinctly observes.

7. Conclusions and recommendations

This concluding chapter builds upon the wide ranging findings from this research project to offer some over-arching comments and to outline a number of policy recommendations.

Concluding comments

This research and its survey findings show that – to a significant extent – rural businesses are living up to the aspiration of the UK Government’s Digital Strategy, that every business should be a ‘digital business’. Rural businesses are typically using a mix of digital devices and employing a broad range of digital applications. It is notable, for example, that 62% use cloud computing and 75% use social media. It is equally notable that more than four in five exporting businesses had made use of e-commerce in the last year.

There is also evidence that digital take-up is bringing significant benefits to these rural businesses. They recognise benefits that span business processes and management, promotion of products and services, and their ability to sell into markets. These are impacting on business efficiency, turnover and profitability. Those businesses which have superfast connectivity are most positive about the benefits that digital take-up has delivered.

“In addition to increasing our sales revenue by utilising multi-channel selling (including our own website, Ebay and Amazon), digital connectivity has enabled us to communicate effectively with and retain our existing local customers. We are able to promote our business to our local customers as an outward looking, competitive business ... This has ultimately enabled us to keep the door of our bricks and mortar shop open.” (Business survey respondent)

There is widespread recognition among rural business owners and managers that further increasing that digital take-up will be of considerable importance to the future of their businesses. Indeed, many take the view current or upcoming digital developments, such as cloud computing, 5G mobile networks and the internet of things, will prove relevant to them.

In short, the rural economy of the UK should not be characterised as a digital back water. For the most part it is plugged in and aspiring to up its digital game.

However, it seems fair to conclude that that aspiration is being checked by certain constraints. Although this research project is not primarily about the availability of broadband and mobile networks, there is no disguising the evidence that poor connectivity remains an issue. Large proportions of the surveyed rural businesses express frustration about the connection speeds and reliability they experience. Whilst a few predominantly rural local authority areas stand out as having good connectivity¹², they are still the exception.

¹² Areas such as the Isles of Scilly, Isle of Wight, West Oxfordshire and Huntingdonshire.

“Poor connectivity makes us reluctant to develop the online side of our business ... which holds back growth, makes it difficult to modernise our systems and means sharing data within our business is difficult.” (Business survey respondent)

Of particular interest for this project is that, even when such concerns about network connectivity are put aside, more than half (52%) the rural businesses surveyed identified some other constraint which has reduced their ability to go digital. For smaller businesses this concern most often relates to accessing external or outsourced digital support. For larger businesses it most often refers to their ability to recruit staff with appropriate digital skills. If the digital potential of the UK's rural economy – estimated by this research to be at least £15 billion in turnover and £12 billion in GVA – is to be unlocked, these constraints will need to be addressed or at least ameliorated. This would provide a significant productivity boost to the UK economy.

There is some variation in digital take-up and use across rural businesses in different locations and sectors, although this should not be exaggerated. There is, for example, greater superfast connectivity in the north of England and greater adoption of online selling in Scotland, Wales and Northern Ireland. There is similarly greater superfast connectivity in the information/communications and finance/insurance sectors, and greater adoption of online selling in the retail and accommodation/food sectors.

Two factors which have been found to impact on the benefits from and constraints to digital take-up are: business size; and the type of digital connection. Businesses with superfast connectivity are much more positive about the benefits they have derived.

Recently formed businesses (in the last two years) make broadly similar use of digital to more established businesses. They are, however, high users of social media and they appear to face fewer digital constraints.

It seems reasonable to conclude that all types of rural business have gained from going digital and the benefits are widespread. It almost certainly assists diversification of the rural economy, with those sectors which remain under-represented in rural areas (such as finance/insurance and information/communications) being among those where digital take-up is most evident. These have potential to bring in better paid employment opportunities. Yet traditional sectors, such as agriculture and rural tourism, are also clear beneficiaries – not least from improved mobile phone networks. Looking forward, high-tech developments could prove as revolutionary for agriculture as for almost any other sector.

Some businesses may decide to relocate for better connectivity or to address their digital needs. Indeed, a fairly small proportion of the surveyed businesses had already done so, though typically these appear to have made a fairly local move. (The project did not, of course, test for a reverse flow of urban businesses which could have left rural locations.)

“It [digital] provides me with many things that I value on a personal front combined with the space I need on a professional front. However, the lack of fast internet connectivity is a significant hindrance to my business and productivity.” (Business survey respondent)

However, it is clear businesses locate to or remain in rural locations for a variety of reasons. They may trade-off those reasons against any digital constraints and they may find ways around such constraints. This project has found that many rural-based businesses place a high value on one or more of the following:

- Work-life balance, including not having to commute to urban centres on busy roads;
- Rural environment, including working in a beautiful, safer and more tranquil setting;
- Sense of community, including working within a friendly, small community;
- Cost of premises, including lower overheads which assists competitiveness; and
- Valued staff, not least having committed and sometimes resourceful employees.

Furthermore, it finds that one person businesses are more likely (than other businesses) to be the result of a move for lifestyle reasons.

Of course, certain businesses – such as those in the agriculture and rural tourism sectors – have little option about their location.

Evidence drawn from the expert interviews is, that the tech sector could, itself, locate in rural areas and it has established one tech cluster at St Ives in Cornwall. However, good digital infrastructure is unlikely to be sufficient to attract it to rural areas. The sector prefers being where similar businesses are located: where it can network and access an appropriately skilled workforce. Areas accessible to London or existing city tech clusters (such as Edinburgh, South Wales, Oxford and Brighton) are the most likely rural locations to deliver these attributes.

There is good evidence that digital has enabled many businesses to provide staff in certain types of jobs with some flexibility in their work patterns, including scope for working remotely or from home. Whilst the project did not survey urban-based businesses, it seems fair to add that this applies to their staff, some of whom may work from a rural (home) location for at least part of their working week. This can reduce commuting and improve work-life balance for employees and reduce an employer's requirement for office space. There could be further benefits for rural communities if more home working residents are around during the day, for example if they make use of local services.

It is fair to ask whether rural, as a distinct concept, still matters in a modern, digitally connected economy. Can rural areas any longer be differentiated from their urban counterparts as a business location? Undoubtedly, the evidence is that those differences have shrunk, with digital connectivity and digital applications reducing some inherent constraints for businesses trading in a rural location. However, such differences have not yet disappeared and seem unlikely to vanish in the near future. Network connectivity and reliability remain a substantial challenge, and there are other issues which likely have a rural dimension, such as access to a skilled workforce and to resources such as digital support. That is not to say those constraints could not be actively addressed and reduced by appropriate policy actions.

Recommendations

The following recommendations are suggested in order to tackle the key constraints identified, to promote digital take-up by rural-based businesses and to increase productivity

in the UK's rural economy. They will require action by a range of different public and private sector organisations at national and local levels. Ultimately public sector initiative will only succeed if action is taken, too, by individual rural businesses.

The recommendations made below take account of two key points that flow from this research. First, the greatest potential from increasing digital adoption in rural areas is to be had by assisting the bulk of ordinary small and micro businesses to up their digital game. Whilst the role of technology-driven businesses should certainly not be overlooked, it is increasing digital adoption across other sectors (such as agriculture, retail, tourism, construction, leisure and business services) which will pay the highest rural productivity dividend. It therefore makes sense to target support broadly and across sectors.

Second, the benefits from the public sector's sizeable investment in superfast and mobile networks will only be properly realised if other identified constraints to digital adoption are addressed in parallel. As noted above, this research finds that, setting aside the much-discussed connectivity issues, over half of rural businesses face some other type of constraint to digital take-up, which is holding back their performance.

In making these recommendations, account has been taken of the fact that various potentially relevant digital policy initiatives and programmes already exist. However, these are national and are not rural-specific. Rather than proposing similar or parallel rural structures, it is proposed that the existing national initiatives and programmes are flexed to take better account of rural business needs – a policy approach sometimes referred to as 'rural proofing'. This would overcome the tendency for them to be urban-focussed or to overlook rural opportunities.

The recommendations made fall under five themes:

- Simpler signposting to digital support and information
- Better access to support, including digital enterprise hubs
- Smarter digital training and skills development
- Faster and more reliable rural digital connectivity
- Stronger rural targeting by existing policies and strategies

Theme: Simpler signposting to digital support and information

External digital support: large numbers of rural businesses (especially micro-businesses) cited finding external or outsourced digital support as a constraint they experienced. This could reflect under-provision in the market or geographic gaps in provision, but equally there could be other factors such as low awareness of support that exists or identifying responsive and trusted providers. No doubt many businesses overcome such concerns through word-of-mouth recommendations. Local areas should consider creating a directory of providers of digital or IT support (perhaps based on the checker trade principle of client endorsement). This could also offer assistance for new entrant providers to promote their services.

Single information portal: various recommendations refer to the provision of better information to rural businesses: for example, about training opportunities or resources and about using e-commerce. Businesses are equally likely to seek information on other topics, such as the roll out of superfast networks in their area and reducing cyber-security risks.

This information is often scattered across multiple websites and is mixed in with material on other topics. Local public sector organisations who provide such information should consider pooling it on one portal website or webpage. This will help address confusion about where best to search and make it simpler for businesses to find resources. One useful example which has been identified is the DigitalBoost website of Scotland's Business Gateway.

Theme: Better access to support, including digital enterprise hubs

Digital enterprise hubs: rural and market towns need to stay relevant and in some cases to reinvent themselves for the modern economy. More towns should explore the scope to create or support a viable enterprise hub, offering high-spec connectivity, training space for local business people, and rentable workspace for home workers, flexi-workers and start-ups. There are many locations where such hubs have been established as commercial or social enterprises in their own right. Local Enterprise Partnerships and Combined Authorities (where they exist) should consider how the proposed Local Industrial Strategies and Growth Deals due to commence in 2019 could encourage more hubs in rural towns.

E-commerce: as a result of e-commerce it has become much easier for rural-based businesses to sell goods and services into international markets. Indeed, third party e-commerce websites have simplified that (perhaps daunting) step, making it much easier to 'have a go'. This could be particularly relevant for the very small businesses that predominate in rural areas. Regional enterprise agencies, Local Enterprise Partnerships and local authorities should recognise the potential of such businesses within their training and advice activities to encourage exports. To this end, they should consider working more closely with third party e-commerce companies so they can provide guidance on their websites about e-commerce sites as an export option.

Theme: Smarter digital training and skills development

Workforce digital skills: the main constraint for larger and medium sized rural businesses is difficulty recruiting employees with appropriate digital skills. This may be particularly challenging in less populous or remoter rural labour markets. It will require collaborative local effort by colleges, universities and employers – including SMEs – to deliver qualifications which reflect local labour markets and courses which are accessible to rural students. Most rural areas suffer an outflow of young people, in-part because employment options are limited and often poorly paid. Making more of the digital skills of those entering the workforce could both assist rural-based businesses and provide better job opportunities for young people. The proposed new digital T-level qualifications could be a key part of the approach. Another aspect could involve rural FE colleges retraining those from older working age groups under the digital element of the new National Retraining Scheme.

Individual rural businesses should be encouraged to set aside a portion of their training budget for digital training, with a particular focus on skills or learning that will increase their productivity.

Digital skills in small businesses: another means to help address the digital support needs of small rural businesses is to improve the digital skills of small business owners and

their staff. This will give more the confidence and skills to manage their digital needs in-house. A two pronged approach is recommended. Local Enterprise Partnerships and Business Gateway in Scotland should (where they do not already) offer short training courses to boost IT skills in locations that are accessible to their rural business community. However, to meet the likely range of training needs and to reach other businesses, they should also promote online training material, which is now widely available (see, for example, those hosted on the Do It Digital website). Again, other organisations based within rural areas (including the private sector, itself) could assist this promotional effort.

Theme: Faster business adoption of digital connectivity

Superfast take-up: for a variety of reasons most rural businesses which can access a superfast broadband connection have not yet done so. Yet those which have report significant business benefits. There is therefore still a need to promote the advantages of superfast connectivity. This needs clear messages that upgrading is simple to do, that there are tangible business benefits and to allay some perceived obstacles (including about costs). To reach as many businesses as possible with these messages, Local Enterprise Partnerships, local authorities, regional enterprise and economic development agencies should engage with local business networks and professional or trade bodies, such as Chambers of Commerce, Federation of Small Business branches and Tourism Associations to get the message across.

Rural businesses which have already taken up superfast broadband should be encouraged to champion the benefits to their peers, providing practical, real world examples that other businesses will relate to.

Theme: Stronger rural targeting by existing policies and strategies

Digital and Industrial Strategies: Government's across the UK should exploit rural opportunities when implementing their Economic, Digital and Industrial Strategies (an example being, Delivering a Digital Wales). The 'outside-in' approach in A Digital Strategy for Scotland, which prioritises action in hard-to-reach rural areas, is an interesting approach to geographic targeting which bears wider consideration. It may, in future, be complemented by a Scottish Government proposal within its Scotland (Islands) Bill, which would place a duty on public bodies to have particular regard for island communities when developing policies, strategies or services. Remote areas, like the islands, face particular economic challenges and have some of the weakest access to digital networks, yet could benefit particularly from greater digital adoption.

The direction and priorities in the various Strategies from across the UK, and the initiatives which sit underneath them, have much to commend them and are highly relevant to rural business needs. However, rural benefits will not automatically accrue without some 'rural proofing'. Examples of how this could be addressed include:

- Making sure there are rural representatives sitting on key groups, such as the Productivity Council and Digital Skills Taskforce, to act as a voice on rural needs;
- Piloting or testing new initiatives in rural areas, such as the Digital Catapult Centres, which are currently all located in large urban places; and

- Designing funding streams, such as the National Productivity Investment Fund, to ensure that they target and benefit rural areas.

Rural productivity: the UK Government Industrial Strategy (Building a Britain fit for the future) recognises that raising productivity cannot be achieved simply by supporting a few high-performing sectors, but must also involve providing help for what it calls, “the long tail of lower productivity firms”. To that end, it proposes setting up a review of the actions that will help the wider pool of smaller businesses to grow and improve their productivity. Defra should work with the responsible Department (BEIS) on a rural strand to this review, to ensure that the needs of the quarter of UK businesses which are rural based are fully considered. Whilst improved productivity is driven by various factors, the evidence from this research is that digital adoption is a major contributor. Similar sentiments are expressed in Scotland’s Economic and Digital Strategies, and in the Productivity Leadership Group’s new campaign, Be The Business.

Rural economy support programmes: the current LEADER and EAFRD rural support programmes will cease after the UK leaves the European Union, as will wider Structural Fund programmes which some rural areas benefit from. This provides an opportunity to design replacement programmes – which recycle current public funding – to meet needs seen as rural economic priorities within England, Scotland, Wales and Northern Ireland. The EU programmes have tended to focus rather narrowly on support for land-based sectors, food and drink businesses, rural tourism and farm diversification. In future the approach should better recognise the breadth of the rural economy and address business issues such as digital skills and digital growth. Part of the Government’s proposed Shared Prosperity Fund (to replace EU funding streams) should be used for a dedicated rural programme capable of supporting the digital needs of rural based businesses.

Larger business policies: larger, technology-driven businesses should also consider adopting a policy to encourage digital take-up in rural areas, by offering to share their own good practice and provide practical advice or support to smaller businesses. Those that do so should be given credit for their efforts.

These recommendations could make a targeted and substantive difference to rural businesses and the rural economy, which this research has sought to assess in terms of turnover and GVA. If they at least serve to start a debate about appropriate actions to release more of the digital potential, they will have achieved something useful.

Examples of local action

It was not within the scope of this project to assess the digital support that is available to rural businesses in different local areas. However, three examples are noted below which appear to be of interest, in that they make substantive effort to address the constraints and opportunities found by this research.

D2N2 Digital Growth Programme

The D2N2 Growth Hub runs this programme across Derbyshire and Nottinghamshire. This delivers a wide ranging and programme of action planning workshops, which are free to attend. The thirty-three workshops taking place in January 2018 cover topics such as developing website content, converting website visits into sales, using social media, video marketing and understanding analytics. There are also two dedicated Digital Advisers able to provide bespoke advice to businesses seeking to expand their use of digital technologies.

Heart of the South West Digital Toolkit

Heart of the South West Growth Hub is delivering half-day business advice sessions, which are intended to be jargon-free, full of useful tips and focused on practical applications. These free events offer a mix of workshops and information about topics such as digital marketing, project management tools, flexible (digital) working, cyber trends and the Internet of Things. Business advisers from the Growth Hub are on hand to discuss related support programmes, grants and opportunities.

HIE Digital Engagement Programme

Highlands and Inlands Enterprise have helped more than 450 businesses to draw up a digital action plan and have made vouchers available to assist those businesses with taking forward the identified actions. From 2017 they have run a Digital Engagement Programme, offering digital master classes and ongoing one-to-one support to their clients. HIE are also launching a Cyberstrong project, to support businesses in improving their knowledge and response to cyber security risks.

Appendix A

Creating a UK rural definition

This appendix provides some further information about the work to create some rural statistics which describe the UK rural economy and rural connectivity across the UK. This required the development of a consistent UK-wide definition of rural areas, which could be applied to the economic and connectivity data sets. No UK-wide definition of rural existed, with each part of the UK having its own approach.

England

The Office for National Statistics (ONS) has a detailed definition of rural and urban settlements, based on Output Area data from the 2011 Census. It defines all settlements with a population below 10,000 (plus some slightly larger hub towns) as being 'rural'. In practice this definition covers smaller towns, villages, hamlets and isolated dwellings. According to this definition 17% of England's population is rural. It should be noted that the Census provides a fair amount of labour market data, but no data about businesses.

Indeed, only certain datasets are available at such a small area level and so are capable of being matched to settlements. The ONS and Defra have, therefore, also classified local authority areas according to their degree of rurality. The two most rural categories of local authority districts (or unitaries) are called: Mainly Rural (50 LAs where at least 80% of their population live in rural settlements); and Largely Rural (41 LAs where between 50% and 79% do). They are often combined into a single Predominantly Rural grouping, where more than half the population live in rural settlements. There is another category of interest, which is Urban with Significant Rural (54 LAs where between 26% and 49% do).

For further details see, 2011 Census Rural Urban Classification (Defra):

<https://www.gov.uk/government/collections/rural-urban-classification>

Scotland

The Scottish Government updated its definitions in 2013/14, based upon settlement size and drive times (the latter to differentiate accessible areas from remote areas). In this case rural settlements are those with a population of less than 3,000. There is another category called small towns, which are settlements with a population between 3,000 and 10,000. Rural and small town settlements are further defined as accessible if they are within a 30 minutes drive time of a settlement that has a population of at least 10,000 or defined as remote if they are not. By these definitions 18% of Scotland's population live in rural settlements and 13% live in small towns.

Local authority areas were used as the basis for something called the Randall classification, which was produced prior to the 2011 Census. This was used by the Scottish Government as a classification of rural and other local authorities. It defines rural as an authority that has a population density of less than 1 person per hectare. This approach classified 14 of Scotland's 32 local authorities as rural.

For further details see, Urban/Rural Classification 2013-14 (Scottish Government):
<http://www.gov.scot/Publications/2014/11/2763/downloads>

Wales

The Welsh Government recognises there are different ways of defining 'rural' for different purposes. However, like England, it also makes use of the settlements with a population below 10,000 measure, based upon 2011 Census data from the ONS. Essentially the same Census method is used in England and in Wales, though two variants were produced in Wales (one of which breaks up certain settlements into sub-divisions). According to the Wider Built-Up Areas variant 33% of the Welsh population lives in rural settlements.

Local authorities, which in Wales are all unitary councils, have been classified into one rural and three urban categories. This work was carried out prior to the 2011 Census and does not appear to have been updated since. Nine local authorities were rural, many of them large in land area and again containing 33% of the Welsh population.

Although there is no post-2011 update, a Welsh Government document on the settlement definition contains 2011 Census rural statistics at a local authority level. From this we can discern that all nine local authorities previously defined as rural would still meet that definition (and would be consistent with the Predominantly Rural group used in England).

For further details see, Best Fit of Lower Super Output Areas to Built Up Areas 2011 (Welsh Government):
<http://gov.wales/statistics-and-research/best-fit-lower-super-output-areas-to-built-up-areas/?lang=en>

Northern Ireland

The Northern Ireland Statistics and Research Agency (NISRA) published a review of its rural definition in 2015, making use of Small Areas data from the 2011 Census. This review contains a settlement based definition of rural and urban places. In this work rural settlements are defined as those with a population below 5,000. Some 37% of the Northern Irish population lives in these rural settlements. As in Scotland, accessibility/remoteness is considered and the NISRA review identifies places within or beyond given drive times to settlements of at least 10,000 residents. These drive times were 20, 30, 45 and 60 minutes.

Whilst not defined as rural by NISRA, information about settlements with a population between 5,000 and 10,000 is shown. There are fifteen such settlements.

No classification of local government areas in the province has been found. Responses to the NISRA review indicate that some Northern Ireland Departments treat Belfast and Derry (or Londonderry) as urban. By default others may be being taken as rural.

For further details see: Urban – Rural Classification (Northern Ireland Statistics and Research Agency):
<https://www.nisra.gov.uk/support/geography/urban-rural-classification>

A UK definition

Although settlement definitions are more accurate than local authority area definitions, there are practical considerations. The key data sets to be analysed for this research project were readily available only at a local authority level. It therefore made sense to attempt a UK definition at that scale.

It was possible to produce an essentially consistent definition by using:

- England: the existing (2011 Census-based) definition of Predominantly Rural local authority areas;
- Scotland: the 2011 population living in rural settlements and small towns were added together and taken as a share of each local authority's total population;
- Wales: the pre-2011 Census definition of rural local authority areas was retained, having checked it against 2011 Census data to establish that nothing would be reclassified;
- Northern Ireland: the fifteen settlements with a population between 5,000 and 9,999 were added to the NISRA definition of rural settlements.

Hence, in all four parts of the UK the project defines as rural those local authority areas where at least half the population lives in a rural or small town settlement. Matching this definition are 91 local authority areas in England, 13 in Scotland, 9 in Wales and 5 in Northern Ireland. These are listed below and shown on a map in chapter one of the report.

It should be noted that an inconsistency in the definition remains. The English definition includes within its rural count so-called 'hub towns', which have a population over 10,000. These are slightly larger places which perform a particular market town function according to analysis of data about travel to work. Undertaking analysis to identify such places in other parts of the UK would be a sizeable research project in itself. However, it is fully acknowledged that were this done, some further local authorities in Scotland, Wales and Northern Ireland might become re-defined as rural.

England: list of predominantly rural local authority areas

In the North East: County Durham; Northumberland.

In the North West: Allerdale; Copeland; Eden; Ribble Valley; South Lakeland; Wyre.

In Yorkshire & Humberside: Craven; East Riding of Yorkshire; Hambleton; Richmondshire; Ryedale; Selby.

In the East Midlands: Bassetlaw; Daventry; Derbyshire Dales; East Lindsey; East Northamptonshire; Harborough; High Peak; Hinckley & Bosworth; Melton; Newark & Sherwood; North Kesteven; North West Leicestershire; Rushcliffe; Rutland; South Holland; South Kesteven; South Northamptonshire; West Lindsey.

In the West Midlands: Herefordshire; Malvern Hills; North Warwickshire; Shropshire; Staffordshire Moorlands; Stratford on Avon; Wychavon.

In Eastern region: Babergh; Braintree; Breckland; Central Bedfordshire; East Cambridgeshire; Fenland; Forest Heath; Huntingdonshire; King's Lynn & West Norfolk; Maldon; Mid Suffolk; North Norfolk; South Cambridgeshire; South Norfolk; St Edmundsbury; Suffolk Coastal; Tendring; Uttlesford.

In the South East: Aylesbury Vale; Chichester; East Hampshire; Horsham; Isle of Wight; Rother; Sevenoaks; South Oxfordshire; Swale; Vale of White Horse; Waverley; Wealden; West Oxfordshire; Winchester.

In the South West: Cornwall; Cotswold; East Devon; Forest of Dean; Isles of Scilly; Mendip; Mid Devon; North Devon; North Dorset; Purbeck; Sedgemoor; South Hams; South Somerset; Teignbridge; Tewkesbury; Torridge; West Devon; West Dorset; West Somerset; Wiltshire.

Scotland: list of predominantly rural local authority areas

Aberdeenshire, Argyll & Bute; Clackmannanshire; Dumfries & Galloway; East Ayrshire; East Lothian; Eilean Siar; Highland; Moray; Orkney; Perth & Kinross; Scottish Borders; and Shetland.

Wales: list of predominantly rural local authority areas

Anglesey; Carmarthenshire; Ceredigion; Conwy; Denbighshire; Gwynedd; Monmouthshire; Pembrokeshire; and Powys.

Northern Ireland: list of predominantly rural local authority areas

Armagh City, Banbridge & Craigavon; Causeway Coast & Glens; Fermanagh & Omagh; Mid Ulster; and Newry, Mourne & Down.

Appendix B

Survey of rural businesses

The rural business survey run as part of this research project generated 807 responses (though not all respondents completed every question). This level of response is sufficient to generate reasonably robust findings, so long as they are not disaggregated too far e.g. through complex cross-tabulations.

As with any self-completion survey, there can be larger numbers of responses from certain groups and fewer responses from other groups. Whilst there is evidence of this, the responses received are broadly considered to reflect a good spread across geographies, business sectors and business sizes. Comparisons with official statistics about rural businesses and populations were used to check that the survey responses were unlikely to be significantly skewed in ways that would distort the findings.

The following tables outline what types of rural businesses responded to the survey. Numbers in columns may not add exactly to 100% due to rounding.

Industrial sector of businesses	Per cent of all responses
Agriculture, forestry and fishing	15%
Mining and quarrying	0%
Manufacturing	4%
Construction	2%
Motor trades	1%
Wholesale	1%
Retail	5%
Transport and storage	1%
Accommodation and food services	10%
Financial and insurance services	2%
Information and communications services	10%
Property	2%
Professional, technical and scientific	13%
Business administration and support	7%
Public administration and defence	2%
Education	4%
Health and social care	2%
Arts, recreation and entertainment	7%
Not stated or other	12%

Base: 807 responses

Numbers employed by businesses	Per cent of all responses
Just the owner (no employee)	33%
Other micro business (1 to 9 employees)	50%
Small business (10 to 49 employees)	11%
Medium or large business (50+ employees)	7%
Not stated	1%

Base: 807 responses

Annual turnover of businesses	Per cent of all responses
Up to £24,999	27%
£25,000 to 49,999	13%
£50,000 to £99,999	13%
£100,000 to £249,999	14%
£250,000 to £999,999	11%
£1,000,000 or more	10%
Don't know or prefer not to say	12%

Base: 807 responses

Age of businesses	Per cent of all responses
Set up in last 2 years	12%
Set up 3 to 5 years ago	15%
Set up 6 to 10 years ago	16%
Set up 11 to 20 years ago	22%
Set up 21 to 50 years ago	23%
Set up more than 50 years ago	11%
Not stated or don't know	1%

Base: 807 responses

Business ownership	Per cent of all responses
Family owned	63%
Not family owned	37%

Base: 807 responses

Geography of businesses	Per cent of all (UK) responses
Scotland	5%
Wales	5%
Northern Ireland	5%
England (whole of)	76%
Not stated or incomplete	9%
North of England (NE, NW and YH regions)	24%
Midlands of England (EM and WM regions)	19%
South of England (East, SE and SW regions)	32%

Base: 807 responses

Relocation of business	Per cent of all responses
Has relocated in last five years	16%
Has not relocated in last five years	83%
Can't recall or don't know	1%

Base: 807 responses

Where relocated, reasons for doing so	Per cent of all responses
Personal/family reasons	35%
Lifestyle of quality of life	33%
To upsize	17%
To downsize	8%
To take advantage of better connectivity	8%
Other reasons	19%

Base: 131 responses

Whether business exported in last year	Per cent of all responses
Yes, it did export	24%
No, it did not export	74%
Can't recall or don't know	2%

Base: 807 responses

If exported in last year, where to	Per cent of all responses
European Union	84%
Non-EU countries in Europe	39%
United States of America	45%
Other parts of the world	53%
Can't recall or don't know	0%

Base: 194 responses

The following tables provide some statistics about the individuals (from rural businesses) who completed the survey form. Numbers in columns may not add exactly to 100% due to rounding.

Gender of respondent	Per cent of all responses
Female	44%
Male	54%
Prefer not to say	2%

Base: 807 responses

Age of respondent	Per cent of all responses
Up to age 34	4%
Age 35 to 44	13%
Age 45 to 54	31%
Age 55 or over	50%
Prefer not to say	2%

Base: 807 responses

Position of respondent	Per cent of all responses
Owner or proprietor	62%
Partner	10%
Managing director	8%
Chief Executive or non-executive director	4%
Chairperson or other board member	4%
Other positions	13%

Base: 807 responses

The final part of this appendix outlines the key statistics from the material about rural businesses' use of digital connectivity, devices and applications, plus their responses about digital benefits, digital constraints and exporting with e-commerce.

Internet connection type	Per cent of all responses
Superfast/Next Generation Access (24 Mbps)	19%
Standard broadband	59%
Non-broadband (including dial-up)	9%
Other	10%
Don't know or not applicable	3%

Base: 807 responses

How rate speed of connectivity	Per cent of all responses
Good rating (+5 or +4)	14%
Fairly neutral rating (+3 to -3)	48%
Poor rating (-4 or -5)	37%
Don't know	0%

Base: 781 responses

How rate reliability of connectivity	Per cent of all responses
Good rating (+5 or +4)	15%
Fairly neutral rating (+3 to -3)	60%
Poor rating (-4 or -5)	25%
Don't know	0%

Base: 781 responses

Digital devices important to business	Per cent of all responses
Smartphone	82%
Laptop computer	79%
Desktop computer	69%
Tablet	57%
Other	8%
Don't know or not applicable	0%

Base: 807 responses

Digital applications used by business	Per cent of all responses
Email and internet browsing	98%
Online business banking	86%
Accessing public services, advice and info	80%
Submitting business returns e.g. VAT	79%
Social media e.g. Twitter, Facebook	75%
Business website for advertising	64%
Working remotely	62%
Business website to provide info/expertise	62%
Cloud computing e.g. for backup or tasks	62%
Virtual meetings and conference calls	50%
Business website for online selling	36%
Selling through third party platform	22%
Other uses	10%
Don't know	0%

Base: 781 responses

Impacts of digital connectivity on business over the last five years	Significant positive	Significant negative
Profitability	19%	10%
Turnover	16%	9%
Business costs	16%	12%
Business staffing	7%	6%
Business efficiency	28%	19%
Business flexibility	25%	16%
Remote or home working	30%	19%
Product or service range	18%	10%
Access to markets (business footprint)	22%	10%
Access to customers and suppliers	29%	12%
Access to training, expertise and skills	15%	11%
Data storage and security	25%	14%

Base: 781 responses

Experienced and has reduced ability for digital connectivity in last five years	Per cent of all responses
Difficulty finding external or outsourced digital support	30%
Difficulty accessing appropriate external digital (IT) training for existing workforce	14%
Difficulty recruiting people with appropriate digital skills	13%
The business' existing workforce lacks sufficient digital skills	13%
Other difficulties	10%
Don't know or can't recall	8%
Business has not experienced any difficulties that reduced ability for digital connectivity	40%

Base: 781 responses

Agree or disagree with digital relevance statements	Strongly agree	Strongly disagree
I don't see digital connectivity as relevant to the business	4%	80%
I prefer to do as much business as possible without using digital connectivity	4%	60%
I have not really considered greater use of digital connectivity in the business	4%	56%
I would like to make more use of digital connectivity in the business	58%	4%
I see increasing digital connectivity use as critical to the future growth of the business	63%	6%

Base: 807 responses

Agree or disagree with cost constraint statements	Strongly agree	Strongly disagree
The cost of staff training required to increase use of digital connectivity is too expensive	6%	15%
The cost of hardware/infrastructure is too expensive to increase digital use	18%	15%
Monthly subscription costs are too expensive to increase digital use	21%	13%

Base: 807 responses

Digital developments considered relevant to businesses and their future growth	Per cent of all responses
Cloud computing (remote storage/processing)	67%
5G mobile (next generation mobile networks)	54%
Internet of Things (interconnected devices)	47%
Big data (that reveal/predict behaviours)	24%
Machine learning (programmes that learn by experience)	21%
Artificial intelligence (capable of deciding appropriate actions)	16%
Don't see digital development as relevant	6%
Don't know	8%

Base: 807 responses

If exporting, whether used e-commerce	Per cent of all responses
E-commerce used for some (5%+) of exports	83%
E-commerce used for at least 50% of exports	57%
E-commerce used for at least 90% of exports	50%
E-commerce used for all/100% of exports	41%

Base: 194 responses

Whether share of export revenue from e-commerce has grown in last year	Per cent of all responses
Increased by at least 5% share	25%
Stayed much the same (+5% to -5%)	48%
Decreased by at least 5% share	11%
Don't know	17%

Base: 193 responses

Whether share of export revenue from e-commerce is expected to grow next year	Per cent of all responses
Increase by at least 5% share	33%
Stay much the same (+5% to -5%)	41%
Decrease by at least 5% share	9%
Don't know	18%

Base: 193 responses

Appendix C

Estimating GVA impacts

The following average multipliers were used to convert business turnover figures into GVA figures (i.e. the GVA multiplier effect), taking account of the mix of business sectors that is found in predominantly rural local authority areas of the UK (according to IDBR data). They are averages of multipliers published for individual industries, which have had to be aggregated up to the level of standard industrial sectors (SIC) to make them usable in this research.

The multipliers for individual industries are produced and published by the Office for National Statistics and form part of its 2013 input-output data set.

SIC sector codes	Average multipliers (business turnover to GVA)	Sector groups used in economic impact calculations
A	0.636	Primary, manufacturing and construction sectors
B	0.789	
C	0.643	
D	0.605	
E	0.860	
F	0.782	
G	0.818	Retail, transport and food services
H	0.783	
I	0.765	
J	0.833	Business services
K	0.817	
L	0.928	
M	0.874	
N	0.856	
O	0.806	
P	0.939	Other services
Q	0.866	
R	0.817	
S	0.877	
T	1.000	

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