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Research Unit

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Superfast Broadband Business Exploitation Programme: Research
and Intelligence

Digital Maturity Economic Impact Report 2019

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Table of contents

Summary	1
1. Introduction	4
2. Case study performance	5
2.1. Cost and time efficiencies	6
2.2. Customer value	8
2.3. Sales and promotion	10
2.4. Innovation	11
3. Economic impact	13
3.1. How many Welsh SMEs might have been positively affected by the adoption and use of broadband-enabled services?	13
3.2. Numbers of Welsh SMEs positively affected (turnover and employment) by adoption and use of superfast broadband-enabled services	17
3.3. A comparison of SME effects in 2017, 2018 and 2019	21
3.4. Summary	23
4. Conclusion	25
References	27

List of figures

Figure 0-1 Estimated Welsh SMEs employment and turnover benefits from broadband adoption and use, by broadband type 1

List of tables

Table 2-1 2019 case study businesses – new and revisited businesses	5
Table 3-1 Size band analysis of enterprises active in Wales in 2019	14
Table 3-2 How many Welsh businesses are expected to have seen a turnover increase as a result of adoption and use of broadband-enabled services	15
Table 3-3 How many Welsh businesses are expected to have seen an employment increase as a result of adoption and use of broadband-enabled services	17
Table 3-4 Size band analysis of Welsh businesses and broadband adoption type	18
Table 3-5 How many Welsh businesses are expected to have seen a turnover increase as a result of adoption and use of superfast broadband-enabled services	19
Table 3-6 How many Welsh businesses are expected to have seen an employment increase as a result of adoption and use of superfast broadband-enabled services	21
Table 3-7 Broadband and superfast broadband comparisons	22

Summary

Deployment and effective use of broadband infrastructure and digital technologies lies at the heart of addressing Wales' regional economic performance challenges. The *Digital Maturity Economic Impact Report for Wales 2019* provides data on how the Welsh economy is adapting to the digital transition. It highlights the continued adoption and use of digital technologies by businesses and the impacts this has on regional productivity in Wales. This is important for Wales in order to bridge the regional prosperity gap with the UK.

Economic impacts are evident in the business case studies presented in the *Report*. These findings highlight that digitisation within a business is an ongoing process rather than an end in its own right. They point to growing use of technologies such as social media, cloud computing and videoconferencing across multiple business processes. They further demonstrate growing SME confidence in digital technology use, and its role in enabling efficiencies, improvements in the customer interface and innovation. These results highlight the importance of businesses gaining digital capabilities that will help them continue to evolve and sustain productivity benefits.

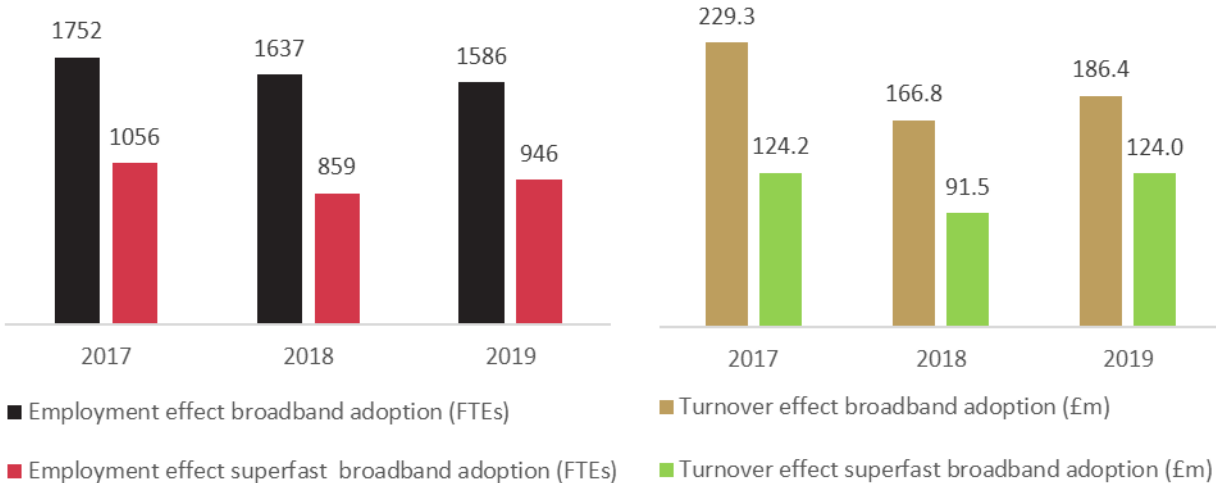
The *Report* draws on evidence from the *Digital Maturity Survey for Wales 2019* to estimate the effect of digital technologies and their potential impact on SME performance. It shows that 43% of SMEs that responded to the Survey had increased their turnover as a result of use of standard or superfast broadband. Positive effects were also noted with respect to employment, with 23% of SMEs reporting increased staffing as a result of broadband use.

The findings show that more than half of SMEs, who were able to estimate the percentage change in turnover due to superfast broadband use, reported an increase of up to 10%. Of those SMEs that had adopted superfast broadband and who provided an estimate of the employment change as a result of adoption, some 22.6% reported an increased effect. It should be noted however that several businesses pointed to the difficulty of providing precise percentages.

Analysis reveals that broadband enabled technology adoption and use could have improved turnover prospects for 110,800 SMEs (up from 102,600 SMEs in 2018) in Wales, of which 63,800 were superfast broadband users. Based on a conservative assessment of a 1% increase in turnover in affected SMEs, it is estimated that the total turnover for SMEs attributable to broadband adoption and use in Wales could be £186.4m (£124.0m was associated with superfast broadband users).

Estimates of the number of SMEs that may have seen employment effects are provided. This shows that 46,700 SMEs (of which 22,600 were superfast broadband users) could have seen a sustained employment increase resulting from broadband adoption and use. Based on the same illustrative 1% conservative assessment of the increase in employment in affected SMEs, it is estimated that employment attributable to broadband adoption could have increased by 1,586 (946 new employment opportunities were associated with superfast broadband users). The analysis shows that the employment and turnover benefits attributable to broadband adoption and use in standard adopters has declined, while superfast broadband adopters have seen an increase in both turnover and employment effects (see Figure 0-1). This points to the growing importance of faster broadband speeds to the outcomes achieved by businesses.

Figure 0-1 Estimated Welsh SMEs employment and turnover benefits from broadband adoption and use, by broadband type



The case-study data points strongly towards greater digital maturity and SME productivity improvements resulting from adoption and use of digital technologies, and that there continues to be an ongoing challenge of measuring economic impacts on the Welsh economy. To address this uncertainty the research team continue to use conservative measures for its assessment of the number of SMEs that have been positively affected in terms of turnover and employment.

Analysis of these findings will continue and will be presented in the final report of the project due by the end of 2020. To support this analysis and modelling of the economic impacts the research team will seek a robust survey response from SMEs during the Digital Maturity Survey 2020. Alongside the final report the research team also plan to hold a conference in the latter part of 2020.

This report was written by Dylan Henderson, Calvin Jones, Max Munday, Laura Norris, Laura Reynolds, Annette Roberts, Neil Roche and Chen Xu. Results of the survey and other research activities can be found at <http://www.cardiff.ac.uk/superfast-broadband-project>

1. Introduction

Cardiff Business School is examining the economic impacts associated with business use of superfast broadband in Wales. This report draws on evidence from the annual Digital Maturity Survey of Small and Medium Enterprises (SMEs), and case studies of business adoption and use of digital technologies enabled by superfast broadband. The research forms part of the Welsh Government's Superfast Broadband Business Exploitation (SFBE) project, part-funded by the European Regional Development Fund (ERDF).

Digital technologies and their use by business has been identified as one of the factors that may help SMEs to improve their productivity. This issue is particularly important to Wales and its sub regions as regional productivity is highly uneven, and reflected in low Gross Value Added per worker, relative to other parts of the UK. The research by Cardiff Business School has been examining the evolution of digital technology use since 2016, and points to the potential benefits to SMEs from the adoption of superfast broadband and associated digital technologies in areas such as turnover, profitability, innovation and employment growth. This evidence is demonstrating how broadband can lever productivity gains, and act as a component of economic convergence processes.

The economic impact research forms part of a wider programme of research undertaken by Cardiff Business School. The Report, for example, draws on data from the Digital Maturity Survey 2019. This provides a detailed analysis of economic impacts of superfast broadband use by businesses in Wales.

This report aims to:

- Present a framework for understanding economic impacts from business adoption and use of superfast broadband in Wales.
- Provide case study evidence of impacts resulting from business exploitation of superfast broadband in Wales.
- Develop an evidence-base for policymakers, to inform superfast broadband business support.

Results of all research activities, including Digital Maturity Surveys, case studies and horizon scanning research can be found at <http://www.cardiff.ac.uk/superfast-broadband-project>

The Report is structured as follows. Section 2 sets out evidence on the performance benefits associated with standard and superfast broadband use of a selection of case studies. The report then discusses the wider Welsh economic implications of broadband adoption and use (Section 3). The report concludes with implications/lessons for subsequent economic impact research (Section 4).

2. Case study performance

The case study aspect of the research elaborates how SMEs utilise both standard and superfast broadband access and the benefits that may come as a result. Interviews in 2019 consulted 11 businesses, two of which were revisits to understand how the activities of these businesses had evolved. Case studies were identified from respondents to the Digital Maturity Survey 2018, as well as from recommendations from our research partners (Welsh Government, Superfast Business Wales and the Superfast Broadband Business Exploitation Advisory Group). Each case study comprised an interview with the business owner or manager, plus analysis of supporting evidence (for example, a survey return). The businesses are from a range of industries, detailed in Table 2.1. The focus on the construction industry this year is due to the low level of returns to the Survey from this sector and a motivation to understand how the industry is being affected by digital rollout and use.

Table 2-1 2019 case study businesses – new and revisited businesses

New cases: Business name	Business activity	Location	Sector	Employees (FTEs)
<u>Accolade Executive Business Coaching</u>	Business coaching	South Wales East	Business and other services	2
<u>Bomper Studio</u>	Advertising	South Wales East	Business and other services	10
<u>Carreg Construction</u>	Specialist design construction	South Wales West	Construction	17
<u>Sophrology Wales</u>	Wellbeing practitioner	North Wales	Business and other services	3
<u>Wynne Construction</u>	Construction projects	North Wales	Construction	47
<u>L H Evans Ltd.</u>	Electrical wholesaler	South Wales East	Retail Wholesale /	108
<u>F. P. Hurley and Sons</u>	High value project Construction	South Wales East	Construction	143
<u>Diack Ltd</u>	Home automation	South Wales East	Construction	12
<u>Hazelwood Carpentry</u>	Carpentry	South Wales East	Construction	32
Revisit cases: Business name	Business activity	Location	Sector	Employees (FTEs)

<u>Melin Tregwynt</u>	Woollen mill and café	South West Wales	Manufacturing	26.5
<u>The White Room at Harlech Pottery</u>	Pottery and Sales	North Wales	Business and other services	2

Case studies were analysed using NVivo which is a qualitative data analysis software package, and coded under the themes of sales and promotion, efficiencies, customer value, and innovation. As in previous years, to ensure validity and consistency in the coding process, one researcher coded all case study transcripts.

Findings from the case studies are not intended to be generalisable to all businesses in Wales. Instead they provide in-depth evidence of the experiences of businesses that have adopted superfast broadband and illustrate the nature of impacts that are being achieved from using associated digital technologies.

2.1. Cost and time efficiencies

As with previous case study analysis, efficiencies remain the most remarked upon aspect of digital technology adoption. The streamlining of processes using digital technology create cost and time efficiencies, generating financial savings as a result. In some instances, where both cost and time benefits were achieved, there was also a positive impact on the environment through reduced travel and the promotion of a paperless office. Accolade Executive Business Coaching emphasised how they could operate an international business from their offices in Wales utilising digital technologies. Previously, to support their work in America and Canada the CEO would need to be out of the UK for several months taking multiple flights a week. The CEO can now operate remotely from the office. This in turn has saved a large sum of money and allowed the business to grow whilst retaining the same level of staffing, showing both time and money efficiencies achieved through digital technologies. The Calibre digital package used by Accolade Executive Business Coaching to replace this travelling, comes at a cost of around £40 per year.

“The only thing that has changed is that we decided to cut back on physical travel as we were away six in every ten months, so how we did that was to completely adopt digital technology, and to do that we kind of promoted ourselves to become as paperless as possible in the business... [We saved] probably about 50K in travel expenses every year...It's helped us so much not to have to put stress on the business. Because trying to cover travel time in your costings is difficult. So it's eliminated that, and meant we've become so much more competitive in the market”

Accolade Executive Business Coaching also felt that an important feature of the business was to be based in Wales, and that this has a positive effect on how the business is viewed internationally. This sentiment was also echoed by Bomper Studio who highlighted how they could work globally with clients as a result of superfast broadband, and at the same time “inject capital more evenly across Britain and across Wales”.

Digital technologies can allow a collaborative approach to the design process. The technology that is used by Bomper Studio allows the sharing of work-in-progress concepts that the client can then provide feedback on. The package allows track changes and saves all edits and comments. Superfast broadband access is vital to use this technology.

“Superfast broadband is really important for that because we wouldn't have access to it. But still we back everything up. It's also client feedback. We used to use email, we still do as well, but everyone knows what it is like to be in a super long email trail with people feeding in back and forth, and you are not really sure what your actions are anymore. Things are more organised with ftrack, so you can go back and just mark comments are completed, or as striking it off, and comment back to it. It just keeps all that communication in one place. Everything else we have a back-up for so all client files, projects, and different versions, we keep here. It's just client feedback that we are dependent on ftrack cloud based system.”

Digital technologies can also streamline paperwork processes and allow fast accountability reporting. Hazelwood Carpentry install fire safety doors, which may require proof of their standard of installation many years later. Digital technologies have allowed the business to expand but to do so in a controlled manner with better access to information for everyone. The streamlining and standardisation of communication between employees is instilled with digital forms, ensuring that staff enter data in the same format requiring less time and effort to interpret. Previously, difficulties had been experienced in interpreting the notes of others. These new processes have supported the significant expansion of the business without the requirement to take on more employees with particular expertise, saving the business around £70,000 a year in salaries. Alongside the accounting of safety procedures, the new technologies also support sustainability reporting and project management.

“Sustainability reporting is a breeze, it takes a photograph of every delivery note with it. That's in the delivery notes, we can search by data and by job and it will just automatically generate a file inside of 10 seconds that I can just email straight off.

Job costings before, if the boss wanted to find out where we were on a job...that would have been a two- or three-hour job to pull all that information together for a very stressed-out accounts lady. Now: press a button, the report's printed, that's it, end of. You can see different colours. You know you're over budget on this material; you're under budget on your wages – easy. For us it's transformed things for right from the top. The Managing Director and the Regional Director, they can just get a report whenever they want, on exactly where the business is, by contract or as a whole.”

Within the construction industry, 3D drawing packages are ensuring detailed representation of the build and quality. Models can be shared between staff, clients, and other businesses reducing time lag as previously drawings would either be faxed, emailed, or sent in hard copy. With real-time data sharing it means that smaller decisions can be made quickly so that the design process can continue without interruption. Furthermore, manufacturer data is shared so that they can simply be digitally inserted into the drawing rather than measuring by hand. However, F.P. Hurley highlight that where time has been gained in the sharing of information, the impact can be a greater overall volume of data and challenges in managing this within the business. Overall, this means that more time is spent in the office working, but ensures quality and reduces the likelihood of amendments needing to be made once on site. The 3D drawing software also ensures traceability and proving that key performance indicators are being met. Wynne Construction make clear that the costs of installing such software is an overall benefit to the business.

“Whilst there's a big cost to us in the business of running it, it's allowed us to increase our capacity with existing staff by about 30%. It helps increase our turnover by 30%. We have had to employ more staff as a result – information managers, design coordinators – so it's costing more, but it's allowing us to be more productive in terms of turnover. We can handle a lot more projects because the whole thing is more streamlined. You're not writing emails. You're not sending letters to people chasing them up.”

2.2. Customer value

Many of the efficiencies outlined in the previous section also provide a source of customer value, several businesses highlighted how the digitisation of data sharing processes enabled their customers to better keep abreast of developments. Carreg Construction are developing an application for clear communication of costs and processes to their clients, this is particularly important as they offer a bespoke high specification build construction service.

“We aim to give our clients an indication of costs at an early stage. This is important for our clients to understand, because of this we’re in the process of creating a bespoke software that allows our clients to approve quotations and valuations. There will be a dashboard of the costs so they know where they are at any one time with the costs associated with their project.”

In a similar vein, Wynne Construction recognise the transparency they are now able to provide their customers and how this contributes to preparations for audit and supports traceability. Furthermore, the package that they use can send reminders to clients should they need to make a decision and have not done so.

Customer value can also come in the form of sharing knowledge of digital technologies. Diack Ltd offer home automation services and are frequently asked to install ‘Alexa-type’ capacities, but do not do so due to security concerns which they explain extensively to their customers.

“We get asked about Alexa a lot. “Can we have Alexa to turn our lights on and off, and can we say ‘Alexa, turn our kitchen lights on?’” I say, “Well, you can, but as an installer we don’t do it, because at the moment we don’t think it’s a secure platform enough to actually allow that to happen.”

“Then you explain to people, well, what you need to do is you’ve got your home automation sat in your house on a secure network, and your phone links on a secure network, and you have passwords and all of that stuff to access it. Then you need an Alexa skill, which has to send that data to a third party somewhere, which then has to have all your passwords and administration access to your home automation going to a third party, for them then to send the data back to your home automation to turn your light on.”

Travel efficiencies can now be utilised to provide better value to customers. Diack Ltd offers a wider range of customer services updating systems and rectifying client problems remotely where possible. This means a reduced cost for the customer and in some instances a free additional service as the task takes ten minutes when there is no travel time. Digital advancements mean that customer costs are also reduced: the installation of digital fingerprint access in assisted living complexes negates the cost of several thousand pounds to replace keys should one be lost. Furthermore, fall-alarms provided in such environments have evolved to become personal pendants that can be used outside of the home.

“So, if you go and take that pendant and you fall in WH Smith’s, you press the button, it’ll actually send a call from your home unit to the control centre, and say, “I’ve fallen over. This is the ID number, this is who I am,” but, by the way, it sends you a breadcrumb GPS of where you are, so they know you’re there.”

Accolade Executive Business Coaching emphasised that whilst digital technologies can streamline the communication process with clients, it is important to preserve the 'personal touch'. This is particularly important in a coaching environment where customer value is gained through personalised interaction. In order to do this the business continues to communicate by telephone with clients and films a regular video blog so that potential customers have a feel for the business.

Additional product and design data secured through digital technologies means that construction companies are now better able to ensure quality and communicate technical information. Utilising 3D software and BIM 360 means that the technical details of the build can be passed on to the building owners; a range of data would be included such as lightbulb specifications. This is an ongoing development in the industry as not all recipients have the skills or technology to be able to read the data yet. This technology also supports VR capabilities, allowing the customer to better visualise the finished design. There is the prospect of a better result as in government buildings such as schools it will allow the end user such as a teacher to give input as to whether design features will be problematic.

2.3. Sales and promotion

Digital systems that improve information management also help with sales and promotion, as business can easily demonstrate the quality of their work and processes. This is extremely important in the construction industry where much is based on reputation and repeat business one of the key sources of income. Furthermore, within an industry where bespoke services are offered, estimating software makes the quotation process increasingly straightforward with costs built in and an ability to easily revise figures.

“No one job ever gets awarded on the basis of the first offer you give. Usually there is an element of work that goes on in, from that point, to get it to the figures to match somebody’s budget or expectations...You may be altering things, and by having a very sophisticated estimating package allows you to do that. If you were just doing it on a piece of paper with a rubber and a pencil you’d be there forever...We bid for millions, and tens and hundreds of millions of pounds worth of work, we’ll get 40. So, it takes a lot of effort in that department to produce enough work for the business to survive and grow.” (F.P.Hurley)

Digital technologies are increasingly integral to sales and promotion. Further to supporting the bidding for new work, advanced software such as 3D modelling is integral in the construction industry for securing high value contracts. Accolade Executive Business Coaching is fully reliant on digital technology for its work, with coaching interactions conducted remotely. The international reach of the business includes the US, Canada and UAE with nearly 100% of the business conducted digitally. This is supported with an application that clients can use to service this international export radius.

“I think there's a huge amount of room yet to make people aware of the potential of using digital technology in a business to become an international business. You don't need to be in a radius of 20 miles now, whether you are stuck in a shop, by which I mean premises that are deemed as an income, it's just not needed because it is just so easy to trade abroad.”

As always, social media is being used to promote the work that a company is doing, utilising linking technology so that an update on one platform updates the others. Carreg Construction outlined how different professions have a preference over social media type use, due to the information that is shared and the way in which it is communicated. This might mean that for some businesses they have to differentiate the type of information they share on particular social media platforms and utilise different formats. L.H.Evans has been successful in using social media to boost website traffic and orders.

“Facebook is one we've worked relatively successfully in. We've been able to identify groups within that and target. And we've almost seen instantaneous results. Not only a spike on our website but also people coming on our website.”

As highlighted in previous Economic Impact Reports, e-commerce can be a costly function for businesses to maintain. However, the Shopify platform is increasingly being used and has proven successful for one of the case study businesses, L.H.Evans.

“We use Shopify, which is very, very useful. We've gone from spending a huge amount on a quarterly basis. It's probably something like 1000% cheaper than we used to spend, and we got nothing from it. Now we spend £28 a month, and it can range from hundreds of pounds a week to thousands of pounds a week coming in orders. So we know that works.”

2.4. Innovation

Digital technologies are allowing businesses to innovate and provide services in different formats. Bomper studio is developing a technological R&D project funded by the Clwster

programme¹. This new arm of the business will develop a 3D real time product configurator. This technology is a further benefit of 3D software that is increasingly being used across industries.

"When you go to look for a sofa online and you select a different colour, leg, and you click left, going through different photos of that specific type...but ours is like a real time render which means everything loads in real time...it's not just a series of images. You can actually move around the sofa...allowing you to move around the sofa, change the fabric, in a 3D real time environment."

To support this development, the business will need to take on more staff and high-speed broadband connection is also required.

A business innovation plan for Sophrology Wales is to offer online coaching and size-week coaching programmes for identified issues such as cancer or chronic illness. This would expand the exports reach of the business and further pioneer the practice of Sophrology in Wales.

With increasing digitisation there is the risk of losing the 'personal touch' that is integral to many businesses. Accolade Executive Business Coaching uses innovative technology to deliver its services. A tablet device designed for handwriting, helps keep the personal touch that is integral to the way that they do business.

"you are finding a lot of people in the corporate world are looking to reconnect with themselves and there is no personality in a keyboard, whereas there is behind someone else's handwriting. So we've done that, and you know it's great. We can easily share files and things and it's remarkable, it will almost always translate your handwriting back to text if you need to do that. Yes, so effectively all our work is in that tablet."

Diack Ltd install innovative technology for their customers, including fingerprint scanning. This is a feature that the CEO has even discussed with the Canadian Government to highlight the technology's value. With expansion into VR Software, F.P. Hurley will support clients to heighten the quality of the buildings that the business designs. This complements the new 3D design product that the business offers as a result of Superfast Broadband.

¹ <https://clwstwr.org.uk/node/10>

3. Economic impact

The annual *Digital Maturity Survey for Wales* assesses the economic impacts associated with business take-up and use of broadband-enabled technologies. It highlights the growing number of SMEs reporting performance benefits associated with such use. The following section examines the potential regional scale of the turnover and employment effects resulting from SME adoption and use of standard or superfast broadband².

Caution is needed when assessing the impacts against those of previous years. In particular, there are ongoing problems in ‘grossing up’ findings from the *Survey* to the population of Welsh SMEs. To address this uncertainty, the analysis adopts a cautious approach. Indeed, while the 2019 *Survey* was representative by sector and location, businesses are more likely to report positive than negative effects on jobs and turnover. Furthermore, despite the increase in respondents in the 2019 *Survey* (to 513) not all businesses provided finer grained details of expected employment and turnover effects resulting from adoption of broadband resources. Other factors include the strong element of subjectivity in business assessments of how new services enabled by broadband feed through to a change in employment or turnover. This means that some respondents might have difficulty providing an accurate assessment of the nature of the counterfactual (i.e. what would have occurred had they not adopted the broadband services).

3.1. How many Welsh SMEs might have been positively affected by the adoption and use of broadband-enabled services?

The analysis begins with an assessment of the overall numbers of businesses that could have been impacted by positive effects from broadband adoption. Findings from the 2019 *Survey* are set out below, highlighting the effects of adoption and use of standard or superfast broadband services on turnover and employment:

- A total of 466 of the 513 respondents (91%) answered the *Survey* question with respect to their actual broadband speed, with no indication of the speed of broadband from the remaining 9% of respondents. A total of 466 of the 513 businesses answered in terms of what effect the adoption and use of broadband had on turnover.
- Of the 466 businesses, some 43% reported that turnover had increased as a result of adoption and use of standard or superfast broadband, and with just 2% revealing that their turnover had decreased. There was some variation of the effects of broadband by firm size-band.

² This section uses unweighted data from the Digital Maturity Survey 2019.

- Around one-third (130) of those businesses reporting a positive turnover effect felt able to estimate the percentage increase. Around 76 reported the increase was up to 10%, and with a further 25 specifying a turnover increase of between 11% and 30%.

One means of thinking about potential Wales-wide effects is to examine the estimated population of all Welsh businesses in terms of numbers of enterprises, employment, and turnover (Table 3-1). This highlights the very large number of enterprises in the cohort with employment between 0 and 9 people in Wales.

Table 3-1 Size band analysis of enterprises active in Wales in 2019

	Enterprises (000s)	Employment (000s)	Turnover (£bn)
Micro (0-9)	253.6	412.4	16.0
Small (10-49)	9.5	179.5	13.6
Medium (50-249)	2.2	146.3	16.8
Large (250+)	1.7	444.6	76.1
All	267.0	1,182.8	122.5

Source: StatsWales (2019)

Assuming the findings from the Digital Maturity Survey 2019 are broadly representative of all Welsh SMEs then some conclusions on the numbers of businesses in Wales benefitting from broadband adoption and use can be developed. For the analysis we adopt a conservative assumption of the estimation of turnover effects from broadband adoption (based on a 1% increase in turnover in SMEs).

Table 3-2 How many Welsh businesses are expected to have seen a turnover increase as a result of adoption and use of broadband-enabled services

	Welsh Enterprises (000s)	Assumptions based on Survey, i.e. est. % of firms seeing a positive and sustained turnover increase from broadband	Estimated Welsh SMEs (000s) seeing a turnover increase due to broadband adoption	Example of how much Welsh SME turnover increases assuming a 1% increase in turnover in positively affected firms in the size cohort (£m)
Micro (0-9)	253.6	41.8%	105.9	66.8
Small (10-49)	9.5	42.7%	4.1	58.1
Medium (50-249)	2.2	36.6%	0.8	61.4
All	267.0	-	110.8	186.4

Table 3-2 shows that broadband-enabled services could have improved turnover in around 110,800 (41.5%) Welsh SMEs, and that this could have increased turnover by £186.4 million, based on the 1% assumption. These turnover increase estimates are lower than those given in 2017 (£229m). This could be linked to the sample itself, with the 2019 survey cohort less positive than their 2017 counterparts, or with the growing influence of macro-economic uncertainty, and poorer business confidence in 2019, affecting the perception of the value of broadband to businesses³.

³ In 2019 SMEs in Wales reported an overall decline in turnover by 7.3% from £50.03bn in 2018 to £46.38bn in 2019. This was particularly evident in micro businesses (which account for the majority of SMEs in the region), where turnover declined from £20.01bn in 2018 to £15.96bn in 2019, amounting to a 20.4 % decline, while the number of micro enterprises have increased 2.3% from 248,025 in 2018 to 253,640 in 2019.

The findings suggest that the actual turnover impact could be a multiple of that reported in Table 3.2. Care, however, is needed because the *Survey* does not explicitly allow any inference to be drawn on how more successful businesses efficiently using broadband services might displace turnover and economic activity in less efficient businesses. In recognising the potential for positive and negative effects on overall attribution a cautious approach to assessment is therefore appropriate.

The *Survey* findings allow for analysis of employment impacts enabled by use of broadband. This shows that some 453 of the 466 respondents answered the *Survey* question with respect to effects of adoption of standard or superfast broadband services on employment.

- A total of 23% of those businesses (105 businesses) responding reported that employment had increased as a result of adoption and use, with just 3% revealing that their employment had decreased. There was some variation on the effects of standard or superfast broadband by firm size - with 24% of businesses employing more than 50 people reporting a sustained employment increase, compared to a fall of around 17% for the smallest businesses. This is not surprising as larger businesses have more potential for an employment increase given their existing scale of operations.
- An increase in sustained employment was reported by 64.8% (68 businesses) of those businesses identifying whether they believed that the increase was sustainable.
- Some 63.8% of those reporting a positive employment effect (67 businesses) felt able to estimate what the percentage increase was, with 31 businesses reporting the increase was up to 10%, and with a further 16 businesses reporting an employment increase of between 11% and 30%.

Applied to the Welsh population of SMEs (Table 3-3) the *Survey* findings suggest that some 46,700 SMEs have seen an employment increase resulting from the broadband adoption. Given the average employment size of each SME in each cohort in Table 3-3, a 1% increase could see around 1,586 new employment opportunities created. This is a decline from the 2017 estimate (1,752) and 2018 (1,637), and again may be linked to the uneven nature of benefits achieved, and changes in the external business context.

As noted in early sub-sections these estimates represent averages for the Welsh SME cohort, and this will contain substantial variations in actual employment increase within the different size cohorts. Further, the direct effects reported are conservative, and take no account of the multiplier effects (supply chain and household income effects) connected to new activity.

Table 3-3 How many Welsh businesses are expected to have seen an employment increase as a result of adoption and use of broadband-enabled services

	Welsh Enterprises (000s)	Assumptions based on Survey, i.e. est. % of firms seeing a positive and sustained increase from broadband	Estimated Welsh SMEs (000s) seeing a sustained increase in employment due to broadband adoption	Example of how much Welsh SME employment increases assuming a 1% increase in employment in positively affected firms in the size cohort
Micro (0-9)	253.6	17.1%	43.4	706.3
Small (10-49)	9.5	29.3%	2.8	525.9
Medium (50-249)	2.2	24.2%	0.5	353.8
All	267.0		46.7	1586.0

3.2. Numbers of Welsh SMEs positively affected (turnover and employment) by adoption and use of superfast broadband-enabled services

This Section repeats the analysis in 3.1, but with a focus on the proportion of businesses that have adopted different types of broadband - superfast or standard.

Table 3-4 Size band analysis of Welsh businesses and broadband adoption type

	Enterprises (000s)	Employment (000s)	Turnover (£bn)	Standard Broadband	Superfast Broadband
Micro (0-9)	253.6	412.4	16.0	45%	55%
Small (10-49)	9.5	179.5	13.6	34%	66%
Medium (50- 249)	2.2	146.3	16.8	26%	74%
All SMEs	265.3	738.2	46.4	41%	59%

A large proportion of superfast-enabled respondents to the 2019 *Survey* were able to indicate how adoption of the resource had affected turnover. In summary:

- Overall, 269 respondents who had adopted superfast broadband answered the *Survey* question with respect to effects of adoption and use of broadband-enabled services on turnover.
- Of this cohort of 269 respondents, 122 businesses (some 45.4%) reported that turnover had increased as a result of superfast adoption - while just 2 respondents indicated that their turnover had decreased.
- A total of 81 of those reporting a positive turnover effect felt able to estimate what the percentage increase was, with 59.3% revealing the increase was up to 10%, and with a further 22.2% reporting a turnover increase of between 11% and 30%.
- Around 95% of businesses reporting a turnover increase related to adoption and use of superfast broadband-enabled services envisaged that the turnover increase would be maintained (i.e. was not just a one-off benefit).

Table 3-5 How many Welsh businesses are expected to have seen a turnover increase as a result of adoption and use of superfast broadband-enabled services

	Welsh Enterprises (000s)	Assumptions based on Survey, i.e. est. % of firms seeing a positive and sustained turnover increase from superfast broadband	Estimated Welsh SMEs (000s) seeing a turnover increase due to superfast broadband adoption	Example of how much Welsh SME turnover increases assuming a 1% increase in turnover in positively affected firms in the size cohort (£m)
Micro (0-9)	253.6	23.8%	60.5	38.1
Small (10-49)	9.5	29.2%	2.8	39.7
Medium (50-249)	2.2	27.5%	0.6	46.2
All	267.0		63.8	124.0

Utilising the same conservative assumption as earlier, in terms of a turnover increase attributable to adoption and use of superfast broadband, Table 3-5 shows that 63,800 SMEs (23.9%) have seen positive turnover effects resulting from adoption of superfast broadband. Using a conservative figure of a 1% increase in turnover attributable from adoption and use of superfast broadband services the Table suggests that total turnover in SMEs in Wales impacted positively by superfast would be around £124.0m. Again, the Survey findings reveal that the real number could be a multiple of this. Importantly, around £124.0m of turnover in Wales would equate to an estimated £37-40m of gross value added (based on the relationship between firm turnover and GVA in Wales derived from ONS data).

Moving on in the analysis to consider the SMEs seeing positive employment connected to the adoption of superfast broadband, the 2019 *Survey* revealed:

- Some 270 of the 466 *Survey* respondents had adopted superfast broadband and were able to respond to survey questions on employment change.

- Just over one-fifth (22.6%) of these 270 businesses reported that employment had increased as a result of superfast adoption, and with just 3.0% revealing that their employment had decreased. There was again some variation of the effects of broadband by firm size band (for example 28.6% of businesses employing more than 50 people reported an employment increase, whereas this figure fell to around 16.8% for those employing between 0-9 FTEs).
- An estimated 87.2% of businesses reporting whether an increase in employment is sustained believed that the increase was sustainable rather than a one-off short-term increase.
- Around 63.9% (39 businesses) of those reporting a positive employment effect (61 businesses) felt able to estimate the percentage increase, with 46% reporting the increase was up to 10%, and with a further 10 businesses suggesting an employment increase of between 11% and 30%.

Table 3-6 indicates that some 22,600 SMEs in Wales could have seen a sustained employment increase resulting from superfast broadband adoption and use. Given the average employment size of SMEs in each cohort, a 1% increase could see around 946 new employment opportunities. Again, and as above, this is likely to be a conservative estimate and with the *Survey* findings hinting at higher levels of new job creation.

Table 3-6 How many Welsh businesses are expected to have seen an employment increase as a result of adoption and use of superfast broadband-enabled services

	Welsh Enterprises (000s)	Assumptions based on Survey, i.e. est. % of firms seeing a positive and sustained employment increase from superfast broadband	Estimated Welsh SMEs (000s) seeing an employment increase due to superfast broadband adoption	Example of how much Welsh SME increases assuming a 1% increase in employment in positively affected firms in the size cohort
Micro (0-9)	253.6	8.0%	20.4	331.7
Small (10-49)	9.5	19.2%	1.8	344.5
Medium (50-249)	2.2	18.4%	0.4	269.8
All	267.0		22.6	946.1

3.3.A comparison of SME effects in 2017, 2018 and 2019

Table 3-7 Broadband and superfast broadband comparisons

	Estimated Welsh SMEs (000s) seeing a turnover/employment increase due to broadband/superfast broadband adoption			Example of how much Welsh SME turnover/employment increases assuming a 1% increase in turnover/employment in positively affected firms in the size cohort (£m or FTEs)		
Year	2017	2018*	2019	2017	2018	2019
Turnover effect broadband adoption	111.4	102.6	110.8	229.3	166.8	186.4
Employment effect broadband adoption	32.1	48.6	46.7	1752.0	1636.6	1,586.0
Turnover effect superfast broadband adoption	47.1	51.7	63.8	124.2	91.5	124.0
Employment effect superfast broadband adoption	16.6	24.5	22.6	1056.0	859.0	946.1

*Note: Our 2018 published figures were based on SME average turnover available at that time. These data were subsequently revised upwards for some size classifications of SMEs meaning our 2018 figures should be seen as conservative.

Comparison headline figures for this section from 2017, 2018 and 2019 are shown in Table 3-8. Some care should again be applied to the interpretation of the estimates. The figures relating to turnover effects based on our conservative 1% assumption are affected strongly in 2018 and 2019 by a general decrease in average turnover per micro-sized firms in these years, due in part to falling business confidence and growing uncertainty in the periods running up to planned Brexit dates. Despite this, the figures for 2018 and 2019, still reveal appreciable turnover effects associated with broadband adoption based on our conservative assumption.

Of primary importance here is the number of firms between 2017, 2018 and 2019 reporting turnover and positive employment effects resulting from superfast broadband adoption. In the context of the challenging economic climate this should be seen as particularly encouraging and indicates clear-cut economic returns occurring as a result of the existence of new broadband infrastructure.

3.4. Summary

As in previous years, the results suggest that the greatest increases in turnover and employment in 2019 were experienced by SMEs adopting and using superfast broadband. In summary:

- 110,800 SMEs in Wales could have improved turnover prospects, with an estimated total turnover attributable to broadband adoption and use in Wales of £186.4m (£124.0m was attributable to superfast broadband adoption).
- 46,700 SMEs (22,600 were superfast broadband users) could have seen a sustained employment increase resulting from superfast broadband adoption and use, with an estimated employment effect attributable to broadband adoption of 1,586 jobs (946 new opportunities were associated with superfast broadband).

In 2019, the effects experienced by SMEs from the adoption and use of broadband are, however, generally smaller than those reported in the 2017 and greater than 2018 Digital Maturity Economic Impact Report. This may be a reflection of there being a levelling off or decline in the impact of broadband adoption and use on turnover and employment over time, and also that these impacts are a function of economic conditions affecting the statistics used in grossing up our estimates. It should also be remembered that differences between 2017, 2018 and 2019 reported impacts could also reflect the different characteristics of the three samples. Analysis of the 2020 Survey will enable a more complete understanding of such trends.

It should also be noted that there are difficulties in estimating the marginal economic effects of improvements in adoption and use of the technology. For example, it is difficult for the *Survey* respondents to be precise on how broadband effects both employment and turnover. However, it is encouraging that respondents to the 2019 *Survey* provided evidence of positive as opposed to negative effects, and with a high proportion of positive impacts expected to be sustained as opposed to short term.

Additionally, although the focus of this section has been on increases in turnover and employment it should be recognised that the technology could be having positive effects even were turnover and employment in affected SMEs to be falling. For example, falling employment may be connected with improving productivity or the job and turnover losses might have been worse without the adoption of broadband. Therefore, it is important to consider the findings of this section, with those in the other sections which reveal performance and productivity impacts connected with businesses adopting and using broadband-enabled services.

4. Conclusion

Cardiff Business School have been reporting on broadband adoption and use and economic impacts since 2016. The 2019 *Digital Maturity Economic Impact Report for Wales* provides further evidence of the digital transition taking place in the Welsh economy. The report benefits from continued SME response rates to the *Digital Maturity Survey for Wales*, allowing the research team to better understand the processes of SME adoption and use of digital technologies.

The findings show that greater digital maturity of SMEs is positively contributing towards economic impacts, with businesses reporting positive benefits associated with use of superfast broadband. Indeed more than half of the SMEs who were able to estimate the percentage increase in turnover due to superfast broadband use, reported an increase of up to 10%. Likewise, of those SMEs that had adopted superfast broadband and who provided an estimate of the employment change as a result of adoption, some 22.6% reported an increased effect.

The economic impact analysis suggests that:

- 110,800 SMEs in Wales could have improved turnover prospects, with an estimated total turnover attributable to broadband adoption and use in Wales of £186.4m (£124.0m was attributable to superfast broadband adoption).
- 46,700 SMEs (22,600 were superfast broadband users) could have seen a sustained employment increase resulting from superfast broadband adoption and use, with an estimated employment effect attributable to broadband adoption of 1,586 jobs (946 new opportunities were associated with superfast broadband).

The case studies highlight important differences between sectors and places in Wales. They further show growing SME confidence in digital technology use, and its role in enabling efficiencies, improvements in the customer interface and innovation. These results point to the mainstreaming of digital technology adoption and use across SMEs in Wales.

Analysis of the *Digital Maturity Survey* findings highlights differences between broadband types (standard and superfast). Here, the results show that those SMEs that have adopted superfast broadband tend to report more positive outcomes in areas such as profitability, employee numbers and innovation. Indeed, few businesses report having no broadband access.

Four years' worth of data on SME digital maturity and its economic impact is helping to provide evidence of digitalisation in the Welsh economy. These results show that the progress towards digitalisation of the Welsh economy is not necessarily a smooth or linear transition. In this respect, economic impacts from digitalisation are influenced by SMEs adoption and use, but also the context that they operate in. In 2019, for example, this context was characterised by ongoing uncertainty relating to factors such as the progress of Brexit.

While the case study data points strongly towards greater digital maturity and SME productivity improvements resulting from adoption and use of digital technologies, the challenges of accurately measuring economic impacts on the Welsh economy are ongoing. To manage this issue the research team has continued to use conservative measures to its assessment of the number of SMEs that have been positively affected in terms of turnover and employment.

Based on the conclusions from the 2019 analysis the research team in the next period of the project will be focusing on gaining repeat survey responses from the SMEs who engaged with prior Digital Maturity Surveys, but also refining the performance and productivity analysis on individual sectors. The research team are also exploring ways to compare performance of SMEs that have participated in the Superfast Business Wales service⁴, against non-participants.

⁴ The Superfast Business Wales service is a free business support service that helps eligible SMEs make the most of digital technology. Further details can be found at: www.businesswales.gov.uk/superfastbusinesswales/

References

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