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Superfast Broadband Business Exploitation Project

Digital Maturity Survey for Wales 2019

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Llywodraeth Cymru
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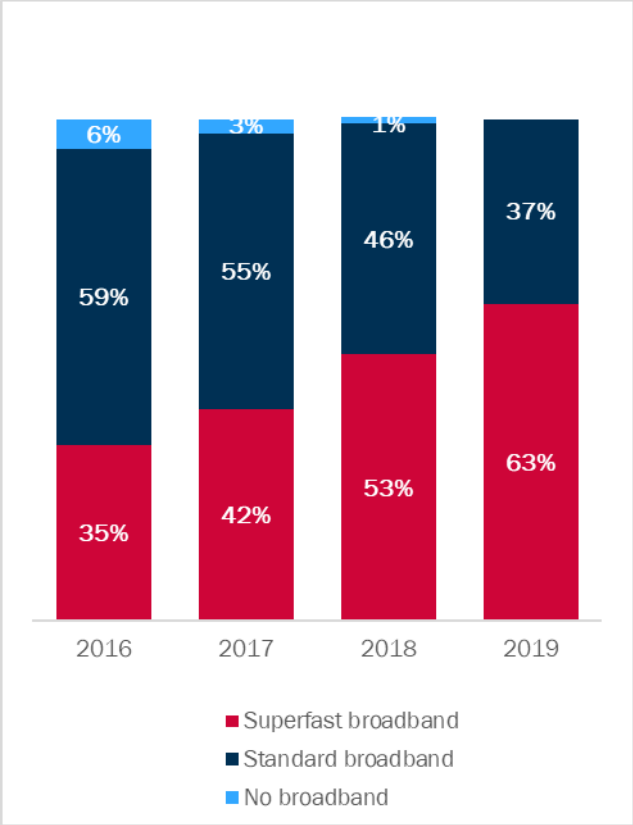
Summary

Strengthening the efficiency of Welsh SMEs represents a vital means of improving Wales' future economic prospects. The Digital Maturity Survey for Wales 2019 provides evidence on how SMEs are responding to this challenge by adopting and using the digital technologies enabled by broadband access. It draws on Cardiff Business School's fourth annual survey and shows how adoption of technologies can not only influence business performance, but also produce impacts for the Welsh economy.

Survey findings

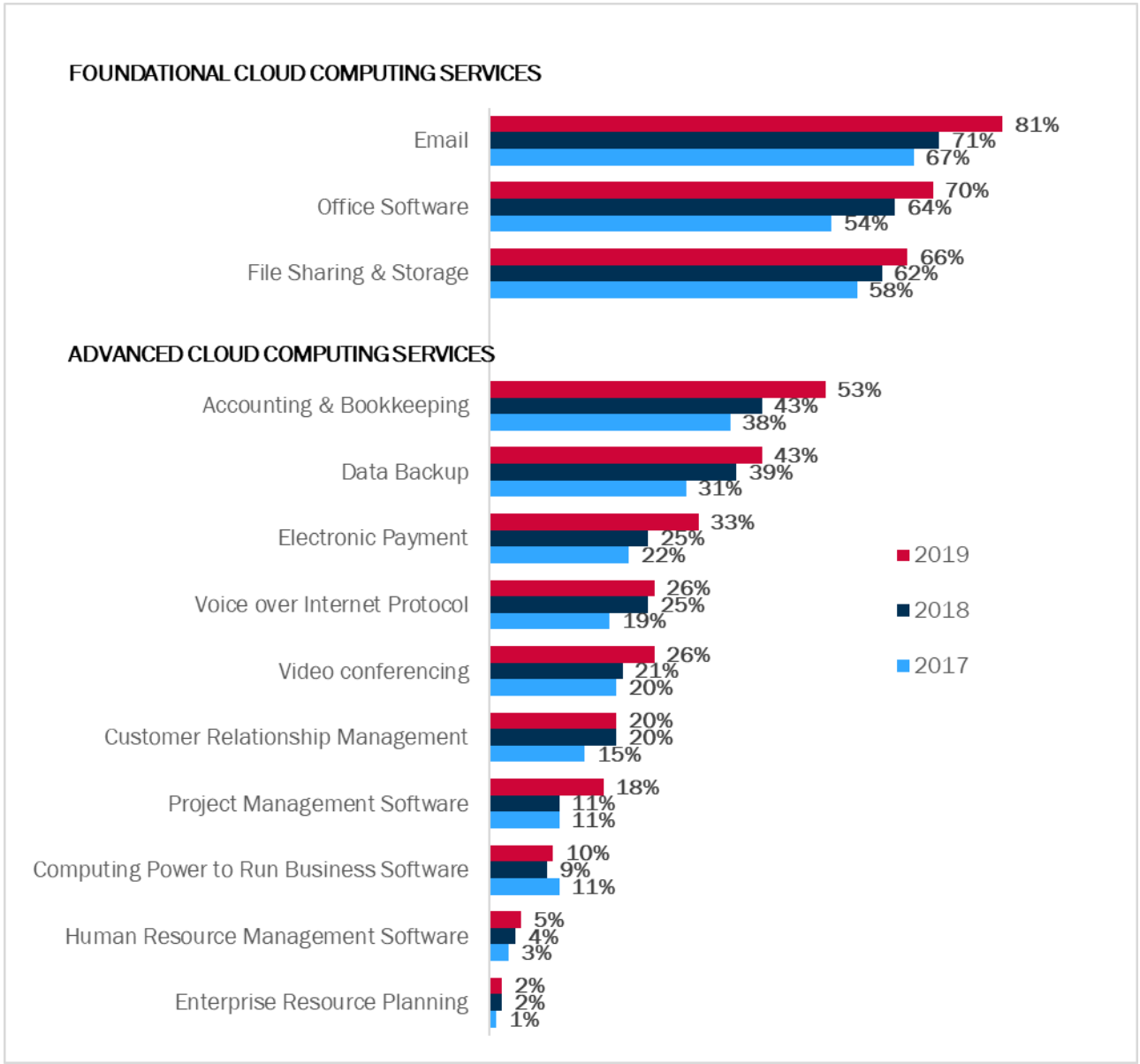
The Survey findings show positive trends with respect to SME adoption of superfast broadband, with some 63% of businesses reporting access through a fixed connection (up 10 percentage points on 2018). These results, the findings suggest, are set in the context of a growing number of premises now having access to superfast broadband and highlights ongoing potential to encourage more SMEs to access such infrastructure.

Figure 0-1 Adoption of broadband by type (% of SMEs)



Use of cloud computing services continues to increase in 2019 (Figure 0-2). Here the Survey results point to more SMEs making use of foundational cloud computing services, with use above half of all businesses. While comparatively fewer business make use of more advanced cloud services, increases can also be observed over the period 2017-2019. Limited numbers of SMEs are making use of the leading-edge digital technologies such as artificial intelligence, additive manufacturing (e.g. 3D printing) and internet of things (IoT) technologies.

Figure 0-2 Proportion of SMEs using cloud computing services, by category (% of SMEs)

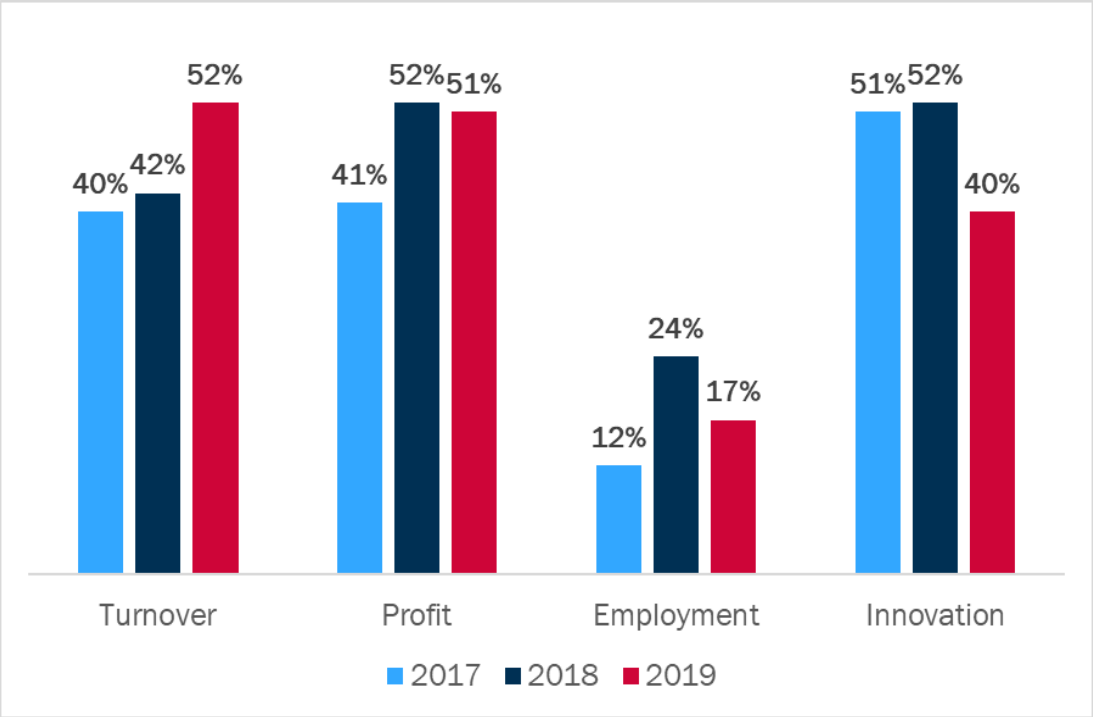


SME skills to make use of digital technologies represents an area of concern. While the majority of businesses report that they have 50% or more of their workforce with intermediate or above ICT skills, the results also show a decline from 2017 to 2019 of four percentage points to 66%.

The use of digital technologies is further demonstrated in the growing number of businesses reporting e-commerce transactions This shows that one-in-three businesses now report between 76% and 100% of sales serviced online, and that had increased by seven percentage points since 2018. Nearly three in ten businesses transacted between 76% and 100% of their purchase online, also up by seven percentage points from 2018.

The findings highlight greater use of digital technologies is associated with SMEs reporting increases in turnover (up by 10 percentage points). Fewer SMEs, however, reported a performance link between broadband and profit, innovation or employment than in the previous year.

Figure 0-3 Performance of SMEs with superfast broadband (% indicating positive outcomes)



Analysis of the Survey findings identify four groups / types of SMEs in relation to digital maturity (see Figure 0-4). The 2019 survey shows that the proportion of businesses that are in the highest groups of digital maturity – Digitally Embedded and Active Exploiters – have fallen back, with corresponding growth in the proportion of businesses that are less digitally mature. It is noted, however, that the proportion of digitally mature businesses is still higher than it was at the start of this form of analysis (in 2017).

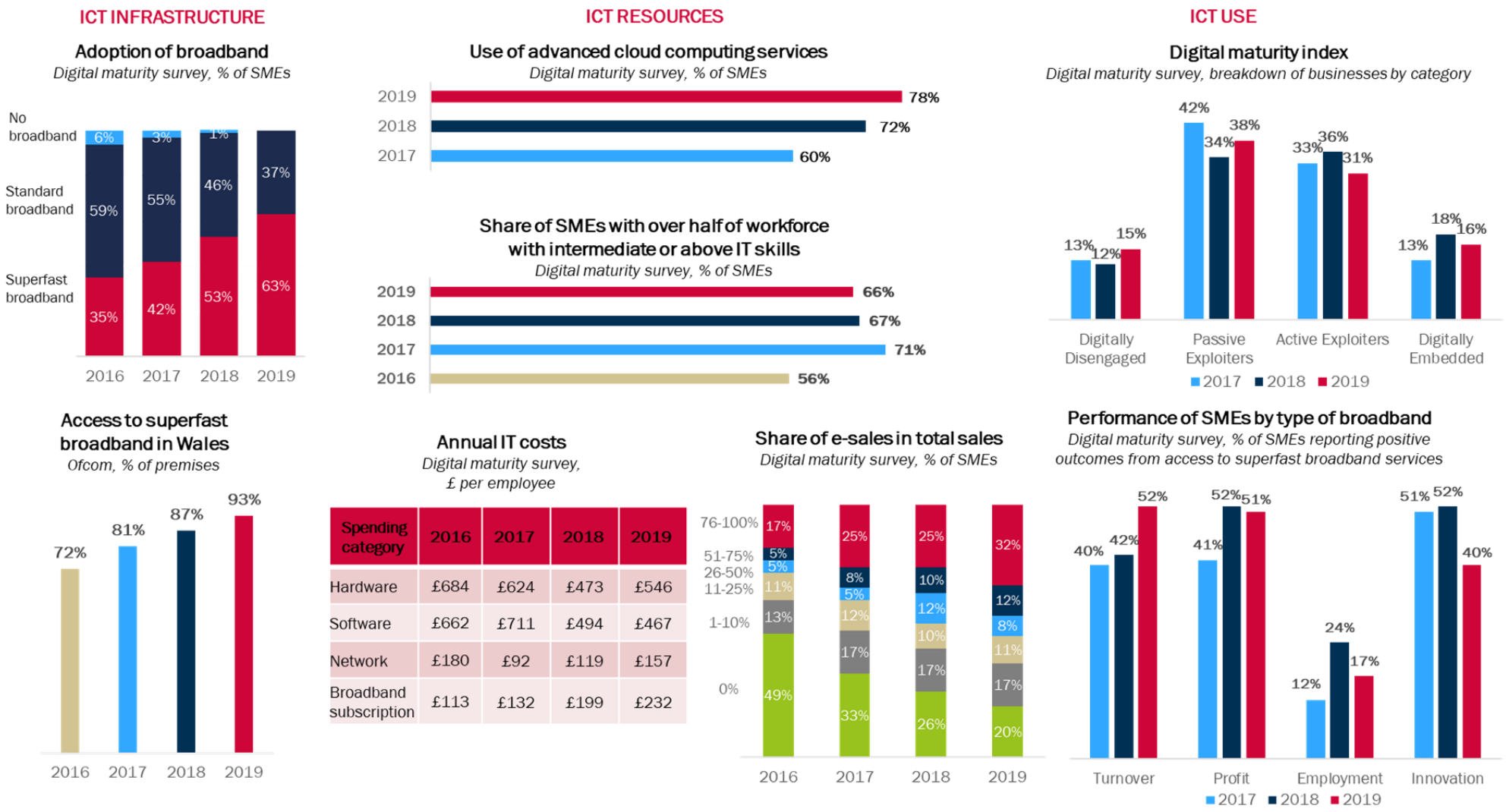
Figure 0-4 Digital maturity groups in Wales (% of SMEs in 2019)

Digitally Disengaged	Passive Exploiters	Active Exploiters	Digitally Embedded
15%	38%	31%	16%
Businesses tending to be standard broadband users, with a high proportion of employees with below average ICT skills. The majority do not use digital technologies and report no sales from online transactions.	Businesses tending to have standard broadband, but more likely to have staff with above average ICT skills. Make use of basic cloud-based applications, but their use of online platforms to generate e-sales is low.	Businesses likely to have access to superfast broadband and a high proportion of staff with above average ICT skills. Use a wide range of digital platforms and technologies. Nearly half report online channel as the main source of sales.	Adopters of superfast broadband with a very high proportion of employees with above average ICT skills. Use a high number of digital applications and secure most of their sales from online transactions.

Although the overall picture is one of businesses increasingly adopting and using digital technologies in Wales, the report shows once again that the transition towards digitalisation is likely to be bumpy when viewed at the regional level, with some indicators going up, while others going down. Too much should not be read into individual yearly changes. The multi-year decline in the skills indicator, alongside the composite decline of the digital maturity index is a potential cause for concern and may point to ongoing challenges for businesses to maintain their digital maturity, and for policy intervention to support this.

This report was written by Dylan Henderson, Calvin Jones, Max Munday, 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*](http://www.cardiff.ac.uk/superfast-broadband-project)

Figure 0-5 Digital dashboard for Wales 2019



1. Introduction

1.1. The research

The Digital Maturity Survey for Wales (the *Survey*) is a regular survey of small and medium-sized (SME) businesses and their adoption and use of digital technologies in Wales. The Survey is intended to understand the transition towards digitalisation of business processes and the benefits that are enabled by superfast broadband. It forms part of a programme of research undertaken by Cardiff Business School that contributes to the Welsh Government's Superfast Broadband Business Exploitation (SFBE) programme, part-funded by the European Regional Development Fund (ERDF).

Full details of the Cardiff Business School's research activities, including the results of the previous surveys, can be found at http://www.cardiff.ac.uk/superfast-broadband-project.

1.2. The context for the research

The context for the research is the growing recognition of the importance of digitalisation to the Welsh economy and society more broadly. This has been reflected in its prioritisation in a number of Welsh Government strategies such as 'Taking Wales Forward'[1] and the 'Prosperity for All: Economic Action Plan'[2]. These strategies form part of efforts to ensure that businesses both have access to digital infrastructure, but also that they have the skills to use it. Such challenges have been reflected in the SFBE programme, with its provision of free workshops and one-to-one advice to SMEs across Wales.

The research is informed by the persistent economic disparities that exist between businesses and parts of Wales. Here, the research illustrates the benefits that can be gained from businesses adopting and using superfast broadband, and how uplifts in digital technology use by SMEs may help to address the productivity weaknesses of the Welsh economy. Indeed, without intervention there is a danger that uneven access to and use of broadband will reinforce these disparities.

[1] http://gov.wales/docs/strategies/160920-taking-wales-forward-en.pdf

[2] http://gov.wales/docs/det/publications/171213-economic-action-plan-en.pdf

A further feature of the context for this research is the evolutionary nature of digitalisation of business processes. Here, while many businesses now make regular use of 'foundational' digital technologies such as email and cloud storage, the increasing sophistication of digital technologies and their embeddedness across business models is challenging SMEs to adapt their skills and capabilities. This has implications not only for business (to ensure their capabilities evolve), but also research (to capture the evolving nature of digital technology use and associated impacts) and also policy makers (to ensure support responds to this transition).

1.3. Survey methodology

The 2019 *Survey* draws on a representative sample of SMEs in Wales. It was disseminated with the support of our research partners (Business Wales, Superfast Business Wales, the 22 local authorities, Federation of Small Businesses Wales [FSB Wales] and Institute of Directors Wales [IoD Wales]). In addition, the Cardiff Business School research team conducted its own dissemination, making use of Bureau van Dijk's FAME database, and a number of telephone and face-to-face surveys. All results were collected and analysed using the Qualtrics survey platform. A detailed breakdown of the 513 survey responses achieved can be found in Table 1-1 below.

Table 1-1 Breakdown of survey responses

	Number of SMEs	Share of SMEs (%)[1]
Location: EU region		
West Wales and the Valleys	311	*60.6*
East Wales	202	*39.4*
Location: Sub-region[2]		
Mid Wales	71	*13.8*
North Wales	115	*22.4*
South East Wales	220	*42.9*
South West Wales	107	*20.9*
Location: Urban/Rural[3]		
Urban	296	*57.7*
Rural	216	*42.1*
Unknown	1	*0.2*

	Number of SMEs	Share of SMEs (%)[1]
Firm Size[4]		
Micro	340	*66.3*
Small	131	*25.5*
Medium	42	*8.2*
Industry Sector[5]		
Construction	35	*6.8*
Manufacturing	79	*15.4*
Wholesale/retail, transport and storage	68	*13.3*
Accommodation and food services	31	*6.0*
Information and communication	57	*11.1*
Business and other services	243	*47.4*

Notes:

1. Percentages may not sum due to rounding.
2. Mid Wales sub-region includes the local authorities of Powys and Ceredigion; North Wales sub-region includes the local authorities of Isle of Anglesey, Conwy, Denbighshire, Flintshire, Gwynedd and Wrexham; South East Wales sub-region includes the local authorities of Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Merthyr Tydfil, Monmouthshire, Newport, Rhondda Cynon Taf, Torfaen, and Vale of Glamorgan; South West Wales sub-region includes the local authorities of Carmarthenshire, Neath Port Talbot, Pembrokeshire and Swansea.
3. Postcodes were utilised to classify respondents by the 2011 Census rural-urban classification (A1-F2), available at https://onsdigital.github.io/postcode-lookup/ (last accessed 22/01/19).
4. Micro businesses have 0 to 9 employees, small - 10 to 49 employees, medium - 50 to 249 employees.
5. Industry sectors refer to SIC 2007 categories and are listed in the table as F, C, G-H, I, J, and K-S, respectively.

1.4. New question additions to the 2019 *Survey*

The 2019 *Survey* follows a similar question structure to that established in previous years. To capture the increasing sophistication of cloud technologies being used by SMEs in Wales additions were, however, made to the *Survey*. This included a minor rationalisation of the cloud technologies available for selection (see Figure 2-10) and the addition of three new technologies to capture use of artificial intelligence (AI), additive manufacturing and internet of things (IoT). These changes resulted in no overall increase in the size of the *Survey*.

1.5. Digital maturity conceptual framework

The framework for the annual *Digital Maturity Survey* is set out in Figure 1-1. This was developed from an earlier review of existing studies of SME adoption of information and communication technology (ICT) and digital technologies. It is designed to reflect the processes by which SMEs' business performance is shaped by the adoption of broadband, the level of resources, and the use of broadband-enabled applications. The framework comprises three primary elements that underpin the Digital Maturity Index, described in Section 3 of this report.

ICT Resources includes infrastructure (broadband adoption), investment in physical assets, software and services, skills training, and staff capabilities. These resources have been identified as an important source of competitive advantage for SMEs and underpin a business' ability to make productive use of digital technologies.

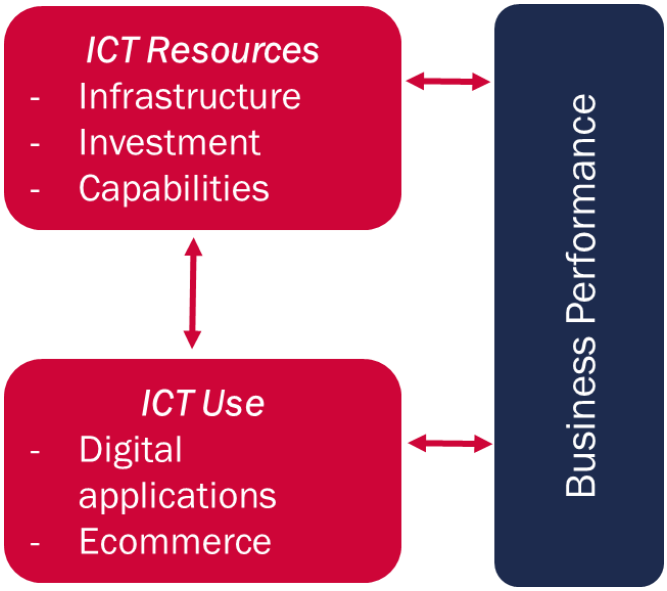
ICT Use refers to the ways in which SMEs make use of digital technologies in their business processes. The scope of digital technologies in use has been a significant growth area in recent years, with the digital maturity of SMEs explained by the growing adoption of superfast broadband, and enabled technologies such as cloud computing.

Business Performance captures the effects of having access to ICT resources and their use by the SMEs. Impact is measured in terms of changes in turnover, profitability, employment, and innovation activity in the business. The Economic Impact Report makes further use of this data to calculate impacts on the Welsh economy[3].

The framework highlights interactions between the three primary elements of digital maturity – ICT Resources, ICT Use and Business Performance. By capturing the dynamic nature of these elements, it acknowledges the potential for feedback to occur. For example, Business Performance might be both an antecedent and consequence of businesses adopting ICT Resources and ICT Use.

[3] See http://www.cardiff.ac.uk/superfast-broadband-project/economic-impact-research

Figure 1-1 Digital maturity framework



1.6. Structure of report

The report begins with the Key survey findings from the Digital Maturity Survey for Wales 2019. This is followed by the Digital Maturity Index, which describes its construction and results. The report then sets out the Comparative analysis, presenting longitudinal findings. It concludes with the Digital Dashboard for Wales and implications for subsequent research in the Conclusions.

2. Key survey results

2.1. Introduction

This section highlights the main descriptive findings from the 2019 *Survey*. The analysis is presented in five parts following the structure of previous *Survey* reports: 1. Adoption of broadband; 2. Use of broadband-enabled services; 3. ICT expenditure; 4. ICT skills; and 5. E-commerce.

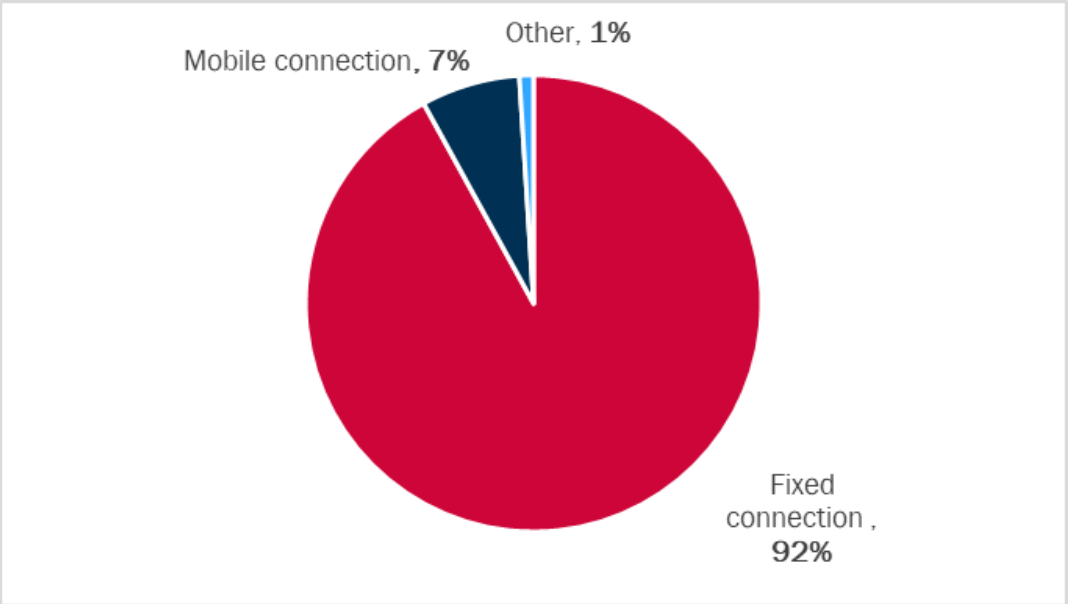
To achieve a sample representative of major industry sectors and three sizes of SMEs, i.e. micro (0 to 9 employees), small (10 to 49 employees) and medium (50 to 249 employees), a stratification method was used. The post stratification weights were then applied to the responses to reflect the breakdown of firm size and industrial structure of the Welsh economy.

The primary method of gaining responses to the *Survey* was through an online questionnaire. As SMEs completing the questionnaire online were more likely to be digitally engaged, and potentially bias the results upwards in terms of digital maturity, additional face-to-face interviews were carried out at business events where SMEs who might have been less receptive to a digital approach to complete the questionnaire could be included. Additionally, telephone interviews were utilised to further address this issue.

2.2. Adoption of broadband

Connection technology to broadband. The primary connection method of SMEs to broadband in 2019 was via a fixed connection (92%, an increase of one percentage point from 2018). Figure 2-1 shows that 7% of businesses used a mobile connection as their primary connection (up two percentage points from 2018) and 1% operated using other connection methods (principally satellite or microwave).

Figure 2-1 Primary connection to broadband (% of SMEs), 2019

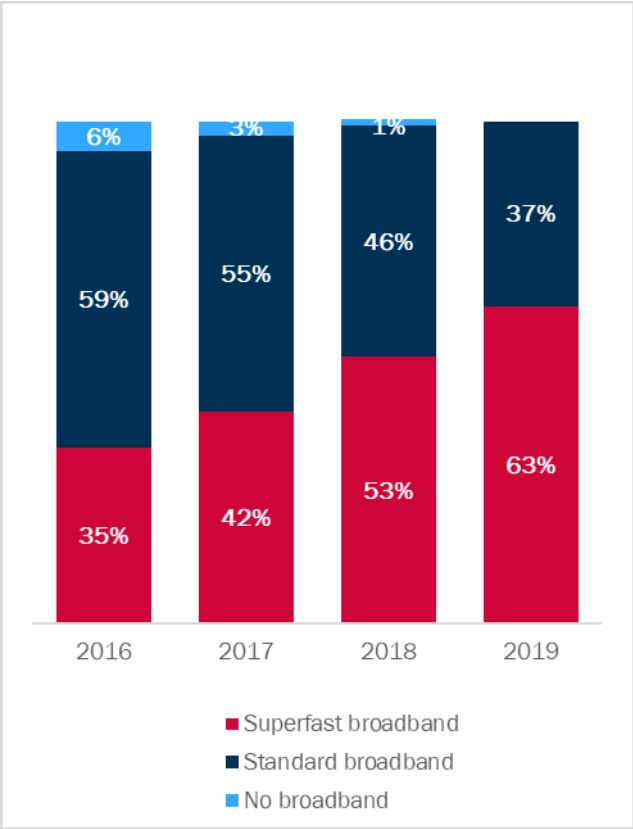


Businesses were most likely to report using a mobile connection as their primary technology in the sub-region of South West Wales (15%), followed by Mid Wales (9%), North Wales (7%) and South East Wales (3%).

Use of a mobile connection was more likely for rural-based SMEs than their urban counterparts (12% and 4% respectively), for micro SMEs (7%) rather than small or medium-sized SMEs (both 2%), and by Accommodation and food services sector businesses (15%).

Adoption of broadband. In 2019, over three-fifths of SMEs (63%) reported using superfast broadband, defined as being able to download data at speeds of at least 30 megabits per second (Mbps). Figure 2-2 shows this was an increase of ten percentage points from 2018. Around two-fifths of SMEs (37%) had standard broadband only in 2019. These trends are likely to reflect the growing availability and take-up of superfast broadband across Wales.

Figure 2-2 Adoption of broadband, by type (% of SMEs)

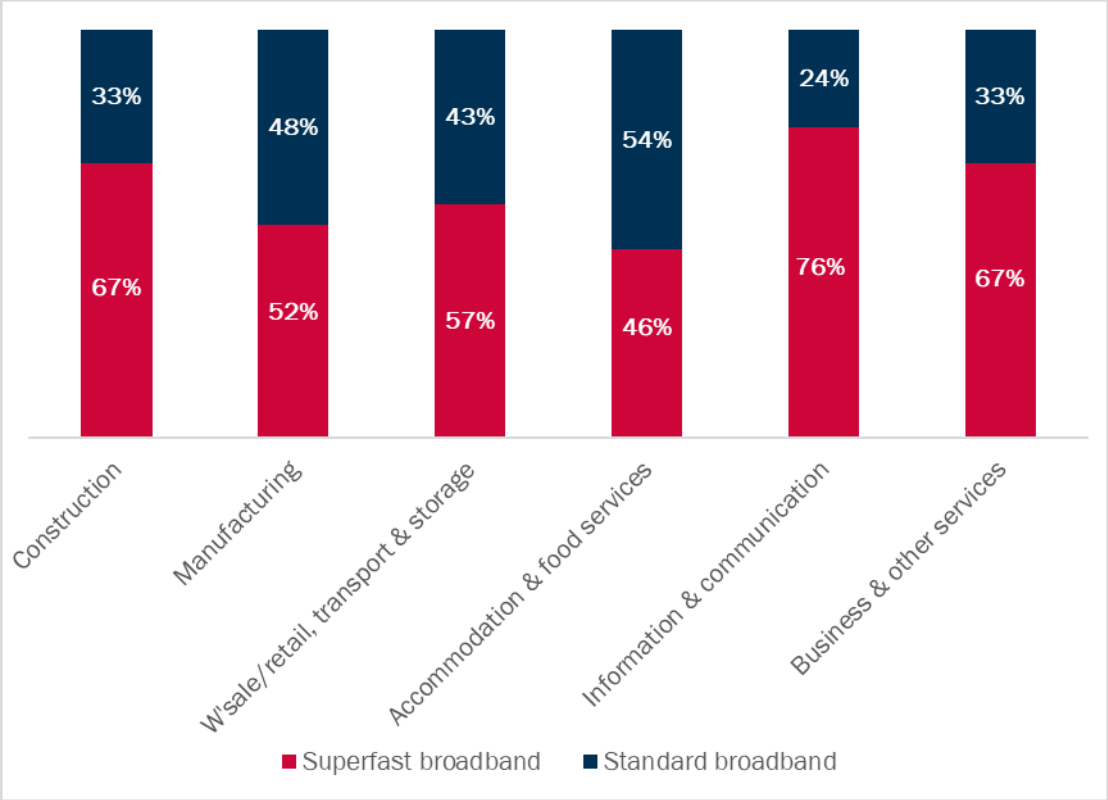


SMEs in the sub-regions of North Wales and South East Wales were most likely to have adopted superfast broadband (both 68%), with South West Wales (49%) and Mid Wales SMEs the least likely (48%). There was, however, an increase in Mid Wales in the percentage of businesses with superfast broadband of sixteen percentage points from 2018.

By size, superfast broadband adoption was highest among medium-sized businesses (up seven percentage points from 2018 to 82%). Nearly three-quarters of small (73%) and over three-fifths of micro businesses (62%) had superfast broadband in 2019.

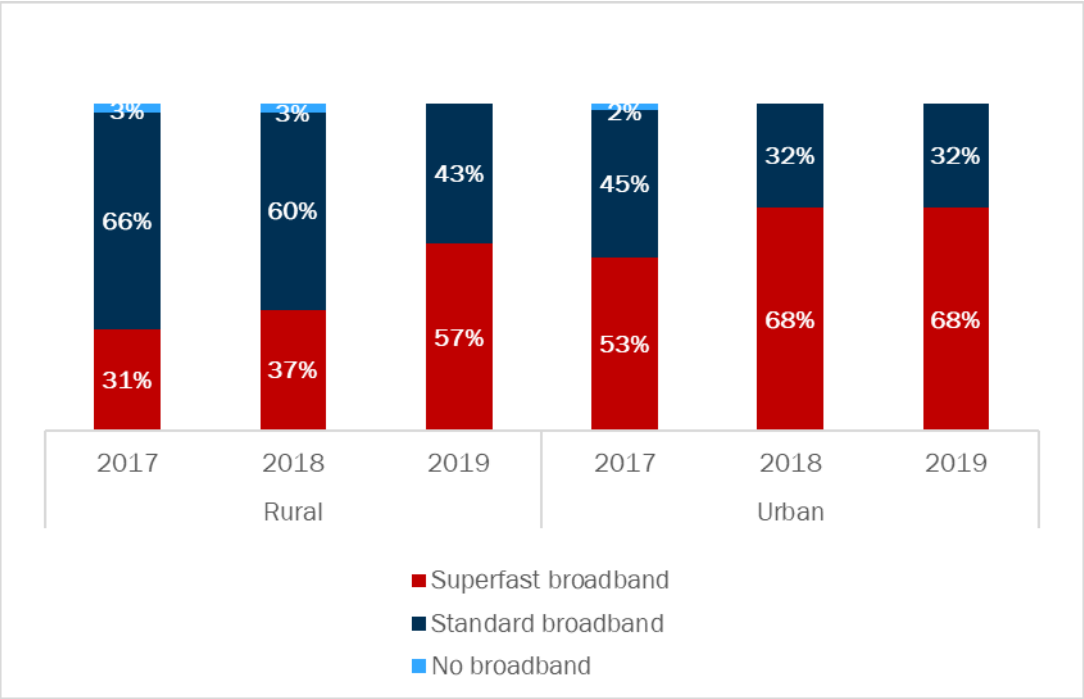
By industry sector, shown in Figure 2-3, adoption of superfast broadband was relatively high in the Information and communication (76%), Business and other services (67%), and Construction sectors (also 67%, up fourteen percentage points from 2018). The lowest share of SMEs with superfast broadband in 2019 was found in the Accommodation and food services sector (46%).

Figure 2-3 Adoption of broadband, by type, by industry sector (% of SMEs)



The proportion of rural businesses adopting superfast broadband, shown in Figure 2-4, increased by twenty percentage points, from 37% in 2018, to 57% in 2019. During this same time the percentage of urban businesses with superfast broadband was level at 68%, providing evidence that the divide between rural and urban areas in adoption of superfast broadband had decreased.

Figure 2-4 Adoption of broadband, by type, by location (% of SMEs)



Average achieved download speeds. Two-fifths of SMEs in South West Wales (40%) reported an average download speed of greater than 30 Mbps in 2019. Figure 2-5[4] highlights that in South East Wales two-thirds of businesses achieved superfast broadband speeds (67%, up nine percentage points from 2018).

Just over one-in-ten businesses in Mid Wales (11%) reported average download speeds of less than 2 Mbps. This was an improvement from 2018, when the comparative figure was over one-in-five (22%) in the sub-region. SMEs in North Wales were the least likely of any sub-region to report average download speeds of less than 2 Mbps (2%).

[4] The median (i.e. 'middle' value of observations) download speed in Mid Wales is 20.5 Mbps; in North Wales 38.4 Mbps; in South East Wales 44.0 Mbps; and South West Wales, 14.8 Mbps.

Figure 2-5 Average achieved download speeds, by sub-region (% of SMEs), 2019

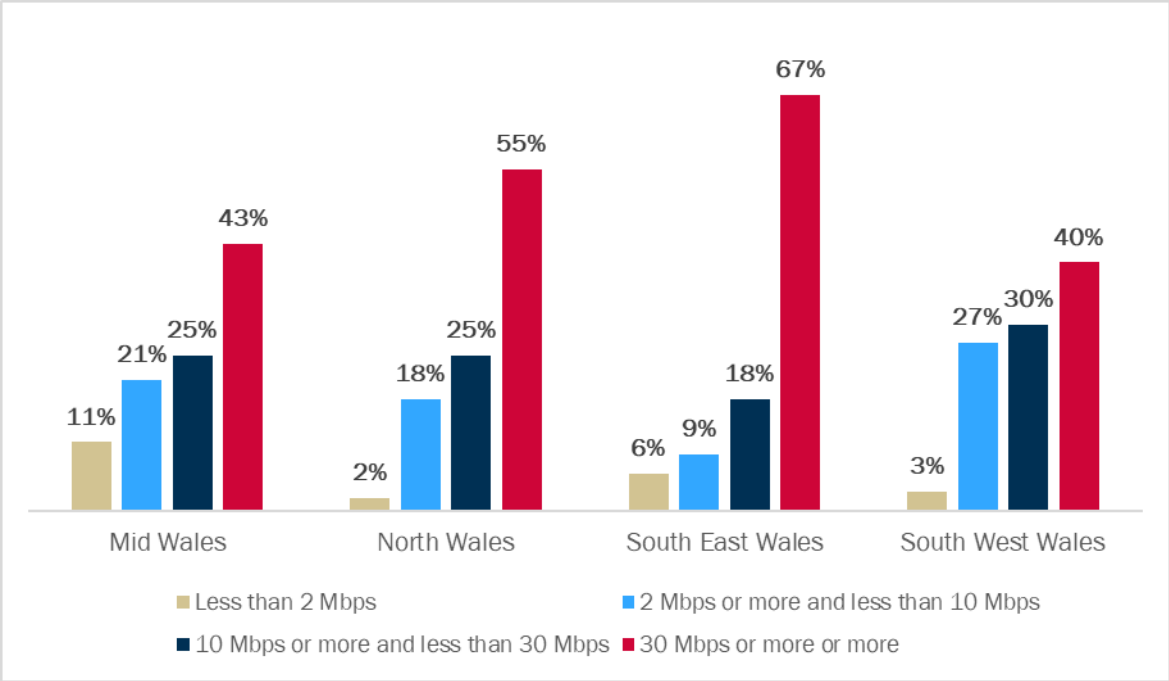
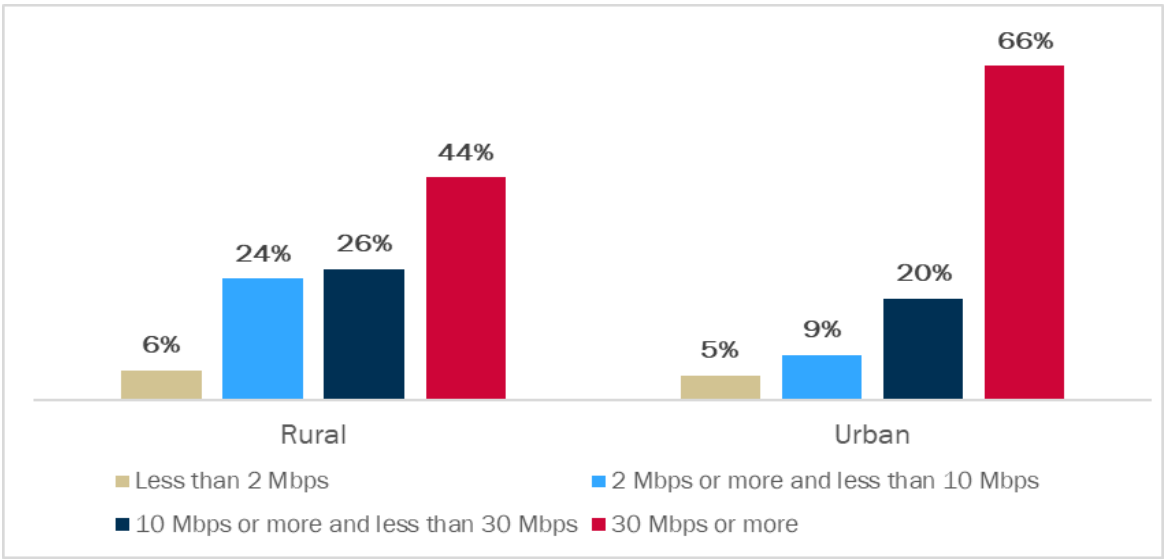


Figure 2-6[5] shows that 6% of rural businesses were only able to achieve download speeds of less than 2 Mbps in 2019. However, this represents an improvement on 2018 where the equivalent figure was 14%.

Figure 2-6 Average achieved download speeds, by location (% of SMEs), 2019

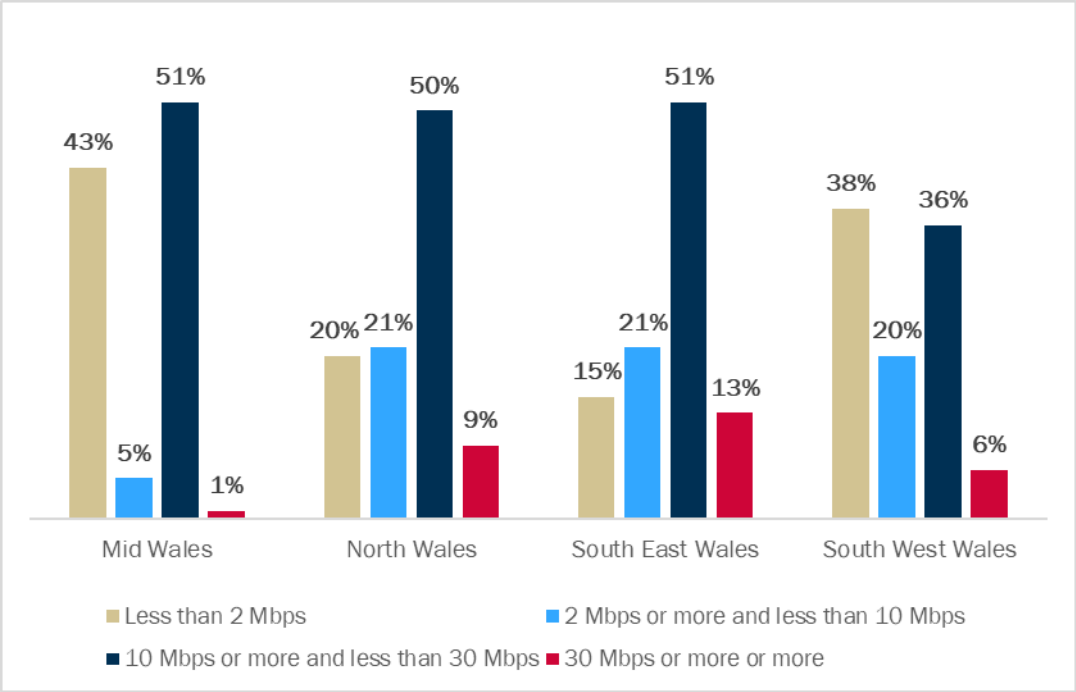


[5] The median (i.e. 'middle' value of observations) download speed in rural locations is 25 Mbps, in urban locations 44 Mbps.

Over two-fifths of rural businesses (44%) reported being able to achieve download speeds of 30 Mbps or more in 2019. This was an increase of nine percentage points on the 2018 figure. Two-thirds of urban businesses (66%) reported average download speeds of 30 Mbps or more, six percentage points up from 2018.

Average achieved upload speeds. Encouragingly, the proportion of SMEs who reported achieving average upoad speeds of less than 2 Mbps decreased in each sub-region of Wales from 2018 to 2019. Figure 2-7[6] shows in Mid Wales 43% of SMEs reported being in this slowest upload category in 2019, representing an eight percentage point decrease from 51% in 2018. North Wales experienced a twenty-two percentage point decrease to 20%, South East Wales a six percentage point decrease and South West Wales a relatively small decrease of two percentage points from 2018 to 2019.

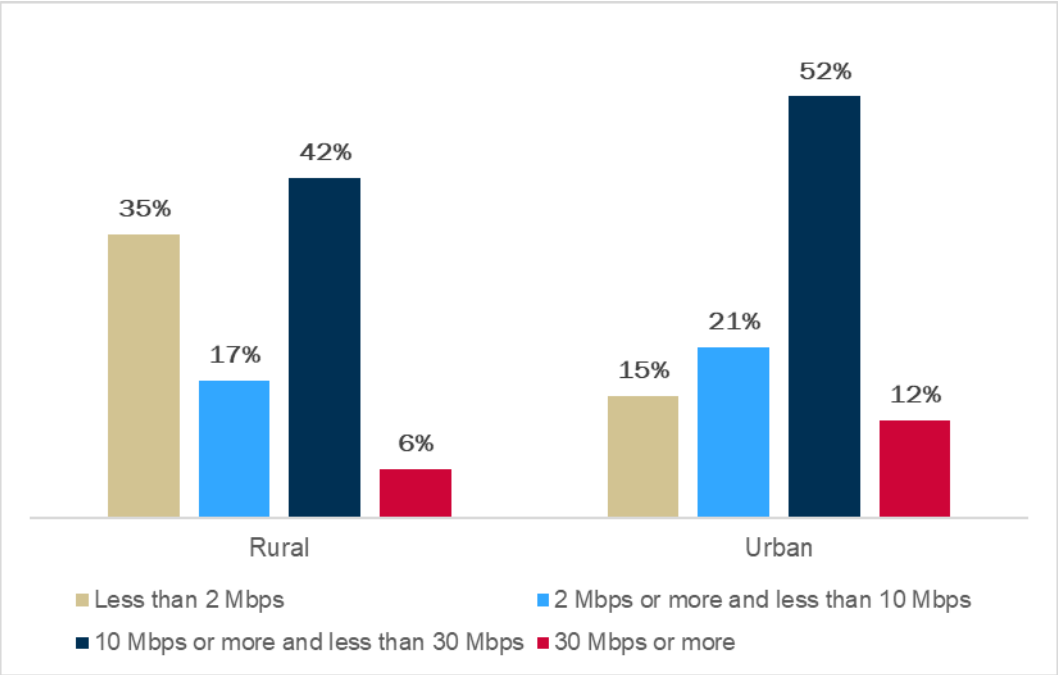
Figure 2-7 Average achieved upload speeds, by sub-region (% of SMEs), 2019



[6] The median (i.e. 'middle' value of observations) upload speed in Mid Wales is 10.4 Mbps; in North Wales 15.6 Mbps; in South East Wales 16.9 Mbps; and South West Wales, 6.4 Mbps.

Figure 2-8[7] shows that urban based businesses were more likely to achieve faster upload speeds with nearly two-thirds (64%) reporting 10 Mbps or more in 2019, as compared to nearly a half (48%) of rural SMEs. The percentage of SMEs in rural areas achieving upload speeds of less than 2 Mbps fell by fifteen percentage points from 2018 to 2019 to 35%. The comparative figure for urban SMEs fell four percentage points to 15% over the same time period.

Figure 2-8 Average achieved upload speeds, by location (% of SMEs), 2019



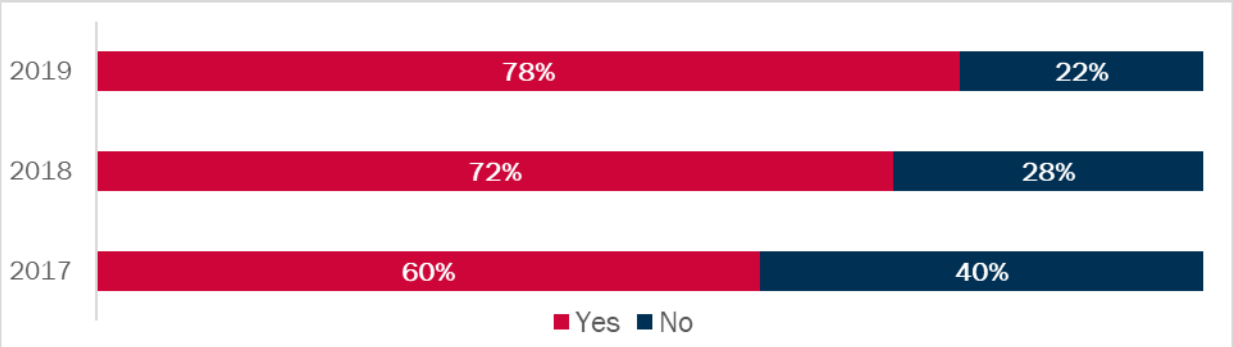
[7] The median (i.e. 'middle' value of observations) upload speed in rural locations is 9.2 Mbps, and in urban locations 15.8 Mbps.

2.3. Use of broadband-enabled services

Use of cloud computing services. The *Survey* distinguishes between the use of basic, foundational cloud computing services (digital tools such as email, office software and file sharing/ storage) and advanced cloud computing services. 'Advanced' services are defined as: accounting and bookkeeping; data back-up; Voice over Internet Protocol; electronic payment; video conferencing; customer relationship management; project management software; computing power to run business software; human resource management software ; and enterprise resource planning.

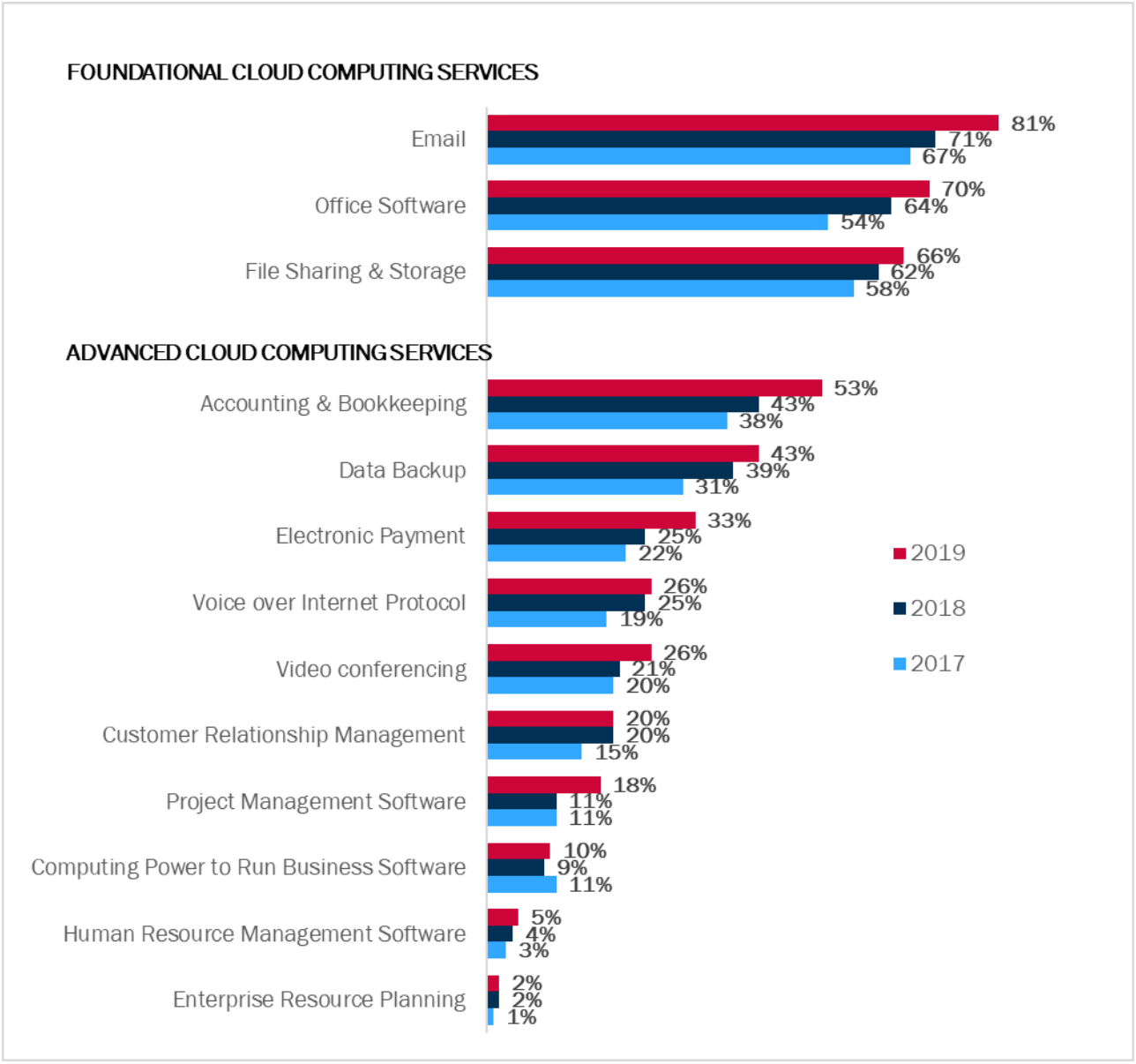
The proportion of SMEs using at least one advanced cloud computing service, shown in Figure 2-9, increased by six percentage points to 78% from 2018 to 2019.

Figure 2-9 Use of advanced cloud computing services (% of SMEs)



As illustrated in Figure 2-10, there were increases in the usage of a majority of advanced cloud computing services when comparing data from 2018 and 2019. Usage of cloud computing accounting/ bookkeeping services increased by 10 percentage points in 2019 to 53% of SMEs; electronic payment increased by eight percentage points to 33%; and project management software increased by seven percentage points to 18%.

Figure 2-10 Proportion of businesses using cloud computing services, by category (% of SMEs)



In the 2019 *Survey*, SMEs were additionally asked about their usage of three other cloud computing services: internet of things (IoT); artificial Intelligence (AI); and additive manufacturing (e.g. 3D printing). The percentage of SMEs reporting using them in 2019 were 6%, 2% and 1% respectively.

Figure 2-11 highlights that SMEs in the Information and communication (87%), Manufacturing (85%) and Business and other services (82%) were most likely to use advanced cloud services in 2019. Accommodation and food services businesses were the least likely to report using cloud services (44%).

Figure 2-11 Proportion of businesses using advanced cloud computing services, by industry sector (% of SMEs)

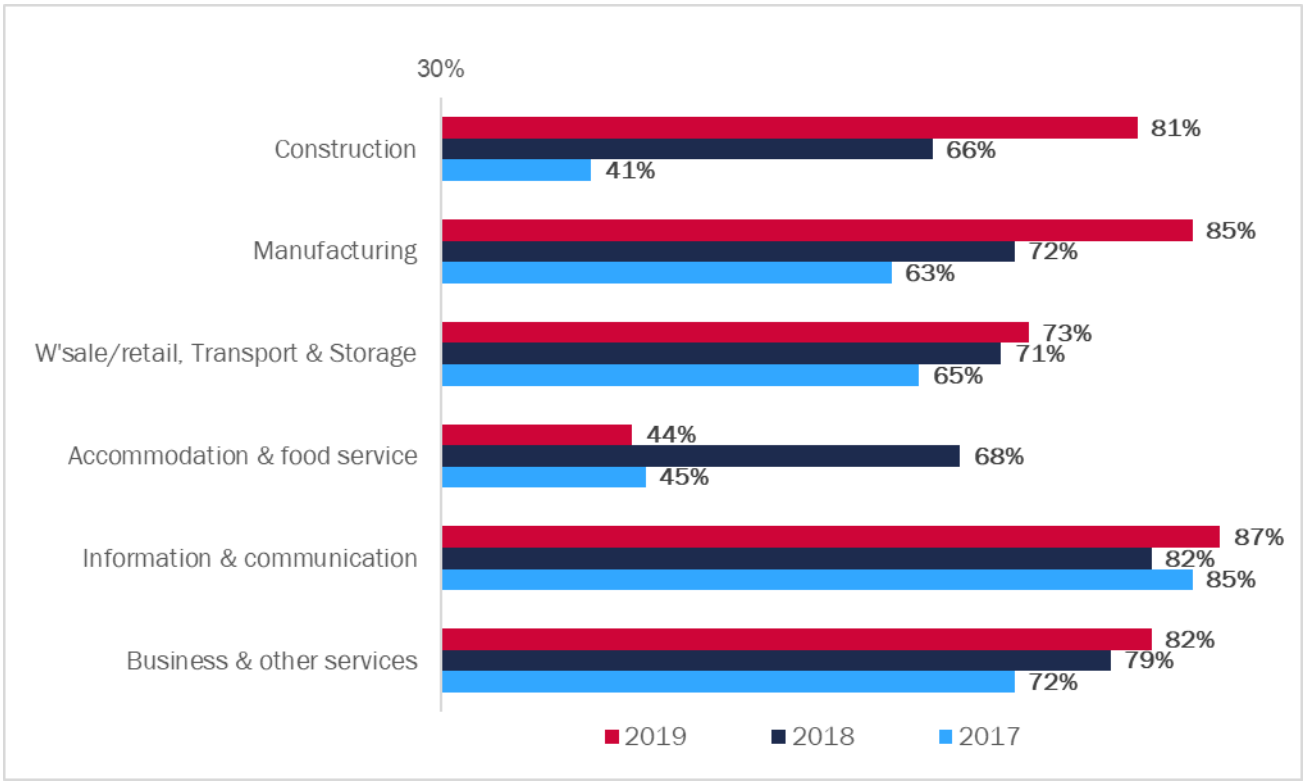
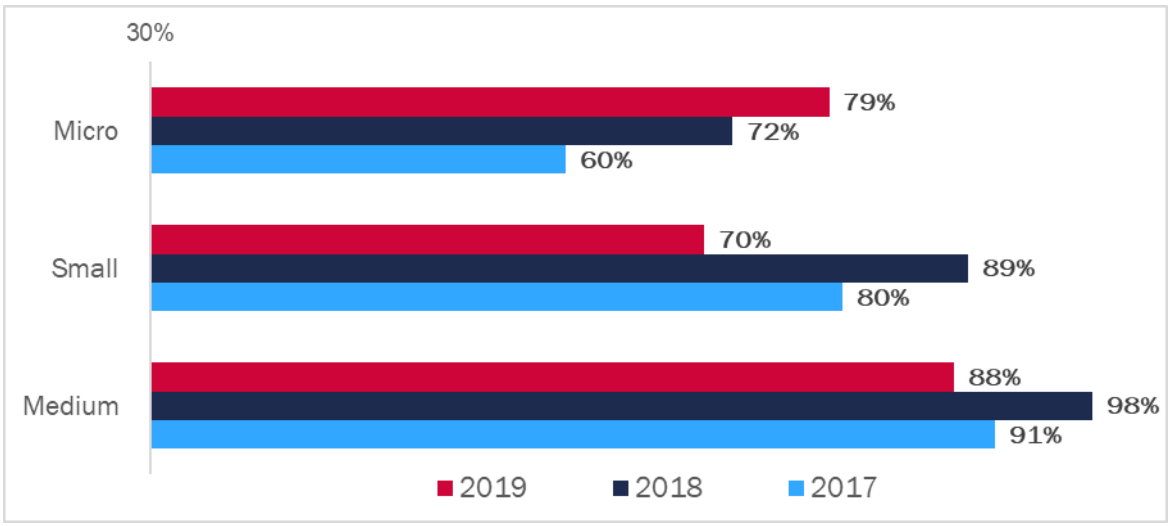


Figure 2-12 shows that in 2019 medium-sized SMEs were most likely to report using advanced cloud services (88%), followed by micro (79%) and small (70%).

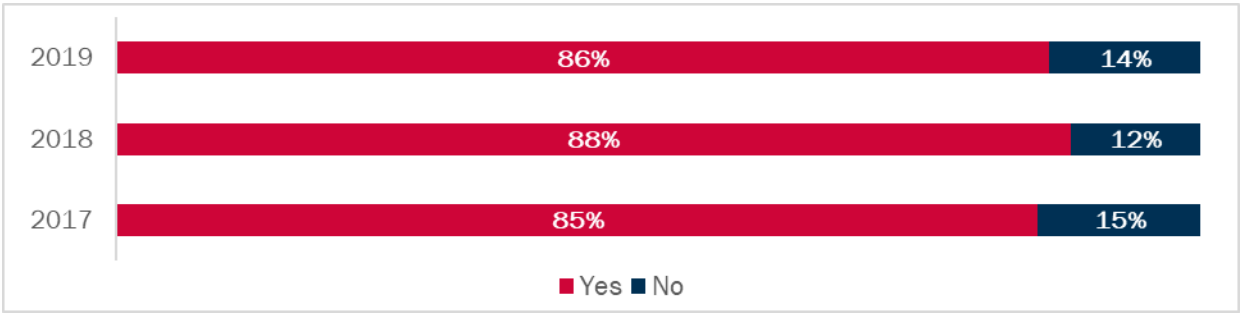
Figure 2-12 Proportion of businesses using advanced cloud computing services, by size of business (% of SMEs)



By sub-region, usage of advanced cloud services in 2019 ranged from 88% in South East Wales, to 76% in South West Wales, 68% in Mid Wales and 64% in North Wales. SMEs located in urban areas were more likely to use advanced could services than rural SMEs (82% and 73% respectively).

Use of website. 86% of the businesses taking part in the 2019 *Survey* reported having a website of their own. Figure 2-13 shows that this proportion has been relatively stable since 2017.

Figure 2-13 Use of website (% of SMEs)

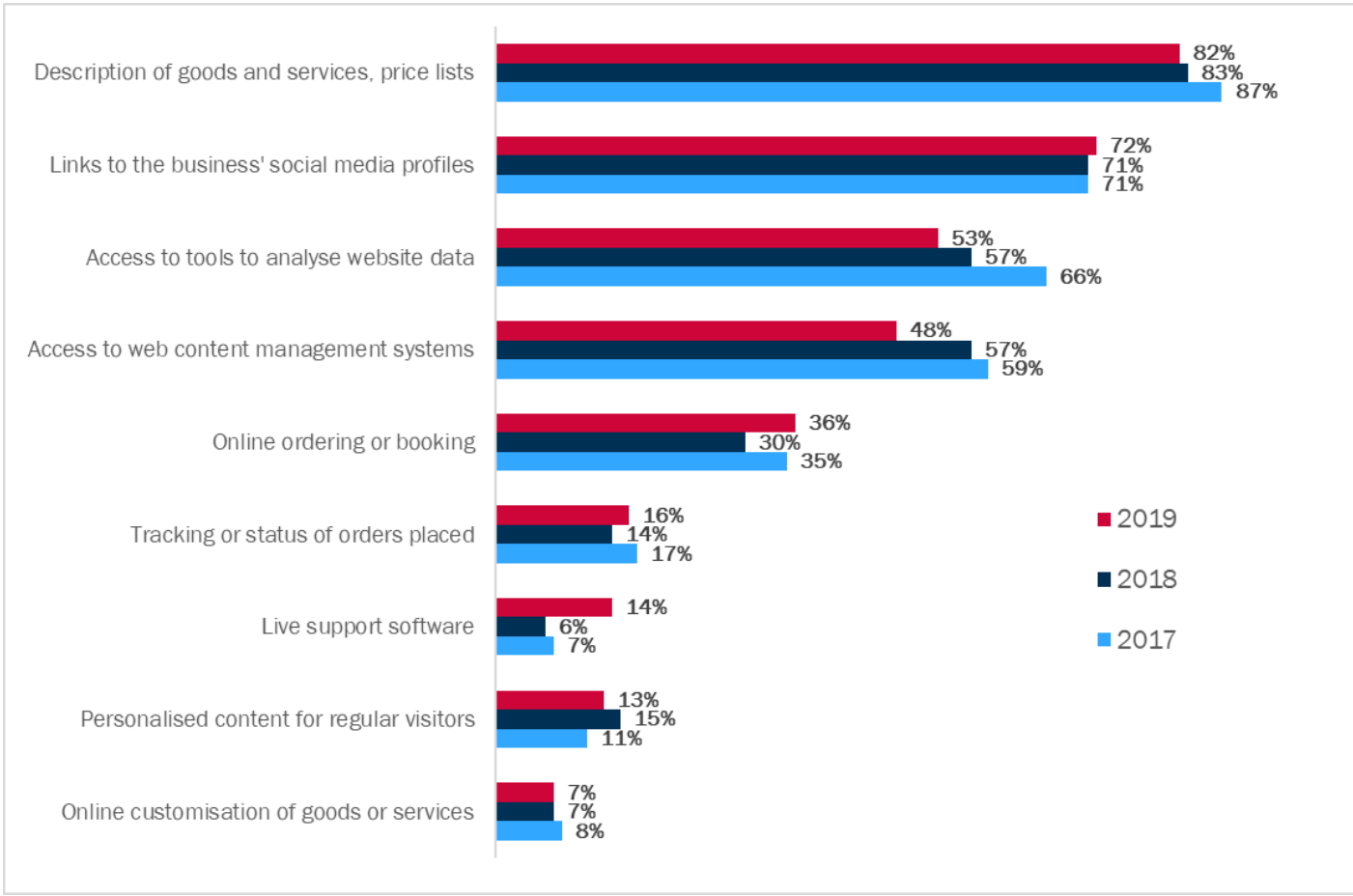


By sector, Construction businesses were the least likely to have a website – with 69% reporting positively, in comparison to over 90% of SMEs in all other sectors. A relatively low proportion of businesses in South West Wales (74%) stated they had a website (comparative figures for other sub-regions were Mid Wales 88%, North Wales, 87% and South East Wales 91%).

Medium-sized SMEs were more likely than smaller SMEs to have a website and a larger percentage of urban based businesses (90%) had a website than rural businesses (81%).

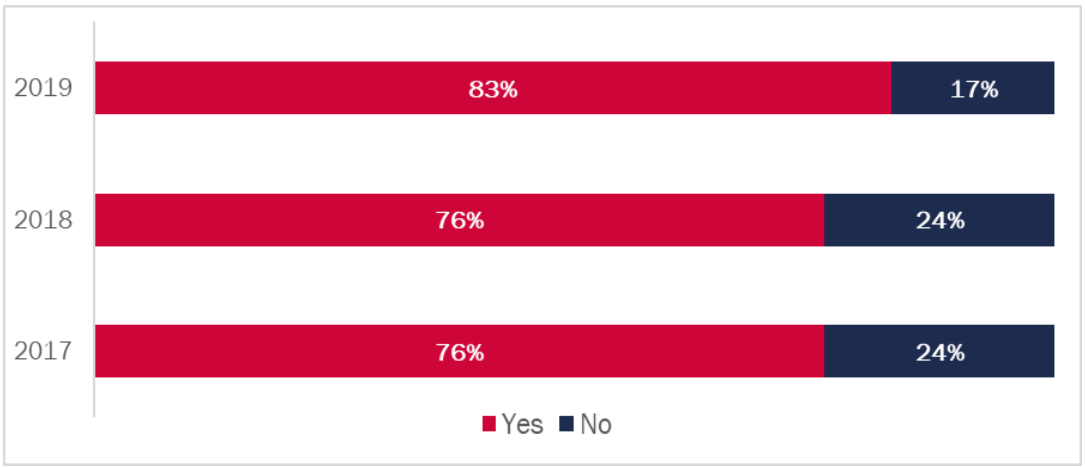
Figure 2-14 shows businesses were most likely to report having the website functions of 'description of goods and services, price lists' (82%) and 'links to the business' social media profiles' (72%). Generally, in 2019, reported usage of web functions were relatively unchanged or exhibited slight decreases. There was, however, a relatively large increase in the use of 'live support software', up eight percentage points to 14%.

Figure 2-14 Proportion of businesses with website, by website function (% of SMEs)



Use of social media. Figure 2-15 shows just over four-fifths of SMEs reported using social media in 2019 (83%). This represents an increase of seven percentage points on 2018.

Figure 2-15 Use of social media (% of SMEs)



There was an increase of three percentage points in the use of social network platforms from 80% in 2018, to 83% in 2019. Figure 2-16 shows that half of SMEs were using a blog or microblog (at 50%, down three percentage points on 2018), and three-in-ten using multimedia content sharing websites (30%).

Figure 2-16 Proportion of businesses using social media, by platform (% of SMEs)

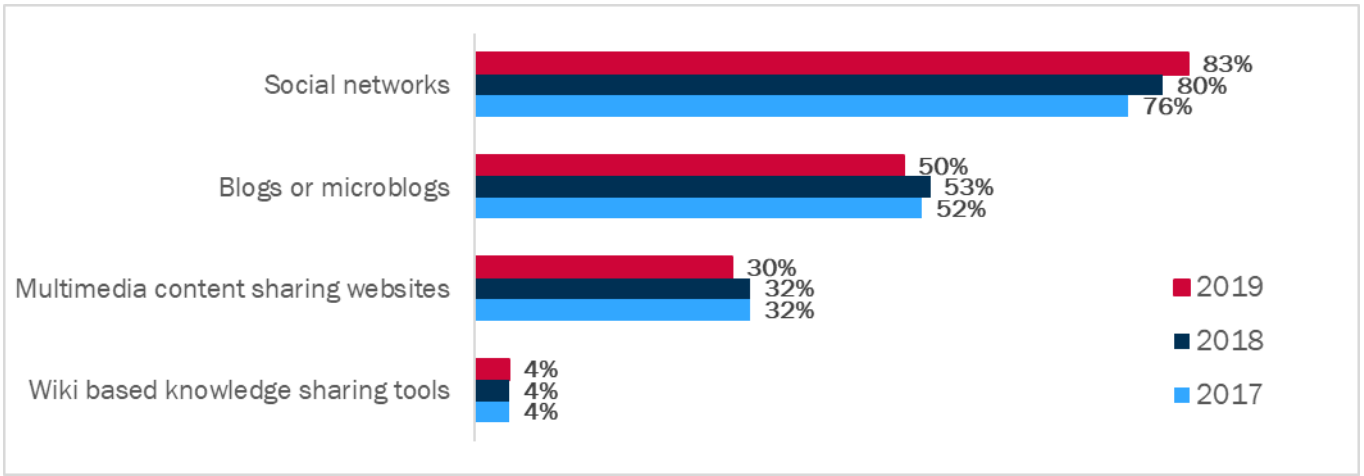
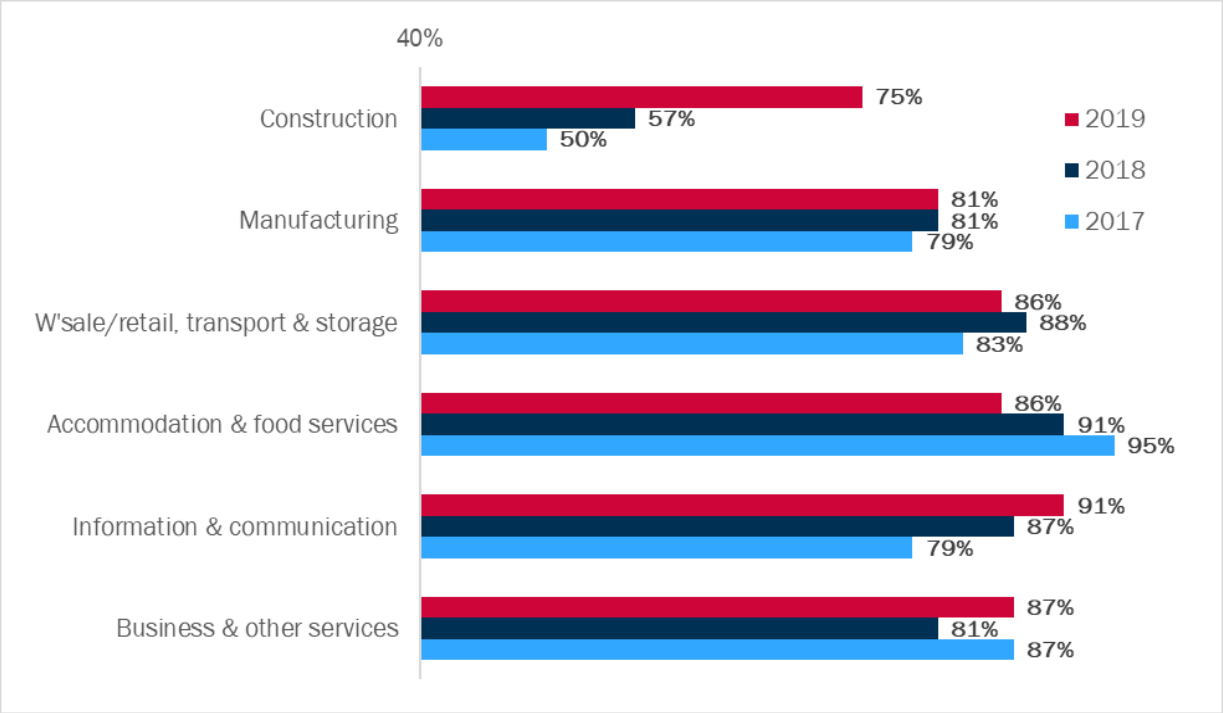


Figure 2-17 shows that businesses in Information and communication (91%), and Business and other services (87%) were the most active users of social media in 2019. While the Construction sector remained the least active user (75%), there was an eighteen percentage point increase in this industrial sector when comparing data from 2018 to 2019.

Figure 2-17 Proportion of businesses using social media, by industry sector (% of SMEs)

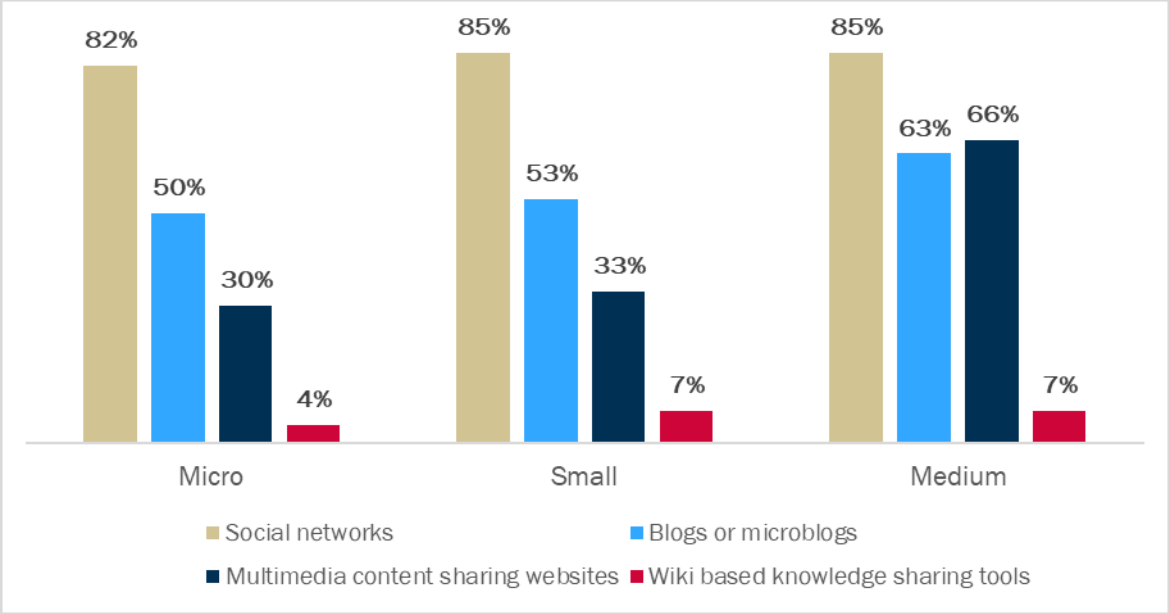


By location, urban based SMEs were more active in using social media than rural SMEs, with urban SMEs more likely to use social media across all the platforms except multi-media content sharing.

By sub-region, in 2019, South East Wales businesses reported the highest use of social media (87%), followed by South West Wales (85%), Mid Wales (79%), and North Wales (76%).

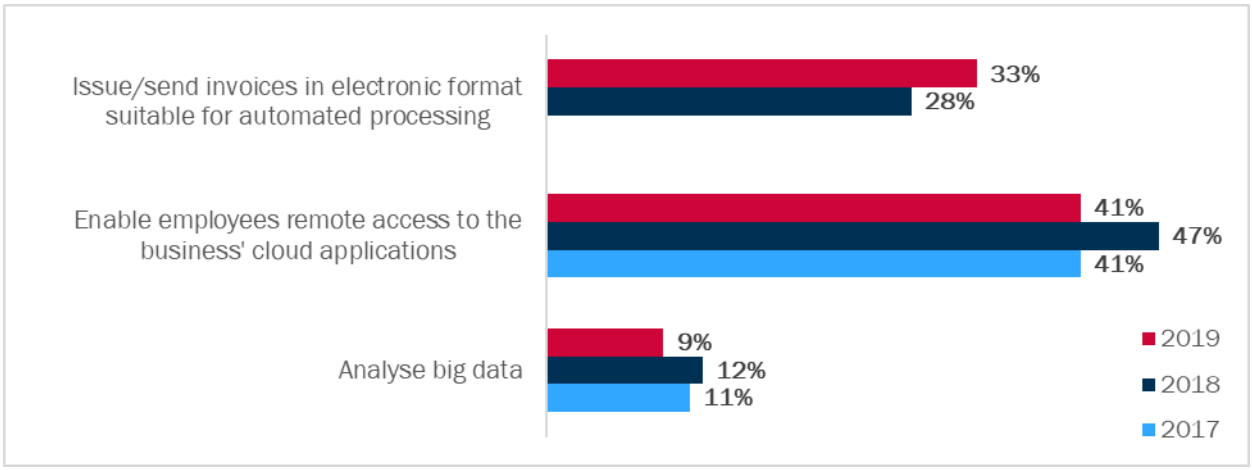
The larger the SME the more likely they were to have been active on social media in 2019. Figure 2-18 shows that 85% of medium-sized SMEs used social network platforms, and around two-thirds each used blogs/microblogs and multi-media content sharing websites (63% and 66% respectively).

Figure 2-18 Proportion of businesses using social media, by size of business and platform (% of SMEs), 2019



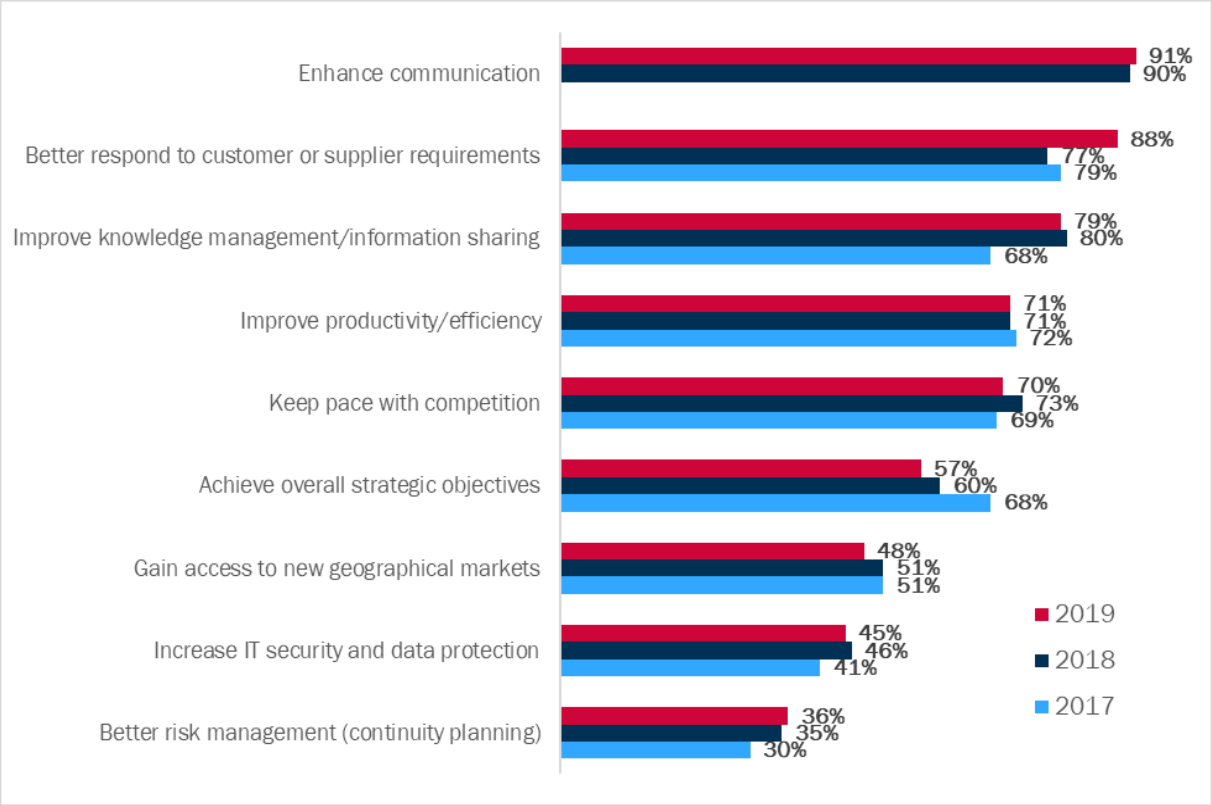
Other use of broadband. Figure 2-19 shows that a third of SMEs reported issuing/sending invoices in an electronic format suitable for automated processing in 2019 (33%, an increase of five percentage points from 2018). Two-fifths of businesses reported that they enabled employees remote access to the business' cloud applications (41%), and nearly one-in-ten reported analysing big data (9%).

Figure 2-19 Use of broadband-enabled functions (% of SMEs)



Benefits of using broadband-enabled services. Figure 2-20 illustrates that SMEs were most likely to perceive the benefits of using broadband enabled services as enhancing communication (91%), enabling them to better respond to customer or supplier requirements (at 88%, up eleven percentage points from 2018 to 2019) and improve knowledge management/ information sharing (79%).

Figure 2-20 Benefits of broadband-enabled services (% of SMEs)

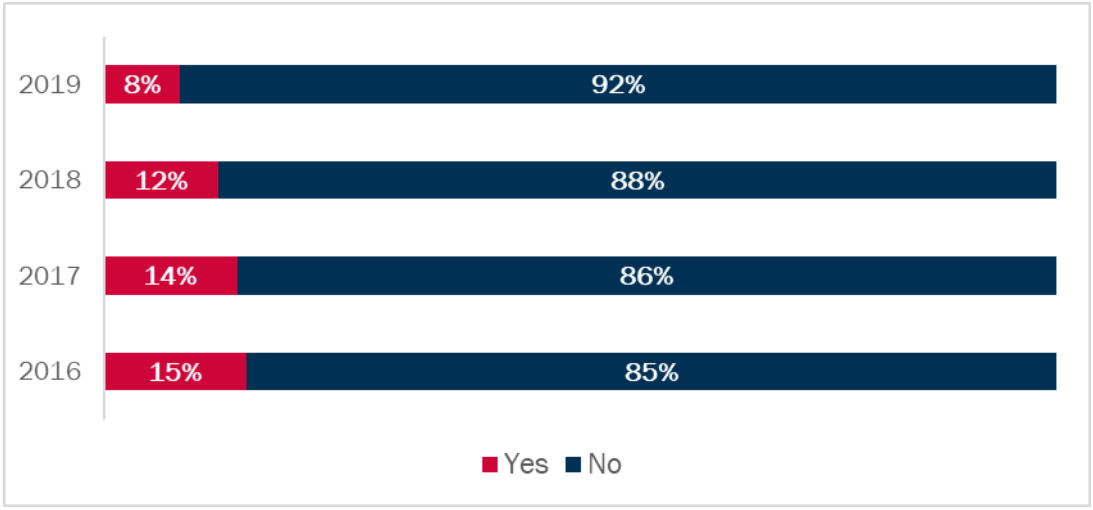


2.4. ICT expenditure

ICT infrastructure investment. Figure 2-21 shows that less than one-in-ten SMEs (8%) reported that they had a dedicated ICT budget in 2019, a decrease from one-in-eight (12%) in 2018.

Urban-based businesses were slightly more likely than rural businesses to have a dedicated IT budget (9% and 8% respectively). Micro-sized businesses were least likely to report having a dedicated ICT budget (8%, as compared to 15% of small-sized businesses). SMEs in Information and communication and Business and other services were most likely to have an ICT budget (17% and 15% respectively).

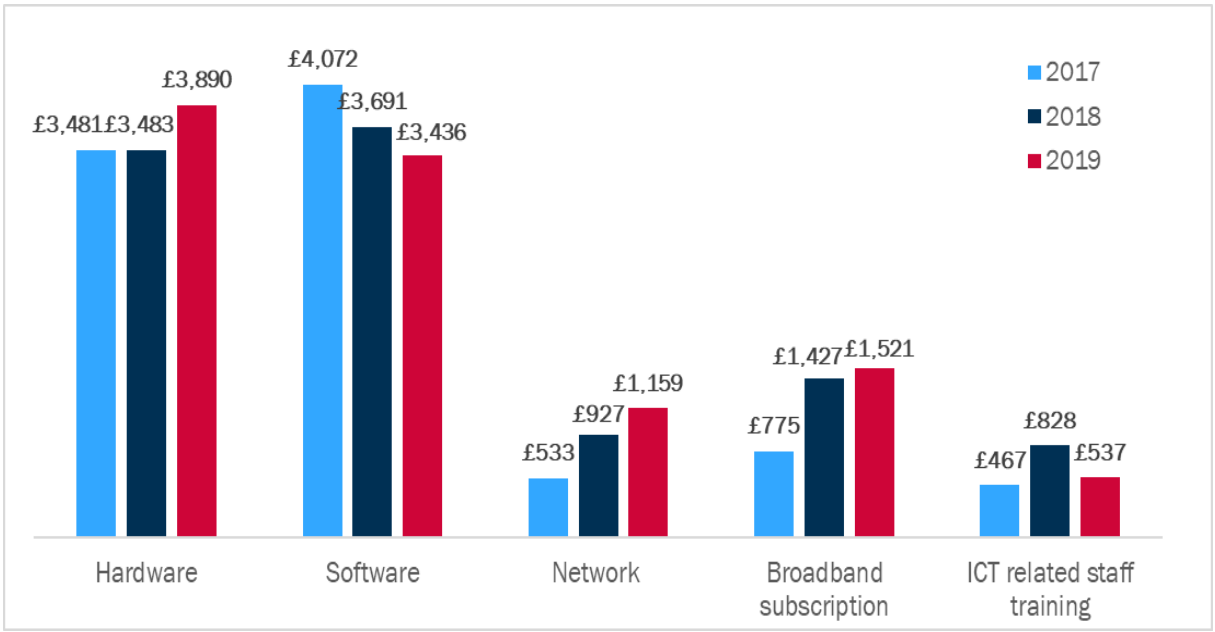
Figure 2-21 Proportion of businesses with dedicated ICT budget (% of SMEs)



SMEs were asked in the *Survey* to indicate their annual spend, averaged over the last three years, on hardware, software, network, broadband subscription, and ICT related training. Figure 2-22 shows that hardware spend increased 12% to £3,890 per SME when comparing 2018 and 2019. Over the same period, software spending decreased 7% to £3,436.

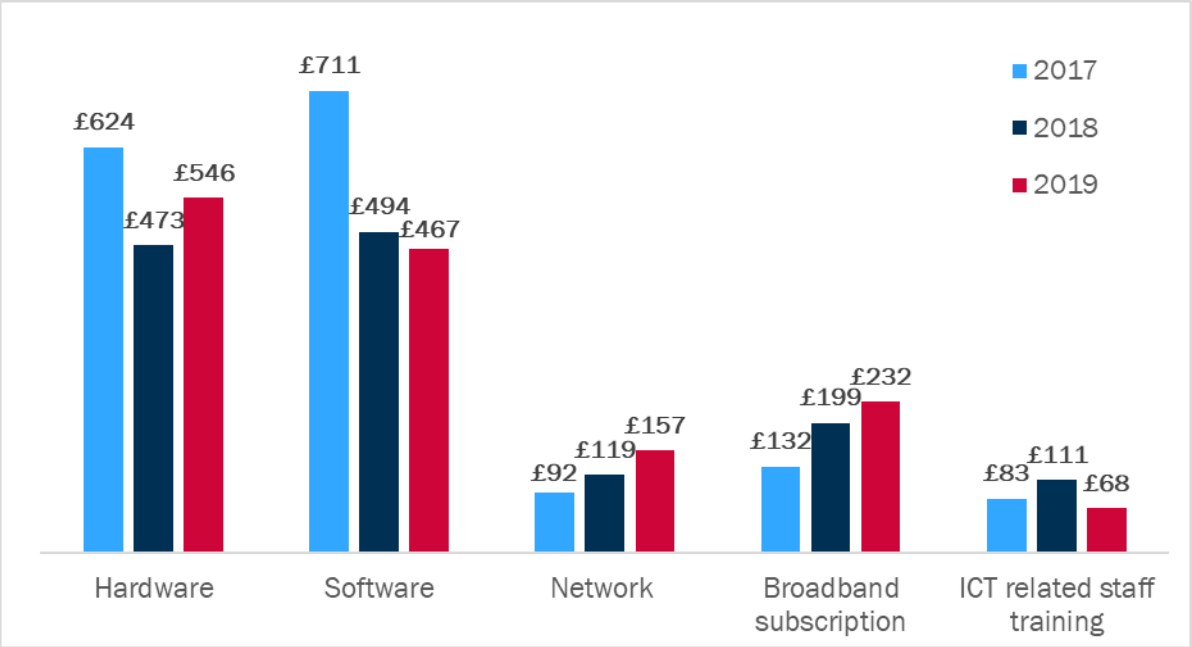
Figure 2-22 also shows there was a decrease in ICT related staff training spend per SME from 2018 to 2019, while both network and broadband subscription spending increased. The latter may reflect businesses buying faster speed broadband connections.

Figure 2-22 Average spend on ICT infrastructure and training per SME (£ per year)



Annual ICT infrastructure and training investment per full-time worker is shown in Figure 2-23. An average of £546 per full time equivalent employee was spent annually on hardware related items in 2019, an increase of 15% from 2018. Contrastingly, spend on software fell by nearly 6%, to £467, during the same time period.

Figure 2-23 Average spend on ICT infrastructure and training per employee (£ per year)

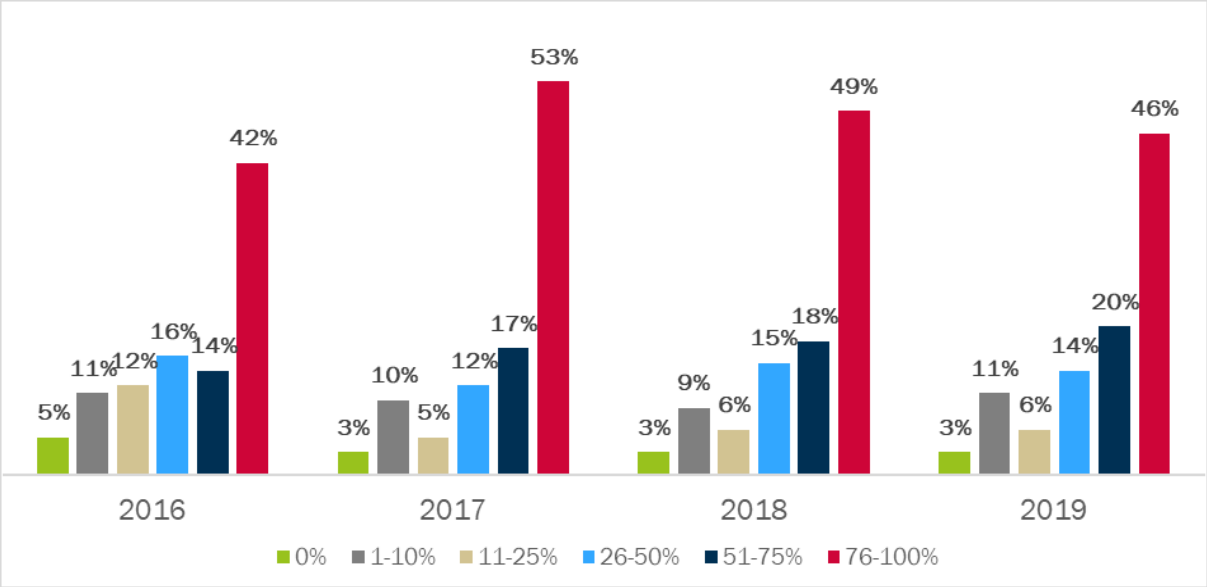


Network and broadband subscription spend per employee both increased from 2018 to 2019 indicating the transition to more cloud-based application use, where in order to fully utilise the benefits available, faster connection speeds are necessary. The decrease in ICT related staff training per employee observed when comparing 2018 to 2019 may relate to SMEs utilising more alternative free, or less cost, training methods (e.g. YouTube videos) than traditional methods.

2.5. ICT skills

Internal ICT capabilities. Figure 2-24 shows that in 2019 two-thirds of SMEs (66%) had at least half of their employees with intermediate or above ICT skills[8]. This was relatively static from 2018 (where the comparative figure was 67%), but represented an increase of ten percentage points from the start of the *Survey* in 2016. These data reflect the digital transition taking place all the time (see Section 1.2 for more details), with SMEs' continual need to reappraise and develop skills in their business.

Figure 2-24 Proportion of employees with intermediate or above ICT skills (% of SMEs)



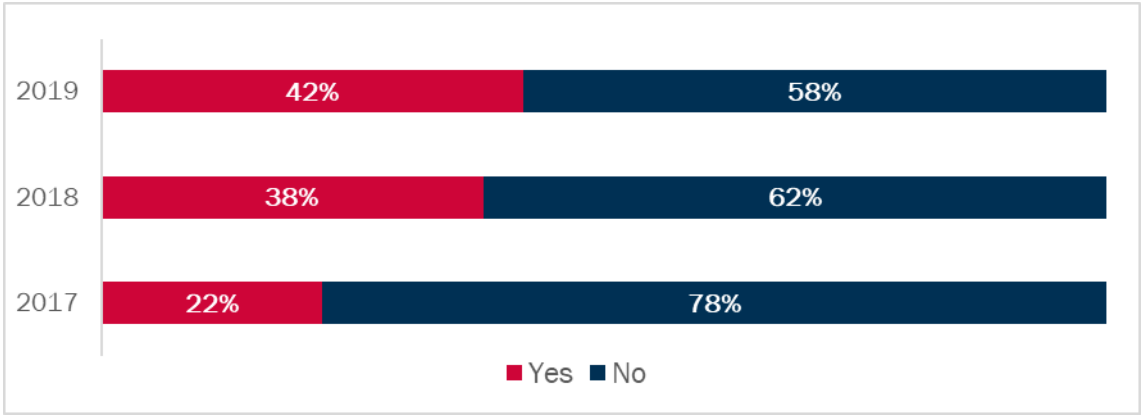
In 2019, the sectors with the highest concentration of SMEs with intermediate or above ICT skills were Information and communication (90%), and Business and other services (79%). The comparative proportion for Accommodation and food services businesses was two-in-five (40%).

Two-thirds of both rural businesses (64%) and urban businesses (68%) reported having at least half of their employees with intermediate or above IT skills, while by sub-region, this metric ranged from a highest in Mid Wales at 78%, to a lowest in North Wales, at 59%.

[8] Intermediate computer skills include the working knowledge of the operations of the internet and email, computers, word processing, graphics and multimedia, and spreadsheets and databases.

Internal ICT specialists were employed by over two-fifths of SMEs in 2019 (42%). Figure 2-25 highlights that this was an increase of four percentage points from 2018.

Figure 2-25 Proportion of businesses that employ internal ICT specialists (% of SMEs)



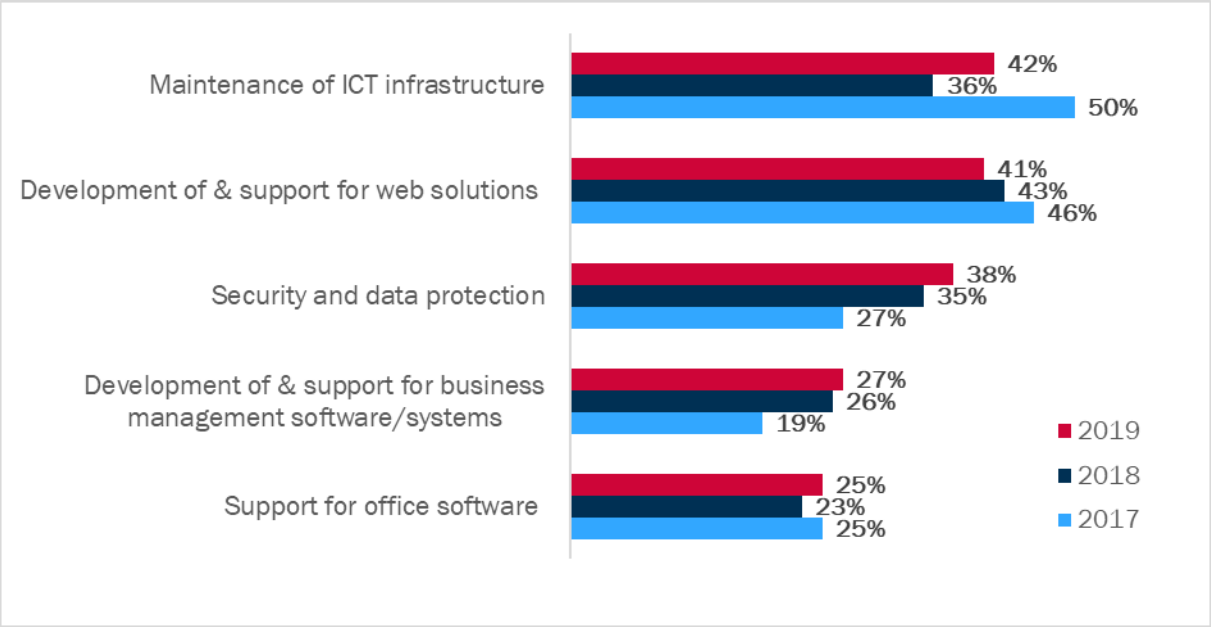
Urban-based businesses (44%) were more likely than their rural counterparts (39%) to employ internal ICT specialists. By sub-region, 46% of businesses in South East Wales, 40% in Mid Wales, 37% in South West Wales and 36% in North Wales reported employing internal ICT specialists. The larger the SME, the more likely they were to report employing ICT specialists internally (69% of medium-sized SMEs, 50% of small sized, and 41% of micro).

Businesses operating in the Information and communication sector were most likely to employ internal ICT specialists (62%), while businesses in Accommodation and food services were least likely (33%).

External ICT support capabilities. Figure 2-26 shows that, in 2019, external ICT support was most likely to be used by SMEs for maintenance of ICT infrastructure (42%, up six percentage points on the comparative figure in 2018) and development of, and support for web solutions (41%).

Nearly two-fifths of businesses utilised external ICT support (38%) for security and data protection in 2019, with this task seeing the largest overall percentage point increase since 2017 (up eleven percentage points).

Figure 2-26 Proportion of businesses that use external ICT support, by task (% of SMEs)

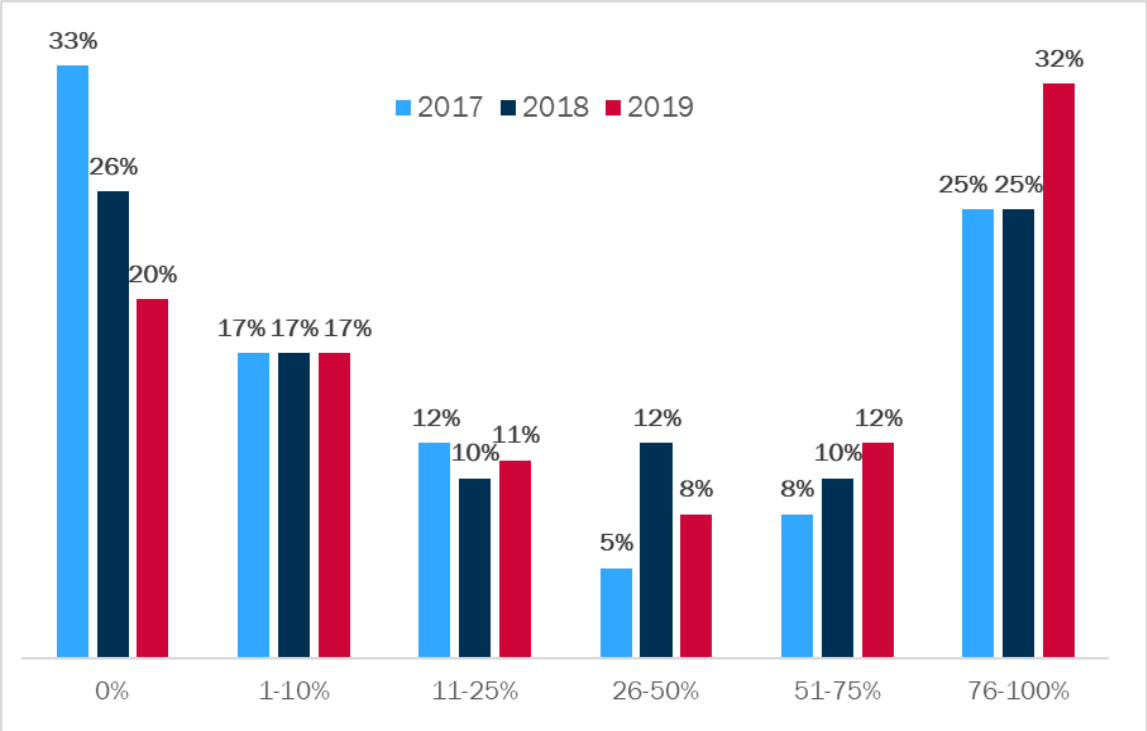


By location, external ICT support was more likely to be engaged by SMEs in South East Wales (65%) and North Wales (58%), rather than Mid Wales (51%) and South West Wales (49%), and in urban areas (64%) rather than rural areas (53%). By size, generally the larger the SME the more likely they were to use external ICT support (92% of medium-sized, 68% of small, and 58% of micro businesses).

2.6. E-commerce

Sales serviced online. In the 2018 *Survey* the proportion of businesses reporting that between 76% to 100% of their sales were serviced online was one-in-four (25%). Figure 2-27 shows that in 2019 this had increased to nearly one-in-three (32%). At the other end of the scale, the proportion of businesses that did not sell online reduced from just over one-quarter (26%) in 2018, to one-fifth (20%) in 2019.

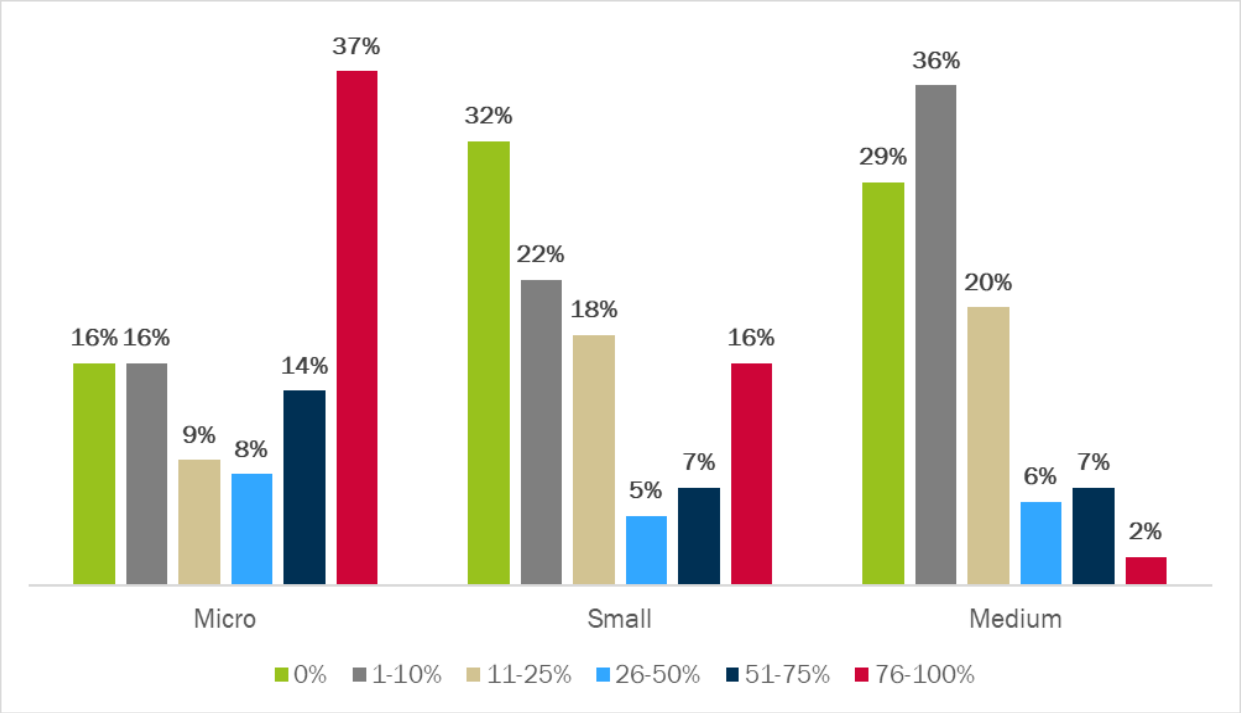
Figure 2-27 Proportion of total sales conducted online (% of SMEs)



By sector, SMEs in Construction, and Business and other services were the least likely to sell online with just over a third of SMEs in both of these sectors (34%) reporting no online sales. Rather than an unwillingness to trade online, the customised nature of services offered in these sectors, may be one of the explanatory factors in this. Information and communication, and Accommodation and food services businesses were most likely to report deriving a higher proportion of sales online.

Figure 2-28 shows that, as in previous years, micro-sized SMEs were the most likely to service between 76% and 100% of their sales online. Nearly two-fifths of micro businesses were in this category (37%, up ten percentage points from 2018). The comparative percentages for small and medium-sized businesses were 16% and 2% respectively.

Figure 2-28 Proportion of total sales conducted online, by size of business (% of SMEs), 2019



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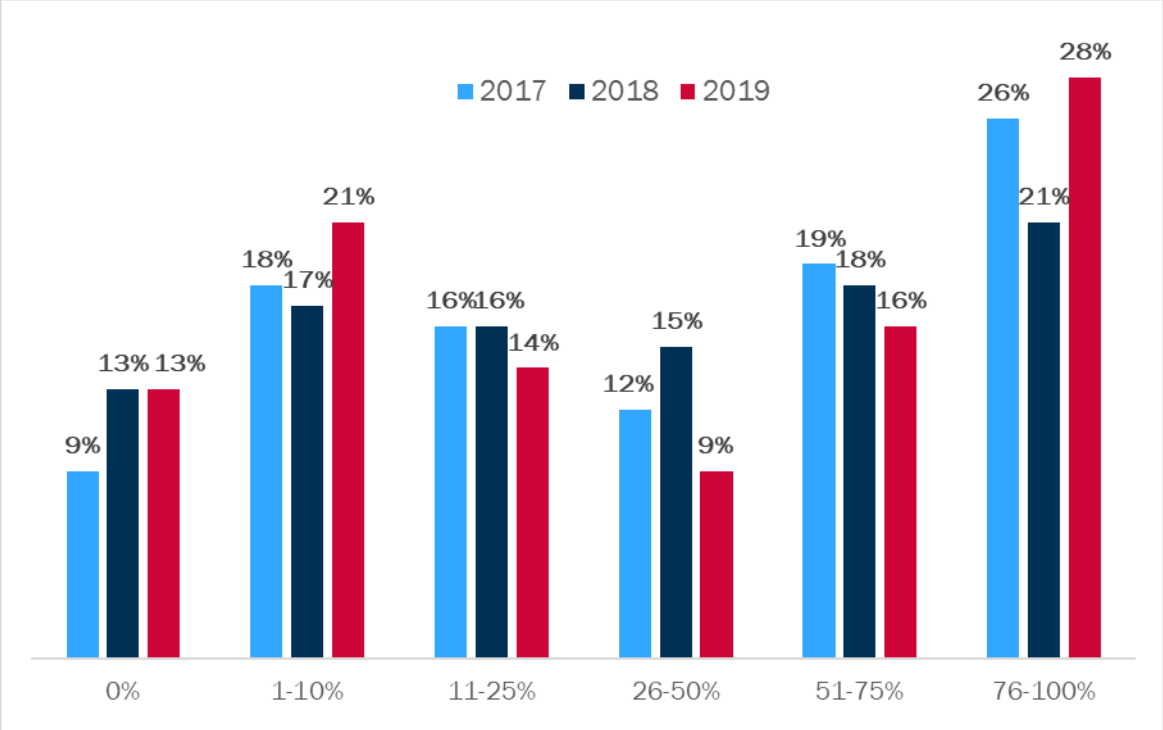
Purchases transacted online. Figure 2-29 shows there was no change in the proportion of SMEs reporting that they did not make any purchases online when comparing 2018 and 2019 (13%). Nearly three-in-ten businesses transacted 76% or more of their total purchases (in value terms) online.

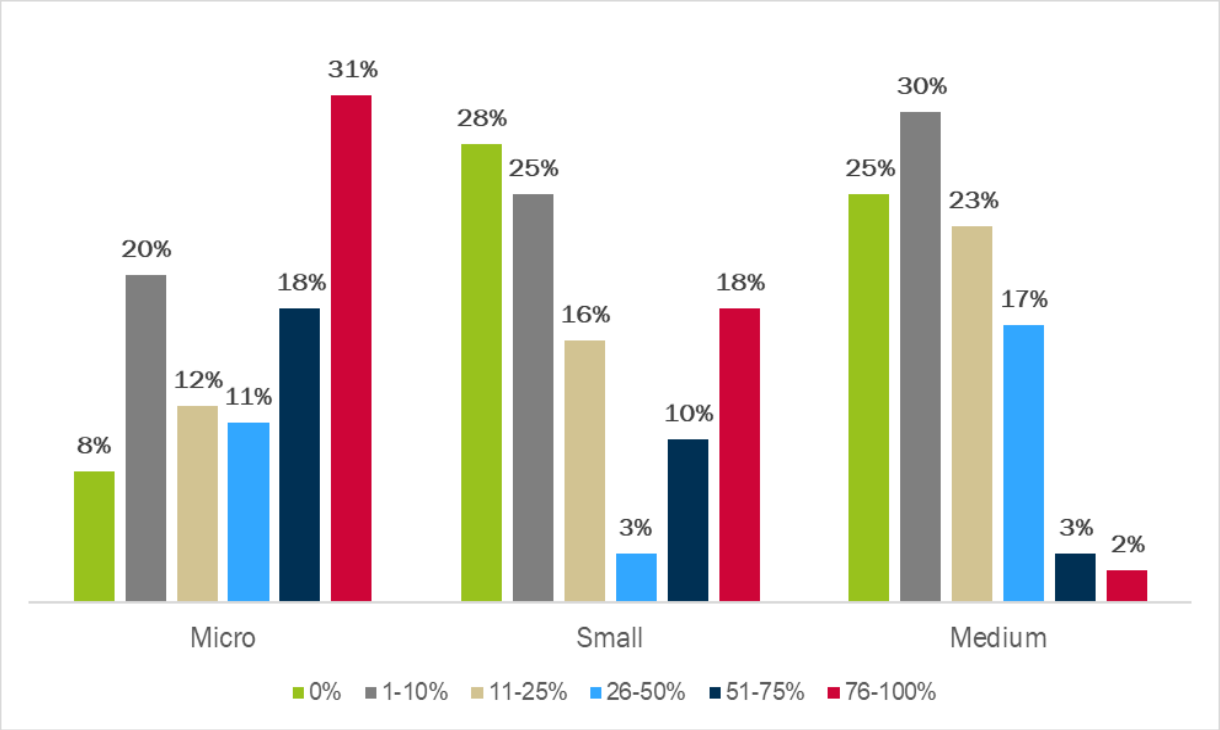
Figure 2-29 Proportion of total purchases transacted online (% of SMEs)



By location, 40% of rural businesses and 49% of urban businesses transacted at least half of their purchases online. SMEs in the Information and Communication, and Business and other services sectors were most likely to purchase online.

Figure 2-30 indicates that the smaller the business, the more likely they were to purchase online. 49% of micro businesses transacted more than half of their total purchases online, in comparison to 28% of small businesses and 5% of medium-sized businesses.

Figure 2-30 Proportion of total purchases transacted online, by size of business (% of SMEs), 2019

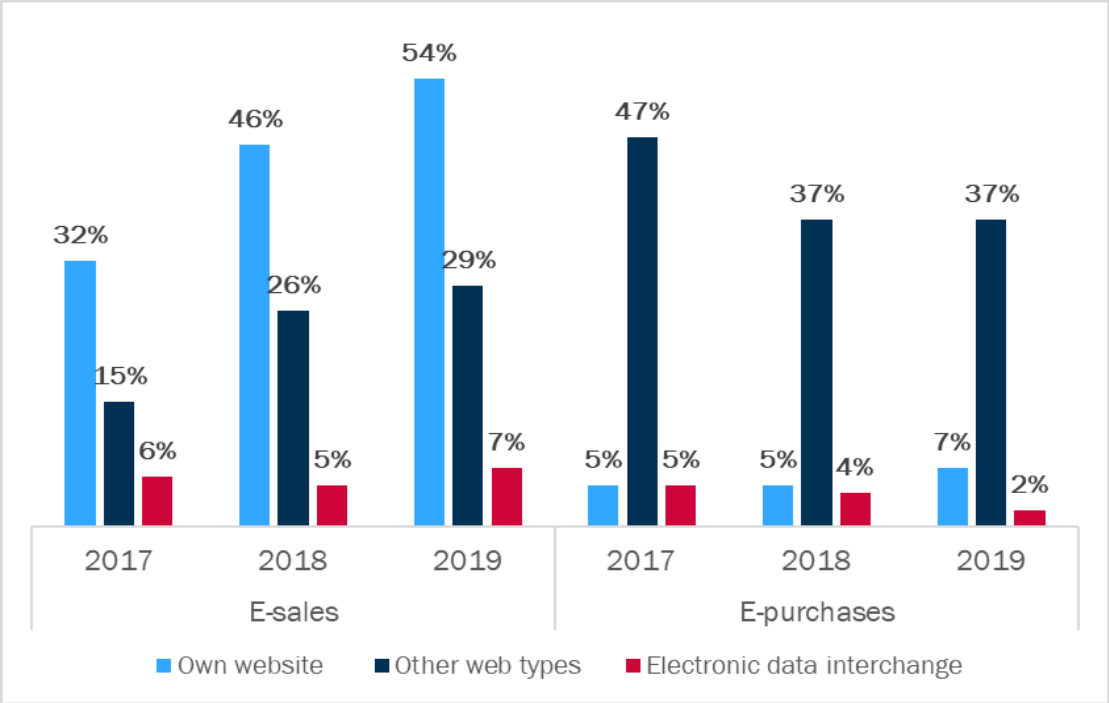


Channels of e-commerce activities. The left hand side of Figure 2-31 shows the proportion of businesses reporting e-sales activities through their own website increased from 2018 to 2019, by eight percentage points, to 54%. Nearly three-in-ten SMEs used other web types, such as online stores, apps or other websites (29%).

E-purchases, shown on the right hand side of Figure 2-31 were most likely to have been transacted through other web types (37%) in 2019.

Usage of Electronic Data Interchange (EDI) for e-sales increased by one percentage point from 2018 to 2019, to 7%, while usage of EDI for e-purchases fell two percentage points during the same time period to 2%.

Figure 2-31 E-commerce activities, by channel (% of SMEs)

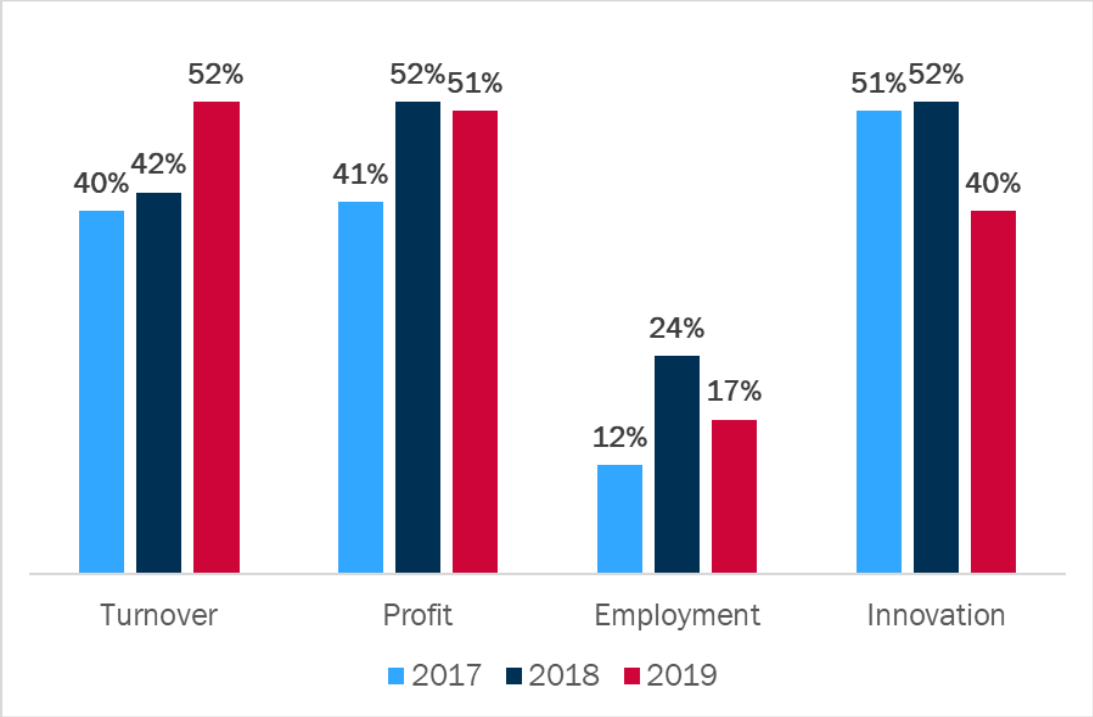


Performance of SMEs with superfast broadband. The *Survey* questioned SMEs on the outcomes they had experienced through use of broadband or superfast broadband. Figure 2-32 shows the proportion of SMEs reporting that they had positive outcomes in terms of four indicators (turnover, profit, employment and innovation) from adopting superfast broadband.

In 2019, just over a half of SMEs indicated that turnover had increased due to exploiting access to superfast broadband speeds (52%, up ten percentage points on 2018). A similar proportion (51%, down one percentage point on 2018) reported that profits had increased as an outcome of their usage of superfast broadband speeds.

Around one-in-six businesses (17%) reported the positive outcome of an increase in employment resulting from superfast broadband. This was a decrease from the almost one-in-four (24%) businesses who indicated positive employment outcomes in 2018. The percentage of SMEs reporting positive outcomes in innovation was 40% in 2019, a decrease of twelve percentage points from 2018.

Figure 2-32 Performance of SMEs with superfast broadband (% of businesses reporting positive outcomes)



The decrease in SMEs reporting positive outcomes in employment and innovation may be related to the uncertain pre-Brexit economic climate; impacts from a reduction in investment; and an expected drop-off in 'novelty value' of digital usage over time.

More detailed analysis on these aspects of the *Survey* will be published in the *Economic Impact Report*.

3. Digital Maturity Index

3.1. Introduction

The Digital Maturity Index (DMI) measures the level of digital maturity in each SME according to the five dimensions of digital maturity depicted in the conceptual framework in Figure 1-1. It scores items from survey questions in each of the five dimensions, with a maximum score of 100[9]. Table 3-1 defines the definitions and measurement items used in the DMI.

[9] All the Yes/No items were coded as 1/0, with items that refer to ranges coded from 1 upwards in ascending order. Binary items were multiplied by a constant of 2 to calibrate the scale to a maximum of 2.

Table 3-1 Definiton and measurement of digital maturity dimensions

Digital maturity dimension	Definition	Measurement items
ICT infrastructure	Broadband adoption	• Access to broadband • Download speed • Upload speed
ICT investment	Business budget for ICT-related expenses	• Annual spending on hardware, software, network, broadband subscription • ICT-related staff training
ICT capabilities	Access to human ICT-related resources	• ICT human skills, both internal and external to the business. • ICT skills of internal staff are measured as the proportion of workforce with intermediate and above ICT skills • Access to additional ICT skills is measured according to whether SMEs employ ICT specialists and/or use external ICT support
Digital applications	Use of digital technologies	• Cloud applications for a variety of business functions • Website and its functionality • Social media and other broadband-enabled applications
E-commerce	Engage in online transactions	• Proportion of total sales serviced online • Proportion of purchases transacted online • Breadth of online channels for making e-sales and e-purchases

3.2. Digital maturity scores and groups

The DMI was derived from SME responses to DMS 2019. A histogram illustrates digital maturity score frequency by interval (see Figure 3-1). This shows that some 69% of SMEs scored between 30 and 60, while fewer businesses fell below or above this range. The maximum achieved score was 82, which suggests that none of the SMEs in the sample were fully digitally mature. Based on these insights, four groups of businesses in terms of broad digital maturity characteristics were identified (Table 3-2) and defined (Table 3-3).

Of the sample of 513 SMEs who participated in the DMS, the resulting four groups were labelled by the level of their digital maturity as Digitally Embedded, Active Exploiters, Passive Exploiters, and Digitally Disengaged, respectively. The four groups could be described as follows: Active Exploiters and Passive Exploiters covered 31% and 38% of SMEs in the sample, while Digitally Disengaged included the least digitally mature 15% and Digitally Embedded included the most digitally mature 16% of SMEs.

Figure 3-1 Histogram of digital maturity scores

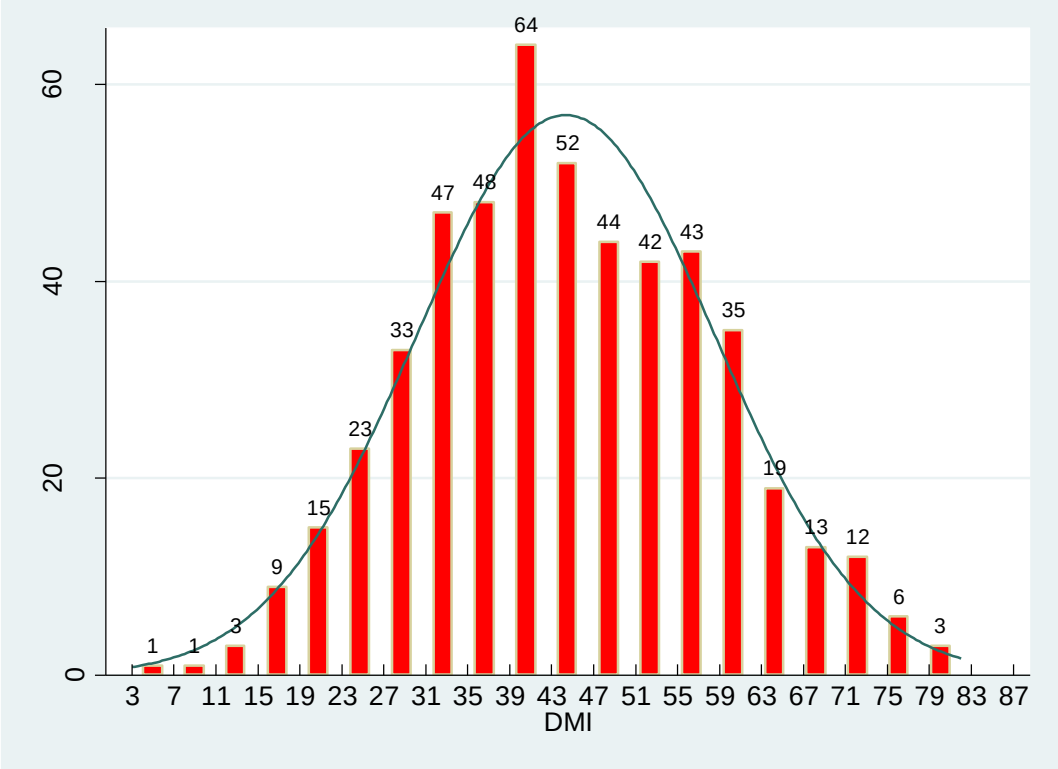


Table 3-2 Profiling of SMEs by their digital maturity score

Digital maturity group	Score range	Group size	Percent
Digitally Embedded	60-85	82	16
Active Exploiters	45-59	159	31
Passive Exploiters	30-44	196	38
Digitally Disengaged	1-29	76	15

Table 3-3 Main characteristics of the digital maturity groups

Digital maturity group	Main characteristics
Digitally Embedded	• adopters of superfast broadband • a very high proportion of employees with above average ICT skills • a high number of digital applications • secure the majority of their sales from online transactions
Active Exploiters	• likely to have adopted superfast broadband • a high proportion of staff with above average ICT skills • a wide range of digital platforms and technologies • nearly half of businesses report online channel as the main source of sales.
Passive Exploiters	• adopted standard broadband • likely to have staff with above average ICT skills • make use of basic cloud-based applications • use of online platforms to generate e-sales is low
Digitally Disengaged	• tend to have adopted standard broadband • a high proportion of employees with below average ICT skills • majority do not use digital technologies • report no sales from online transactions

Table 3-4 shows the average digital maturity scores among groups and their individual five component scores that make up the DMI. Digital application is the factor that accounts for the largest proportion of the digital maturity score in each group. The extent to which an SME uses digital applications and e-commerce accounts for the major differences in businesses' digital maturity, while the differences in using ICT infrastructure, investment and capability are not significant in explaining the digital maturity differences among groups.

Table 3-4 Average scores per group per digital maturity dimension

	ICT infrastructure	ICT investment	ICT capability	Digital applications	E-commerce	Average digital maturity score
Digitally Embedded	9	3	8	37	11	66
Active Exploiters	8	3	7	29	7	52
Passive Exploiters	7	2	6	19	4	38
Digitally Disengaged	6	1	4	10	2	23
Total	8	2	6	24	6	44

3.3. Digital maturity and business performance

The 2019 *Survey* further examines whether, and to what extent, business performance differs according to digital maturity level. Businesses reported whether access to broadband services affect its performance in terms of turnover, profitability, employment, and innovation activity (introduction of new products, processes or services) and further specified by what percentage it had been affected. Overall, higher levels of digital maturity were associated with increases in business performance.

Figure 3-3 depicts how businesses' adoption of broadband affects turnover, profitability, employment and innovation by digital maturity group. Digitally Embedded businesses significantly outperformed other digital maturity groups, and more than 70% of the businesses in this group reported increases in turnover, profitability and innovation activity as a result of having access to broadband. While 49% of the Digitally Embedded SMEs reported an increase effect of broadband adoption on employment among all digital maturity groups, with increases in innovation being reported as the largest ones when compared to the rest of the performance indicators.

Among all the SME's performance indicators (turnover, profitability, employment and innovation), increases in those indicators are all positively associated with the extent digital technologies are used. While 2% of SMEs in the Digitally Embedded group reported a decrease effect on Employment, none of the Digitally Embedded SMEs reported a decrease effect on Turnover, Profitability and Innovation,

Figure 3-2 Effect of broadband adoption on turnover, profitability, employment, innovation

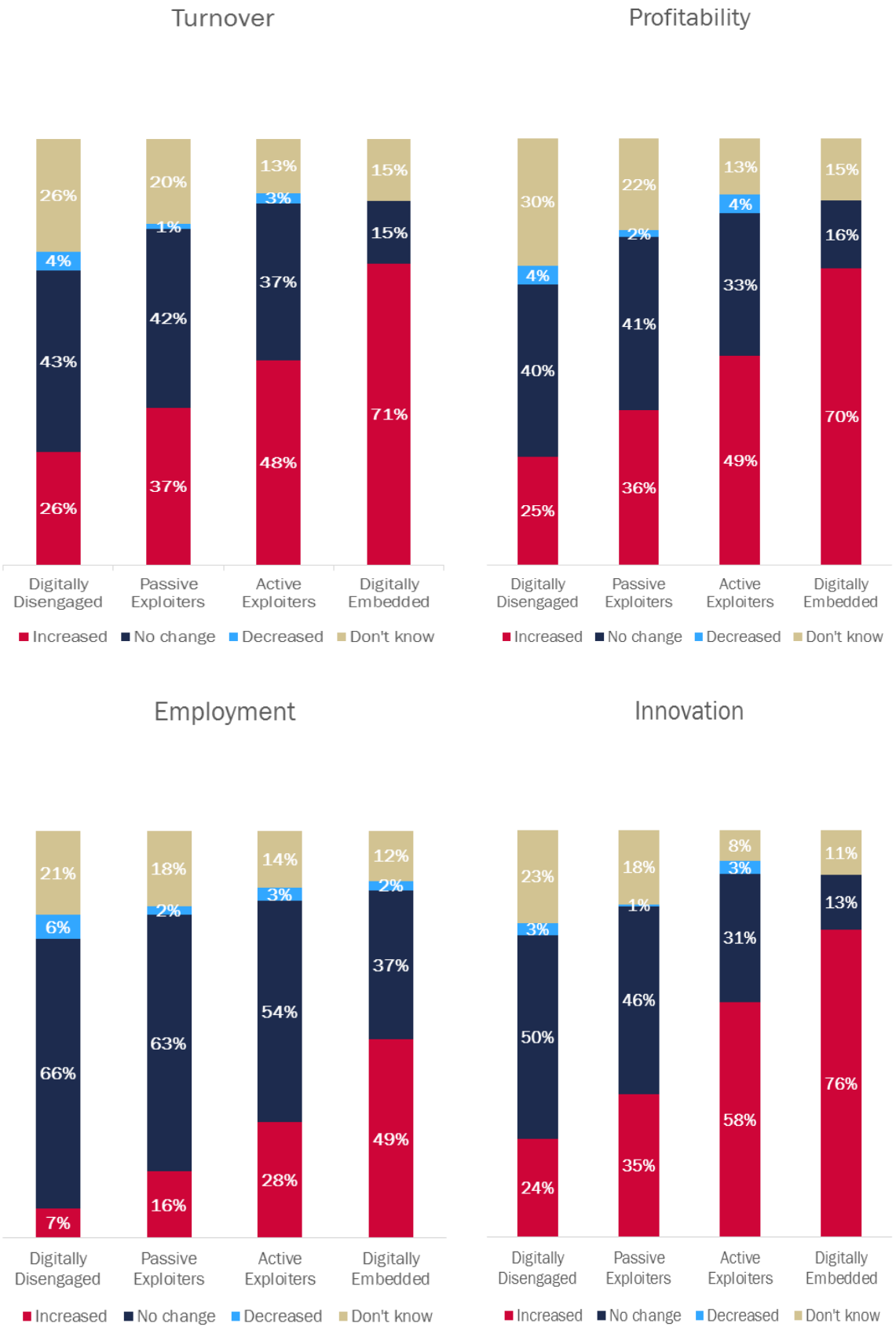
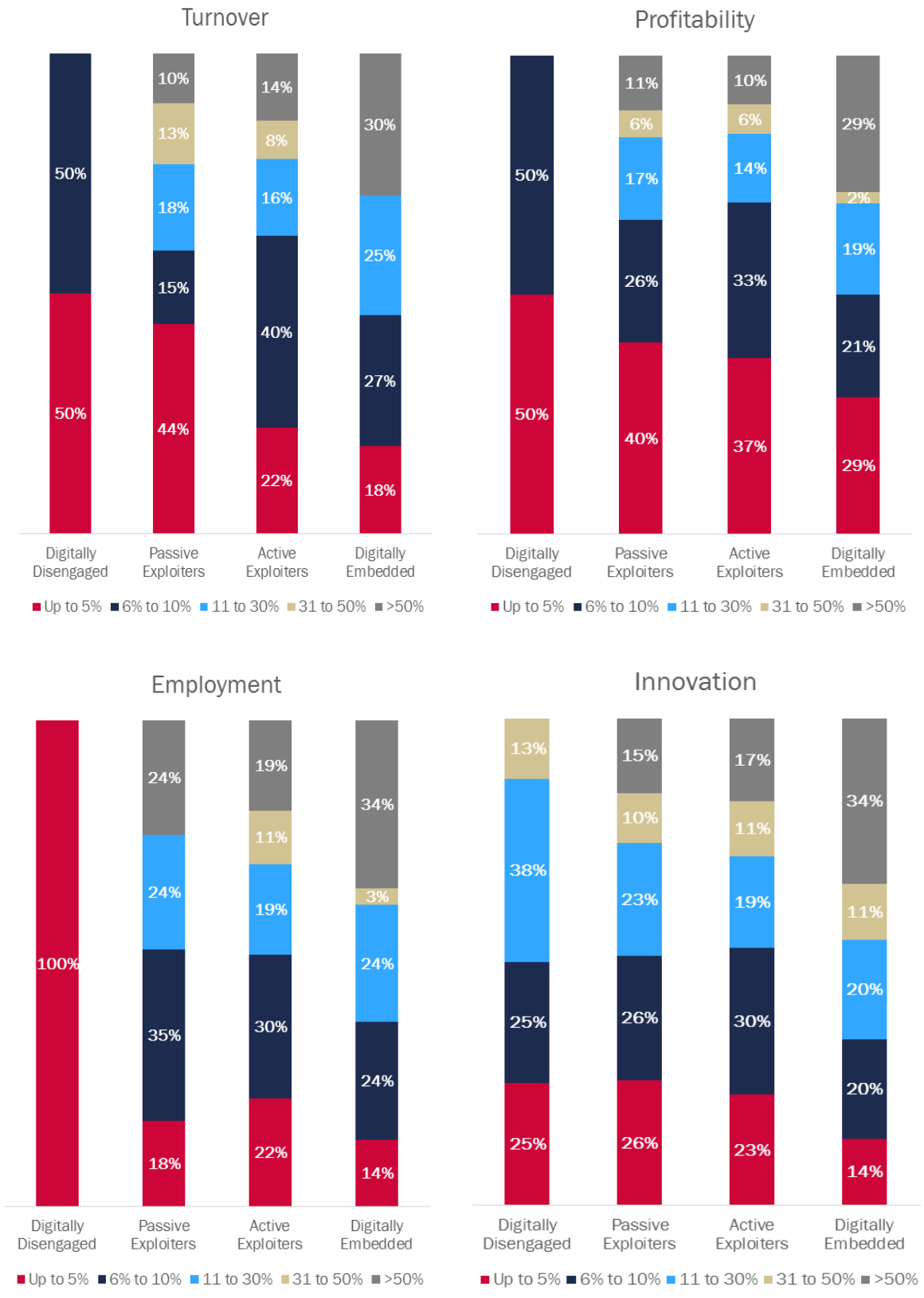


Figure 3-3 Effect of broadband adoption on increase in turnover, profitability, employment, innovation as a result of access to broadband



Businesses that reported growth in their performance were further asked to indicate by how much. Figure 3-4 shows increase in business performance by digital maturity group and indicates that digitally mature businesses tend to report the highest percentage effect (e.g. more than 50%) on turnover, profitability, employment and innovation. Conversely less digitally mature (Digitally Disengaged and Passive Exploiters) reported lower effects (e.g. up to 5%).[10]

Table 3-5 suggests that the majority of SMEs in all digital maturity groups agree that broadband-enabled services improve their knowledge management, response to customers or suppliers, and communication. Some 64% of the SMEs in the Digital Disengaged group indicated that broadband enabled services allowed them to better respond to customer or supplier requirements, but only 49% of businesses in this group agree that such services increase their competitiveness. In contrast the majority of SMEs in the Digitally Embedded group agreed with all the strategic benefits of broadband adoption listed in Table 3-5.

[10] Note, the three 100% bars appearing for the Digitally Disengaged group on Employment in Figure 3-3 is because only one business in this group responded with the less than 5% increase range specifically. Similarly, the 50% and 50% bars on Turnover and Profitability are explained by only eight (Turnover) and six (Profitability) businesses reporting less than 5%, and 5% to 10% increase effect on each business performance indicator, the samples spread equally on those to increases effects percentage.

Table 3-5 Effect of broadband-enabled services on perceived business benefits (% that agree)

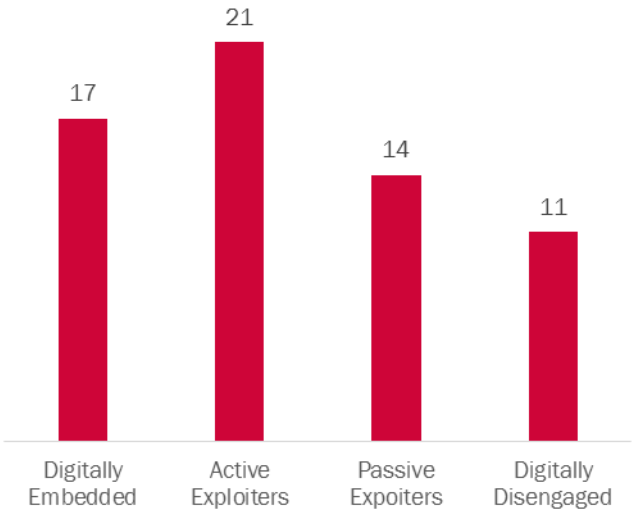
	Digitally Embedded	Active Exploiters	Passive Exploiters	Digitally Disengaged	Average
Better respond to customer or supplier requirements	91%	87%	81%	64%	82%
Keep pace with competition	91%	81%	65%	49%	72%
Improve knowledge management/information sharing	89%	88%	74%	59%	79%
Enhance communication	93%	92%	88%	72%	88%
Improve productivity/efficiency	88%	83%	62%	55%	72%
Gain access to new geographical markets	70%	49%	42%	22%	46%
Increase IT security and data protection	66%	58%	44%	25%	50%
Better risk management (continuity planning)	61%	39%	30%	21%	37%
Achieve overall strategic objectives	83%	72%	52%	30%	61%

3.4. Business characteristics and digital maturity

Business characteristics of the SMEs in the 2019 *Survey* sample were analysed to see how size, location and industry of the business are associated with digital maturity level. The results show that larger businesses in terms of employment, businesses located in South East Wales, and selected sectors such as Information and communication tend to be more digitally mature.

Figure 3-4 shows the average number of people employed by businesses in the four digital maturity groups. Active Exploiters SMEs have an average employment of 21, followed by Digital Embedded businesses with an average of 17 people employed per business. Overall, the findings show that larger firms, by number employed, are likely to be more digitally mature.

Figure 3-4 Average number of people employed by digital maturity group



Mid Wales accounts for the largest percentage of digitally mature SMEs (Digitally Embedded and Active Exploiters) (54%), closely followed by South East Wales (53%).

Figure 3-5 Distribution of the digital maturity groups by Subregion

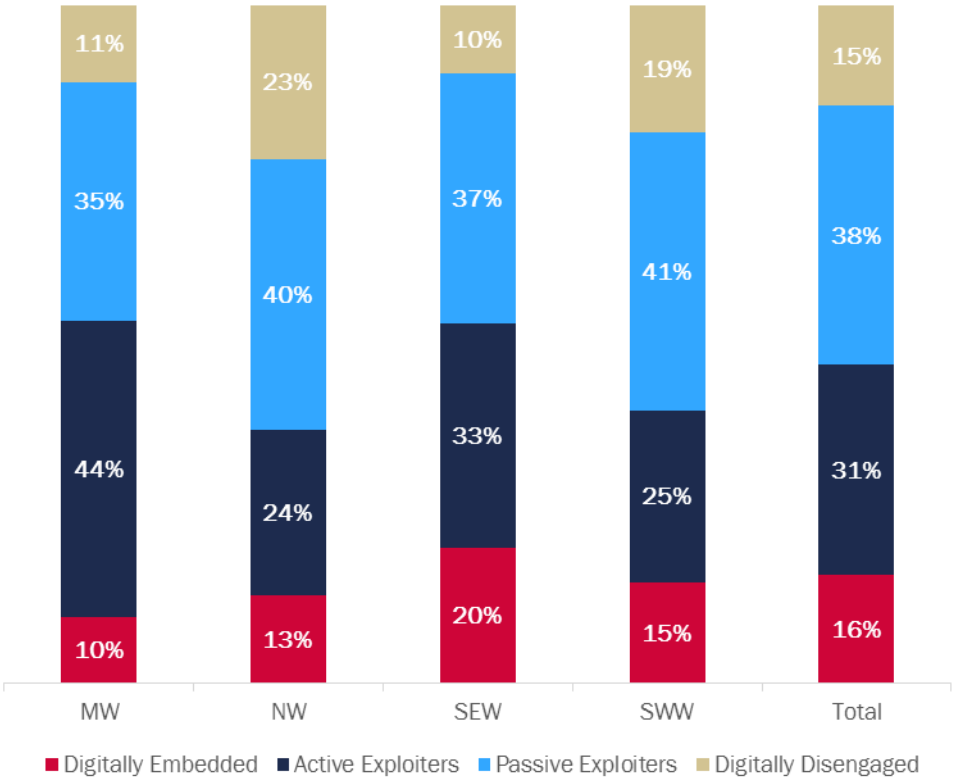
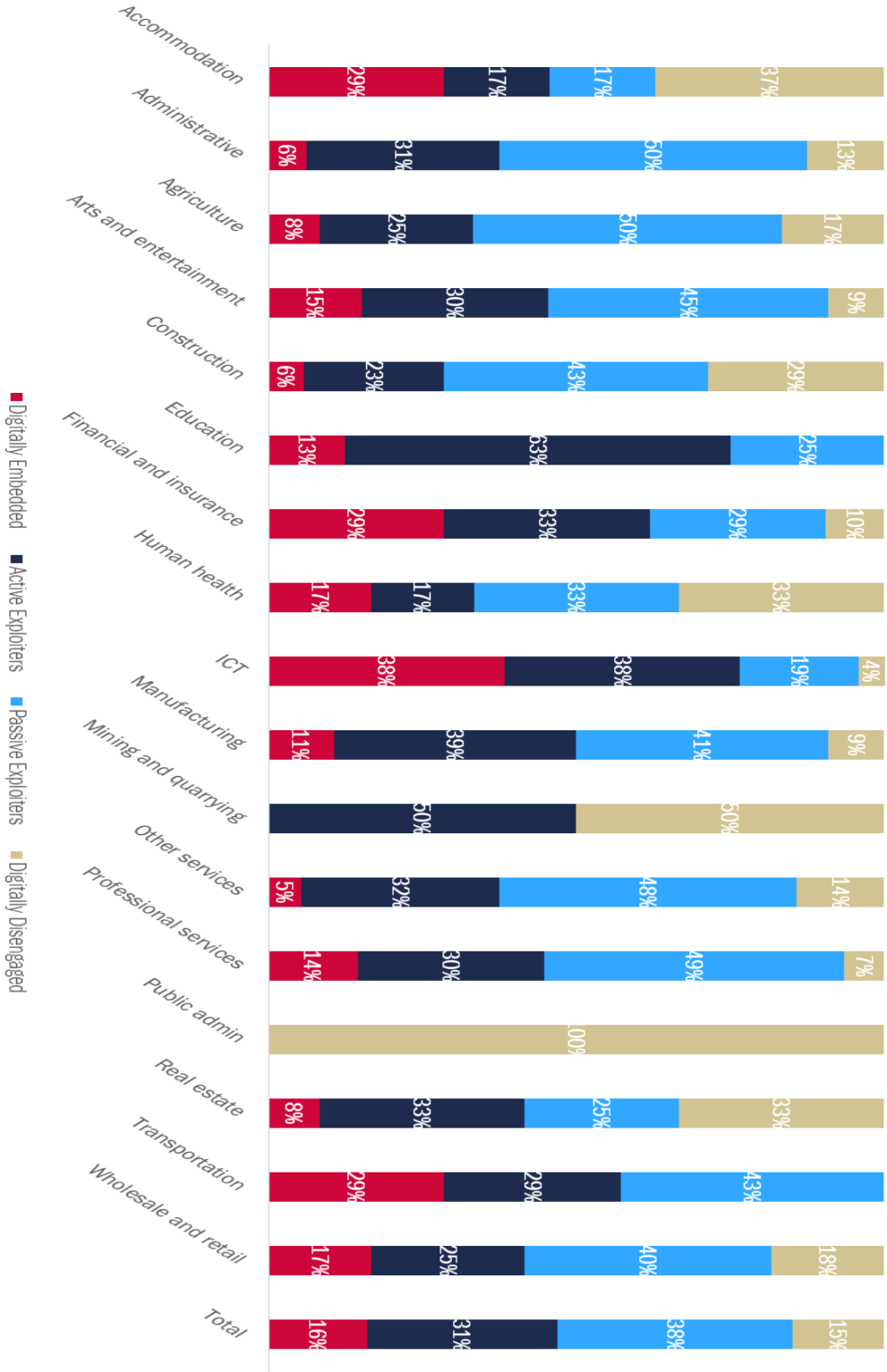


Figure 3-6 depicts the distribution of the digital maturity groups across sectors. This suggests that ICT, Education and Transportation are the sectors with greatest proportion of digitally mature businesses (Digitally Embedded and Active Exploiters). Other services, Agriculture and Construction are the sectors with the lowest percentages of digitally mature businesses. Overall, the distribution of digitally mature groups by sector may be affected by the nature of the services/products provided by the specific sector, and the industry profitability (GVA/head) as more profitable businesses are likely to be more digitally mature (Figure 3-3), it may also be related to the sample's distribution across sectors.

Figure 3-6 Distribution of the digital maturity groups by industry



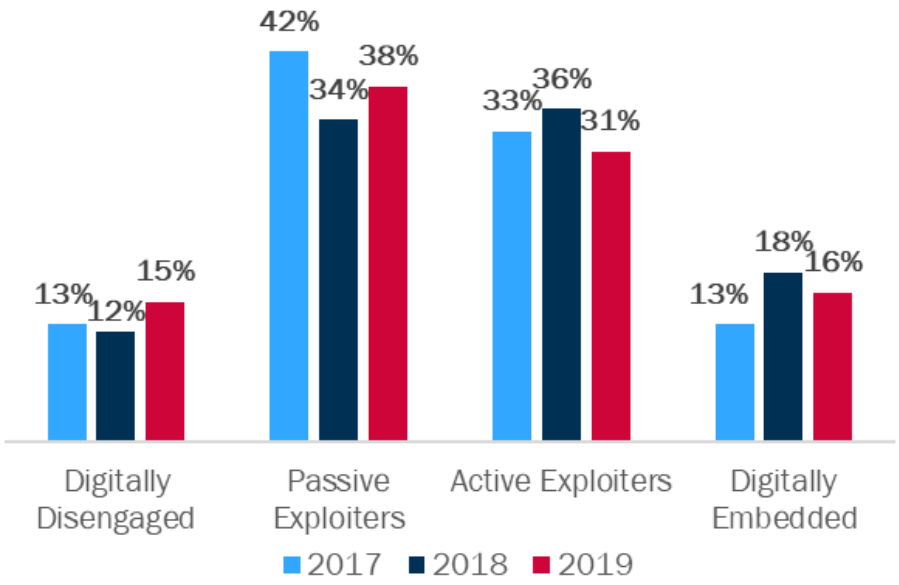
3.5. DMI scores for Welsh SMEs - 2018 to 2019

The results of the DMI analysis suggest that average digital maturity has declined slightly from 2018 to 2019 (Figure 3-7). While digital maturity scores increased marginally from 2018 to 2019 for the majority of the digital facilities and technologies businesses had adopted, these have been outweighed by decreases in other digital maturity indicator scores.

For example, in the DMS 2019 sample, the ICT related staff training expenditure, and Proportion of FTE workers with intermediate or above IT skills, decreased relative to the DMS 2018 sample, while the rest of the ICT expenditures and skills measurements were higher in the DMS 2019 sample. Additionally, in 2019 there were fewer advanced website functions applied on businesses' websites and a lower proportion of businesses using EDI technologies as compared to 2018.

In conclusion, the slight decline in the DMI in 2019 is likely to indicate that businesses in the sample are increasingly adopting basic digital technologies but not more sophisticated digital technologies.

Figure 3-7 Digital maturity index, breakdown of businesses by category



4. Comparative analysis

4.1. Introduction

In this section an analysis is undertaken of a longitudinal sub-sample of businesses who have taken part in the *Survey* for each of the years 2017, 2018 and 2019. This offers a chance to compare aggregated results, year-on-year, for the sub-sample and identify any evolution in the use of broadband amongst this cohort. During the three years analysed, the *Survey* format, questions and data collection methods used have remained consistent aiding direct comparisons over time to be made.

Given the relatively small sample size of 53 SMEs included in this analysis appropriate caveats should be noted in the interpretation of the results. However, the analysis does provide a supplementary level of detail on the adoption and usage of superfast and standard broadband enabled technologies.

The comparative analysis indicators include superfast broadband adoption; average download and upload speeds; e-commerce; use of advanced cloud computing services; and existence of ICT budget.

4.2. Firm-level comparative results

Adoption of superfast broadband. In 2017, just over a half of the longitudinal sample (54%) had adopted superfast broadband. Table 4-1 highlights that this proportion had increased to two-thirds of the sample (66%) in 2018 and then to over three-quarters (77%) in 2019.

Table 4-1 Broadband adoption for sub-sample, 2017 to 2019 (% of SMEs)

Broadband adoption status	2017	2018	2019
No broadband	6%	0%	0%
Standard broadband	40%	34%	23%
Superfast broadband	54%	66%	77%

Average download speeds. Table 4-2 shows the proportion of businesses in the longitudinal sample reporting average achieved download speeds of 10 Mbps or greater increased between 2017 and 2019 by fourteen percentage points (to 92%). Table 4-2 highlights that the majority of this increase (ten percentage points) occurred between 2018 and 2019, reflecting the accelerating move to faster broadband speeds.

The percentage of SMEs averaging download speeds of less than 2 Mbps decreased between 2017 and 2019 by six percentage points (to 2%).

Table 4-2 Average download speeds for sub-sample, 2017 to 2019 (% of SMEs)

Average download speeds	2017	2018	2019
Less than 2 Mbps	8%	8%	2%
2 Mbps or more and less than 10 Mbps	14%	10%	6%
10 Mbps or more and less than 30 Mbps	27%	29%	38%
30 Mbps or more	51%	53%	54%

Average upload speeds. In 2017, just over a third of the longitudinal sub-sample (35%) reported average achieved upload speeds of less than 2 Mbps. This figure had fallen to one-in-six (16%) by 2019. Table 4-3 also highlights that SMEs who had achieved average upload speeds of at least 10 Mbps increased twenty percentage points from 2017 to 2019 (to 73%).

Table 4-3 Average upload speeds for sub-sample, 2017 to 2019 (% of SMEs)

Average upload speeds	2017	2018	2019
Less than 2 Mbps	35%	24%	16%
2 Mbps or more and less than 10 Mbps	13%	18%	12%
10 Mbps or more and less than 30 Mbps	40%	50%	63%
30 Mbps or more	13%	8%	10%

E-commerce. The longitudinal sub-sample showed no change in the percentage of businesses reporting that none of their sales were serviced online over the period 2017 to 2019 (28%). Table 4-4 illustrates that between 2017 and 2019 there was an increase of eight percentage points in the proportion of sub-sample businesses conducting over half of their sales online (32% to 40%).

Table 4-4 Proportion of total sales serviced online for sub-sample, 2017 to 2019 (% of SMEs)

Proportion of sales online	2017	2018	2019
0%	28%	26%	28%
1-10%	20%	17%	23%
11-25%	9%	7%	6%
26-50%	11%	11%	2%
51-75%	2%	11%	4%
76-100%	30%	28%	36%

Table 4-5 illustrates there was an increase of eleven percentage points in the proportion of businesses carrying out over three-quarters of their purchases online, from 2017 (27%) to 2019 (38%). The percentage of businesses in the sub-sample not making any purchases online increased by eight percentage points when comparing the three years from 2017 to 2019 (to 14%).

Table 4-5 Proportion of total purchases transacted online for sub-sample, 2017 to 2019 (% of SMEs)

Proportion of purchases online	2017	2018	2019
0%	6%	8%	14%
1-10%	21%	19%	14%
11-25%	15%	19%	20%
26-50%	10%	4%	6%
51-75%	21%	23%	8%
76-100%	27%	27%	38%

Use of advanced cloud computing services. The proportion of the sub-sample businesses using advanced cloud computing services increased by nineteen percentage points from 2017 to 2019.

Advanced cloud computing services included accounting and bookkeeping; data back-up; Voice over Internet Protocol; electronic payment; video conferencing; customer relationship management; project management software; computing power to run business software; human resource management software; and enterprise resource planning.

Table 4-6 Proportion of sub-sample using advanced cloud computing services, 2017 to 2019 (% of SMEs)

	2017	2018	2019
Use Advanced cloud computing services	62%	72%	81%
Do not use Advanced cloud computing services	38%	28%	19%

Table 4-7 shows that the proportion of the longitudinal sample that reported having a dedicated ICT budget decreased by two percentage points from 2017 to 2019, to 16%.

Table 4-7 Proportion of sub-sample having a dedicated ICT budget, 2017 to 2019 (% of SMEs)

	2017	2018	2019
Have a dedicated ICT budget	18%	17%	16%
Do not have a dedicated ICT budget	82%	83%	84%

Summary. The comparative analysis summary results are shown in Table 4-8. The relatively small sample size requires a degree of caution to be applied to the findings. The results do, however, show general progress to higher levels of broadband maturity in Wales for the longitudinal sub-sample of businesses, especially in greater adoption of superfast broadband and increased usage of more advanced cloud computing services

Table 4-8 Summary of firm-level comparative results, 2017 to 2019 (n = 53)

	Percentage point increase 2017 to 2019
Superfast broadband adoption	+23
Download speed average > 10 Mbps	+14
Upload speed average > 10 Mbps	+20
Business uses Advanced cloud computing services	+19
Business has an ICT budget	-2
E-commerce: Sales online >50%	+8
E-commerce: Purchases online >50%	-2

5. Conclusions

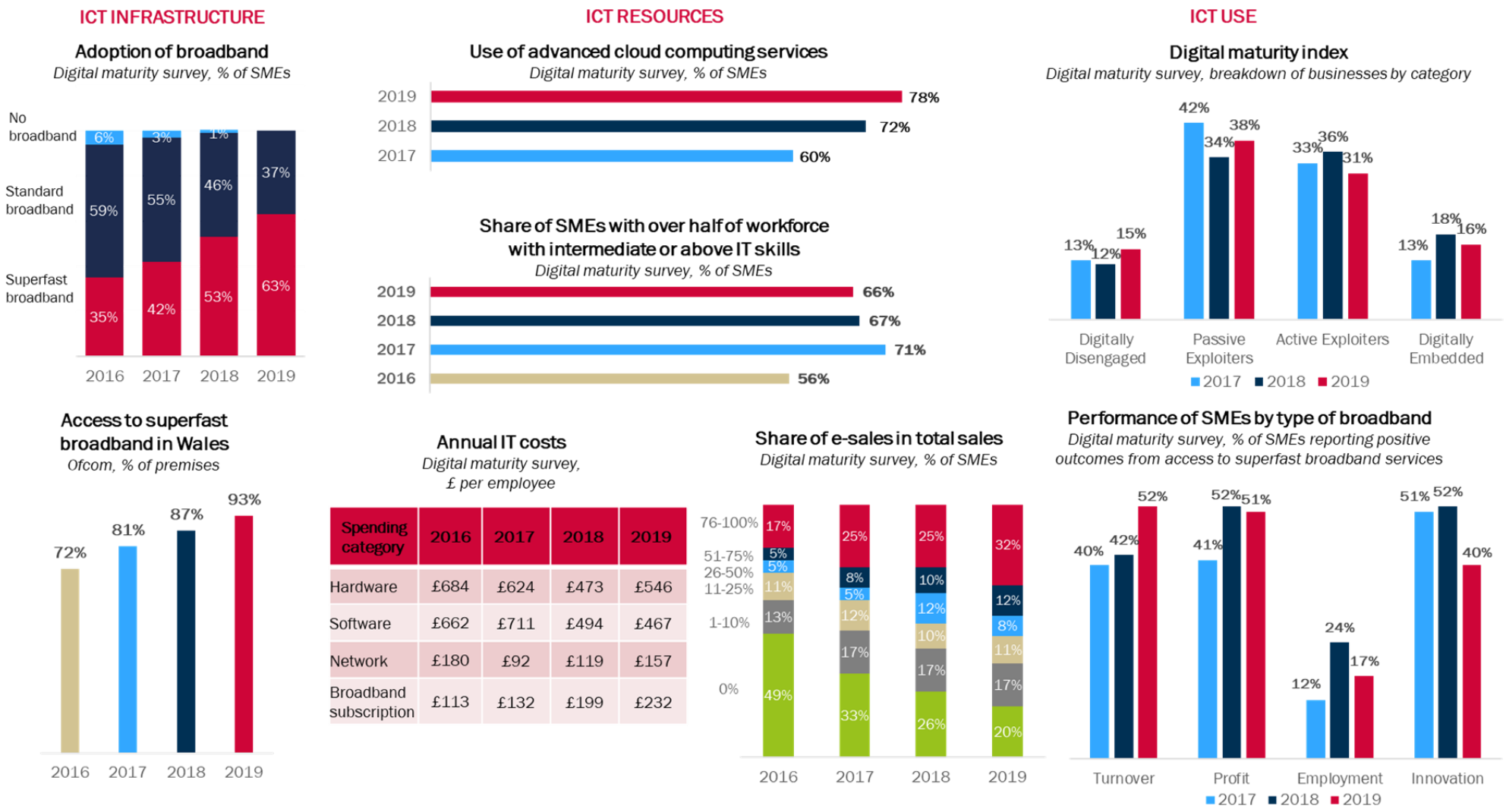
5.1. Introduction

The aim of the Digital Dashboard for Wales is to draw out a snapshot of the results of the Digital Maturity Survey results over the period of the project. The current Digital Dashboard show results covering a four-year period (2016-2019 inclusive), and highlights the dynamic nature of digital maturity. These results are primarily drawn from the DMS, but also include other (secondary) sources, which provide supplementary contextual indicators.

5.2. The Digital Dashboard for Wales

The Digital Dashboard for Wales provides an overview of digital maturity in three main areas: ICT Infrastructure, ICT Resources and ICT Use. Under each area comparisons are drawn against results from earlier years (see Figure 5-1). This highlights the digital transition that has been underway in Welsh businesses in recent years. Here, the Digital Dashboard shows that this is resulting in incremental changes not only in how businesses are accessing broadband connectivity, but also how they are using it, and how this is leading to performance benefits.

Figure 5-1 Digital dashboard for Wales 2019



5.3. Implications

The report has summarised the findings from the 4th Digital Maturity Survey. The dashboards show some encouraging trends in terms of take-up of the superfast broadband resource, the use of more advanced cloud computing services, and with an increasing number of our surveyed businesses undertaking trade digitally. It is also encouraging that the Digital Maturity Survey continues to gain a good number of respondents. The longitudinal data we now have covers four years examining ICT resource use and performance in Welsh SMEs. However, the time lapse creates its own challenges. Such has been the speed of the take-up of superfast broadband resources by the Welsh SME community that businesses are using the opportunities offered by the resource in very different ways than when the research programme started in 2016. Then there is the challenge to adapt the survey so as to pick up on changing SME use of ICT resources but at the same time to maintain elements that allow analysis of trends through time.

In addition to the above, 2020 marks the last year of the funded support for the programme of research. The research team intend to undertake another Digital Maturity Survey later this year, such that five will have been completed within the programme. After December 31st 2020 we intend to maintain some elements of the survey programme but the resources will not be available at the same scale as previously. We believe, however, that the maintenance of the Survey is important, not least to hopefully inform regional investment programmes after Brexit, which it is hoped will continue to support SME engagement with continually evolving ICT infrastructure. Equally in research that informs the Economic Impact reports from the programme we continue to see evidence of productivity improvements in businesses successfully engaging with the superfast broadband and enabled digital technologies, and with new work this year diving more deeply into SME perceptions of how engagement with the superfast infrastructure leads to performance improvement, improved communication effects and competitiveness.

Increasingly the programme of research is finding its way back to SME respondents, but the findings are also being disseminated through good quality academic papers and through conferences. Our Digital Maturity Survey research was front and centre at special sessions of Regional Studies Association (RSA) European meetings in Santiago de Compostela in 2019, and formed the core of the RSA Wales and South West meeting in Cardiff during May of last year. We will continue to report on elements of this work in our forthcoming Digital Maturity Economic Impact Report.

We remain grateful to the Advisory Panel of the SFBE programme for advice and guidance on the survey and its interpretation.

6. Annex

6.1. Overview of 2019 sample

The following tables show the samples of business population in Wales in comparison to the 2019 survey sample. The data was used to carry out stratification and weighting methods.

Table A-1. Business Population: Wales 2019 by industry and size (% of all SMEs)

	Micro	Small	Medium	All SMEs
Construction	27.8	0.5	0.1	28.4
Manufacturing	5.4	0.5	0.2	6.1
Wholesale/retail, transport & storage	23.1	1.2	0.1	24.4
Accommodation & food services	4.1	1.0	0.1	5.2
Information & communication	7.7	0.1	0.0	7.8
Business & other services	27.0	0.9	0.2	28.1
All industries	95.1	4.2	0.7	100.0

Source: Annual Business Population Estimates, ONS.
https://www.gov.uk/government/statistics/announcements/business-population-estimates-2019

Table A-2. Sample: Digital Maturity Survey 2019, by industry and size (% of all SMEs)

	Micro	Small	Medium	All SMEs
Construction	3.1	2.7	1.0	6.8
Manufacturing	6.0	5.9	3.5	15.4
Wholesale/retail, transport & storage	10.0	2.9	0.4	13.3
Accommodation & food services	4.3	1.1	0.6	6.0
Information & communication	8.6	1.7	0.8	11.1
Business & other services	34.3	11.1	2.0	47.4
All industries	66.3	25.5	8.2	100.0

Source: Digital Maturity Survey 2019, WERU.

The next tables provide details on the sample achieved by the 2019 survey. They include a breakdown of the sample by sector, location, firm size.

Table A-3. Sector

	Number of SMEs	Share of SMEs
C: Manufacturing	79	15.4
F: Construction	35	6.8
G: Wholesale & retail trade; repair of motor vehicles	66	12.9
H: Transport & storage	2	0.4
I: Accommodation & food service activities	31	6.0
J: Information & communication	57	11.1
K: Financial & insurance activities	19	3.7
L: Real estate activities	13	2.5
M: Professional, scientific & technical activities	84	16.4
N: Administrative & support service activities	27	5.3
O: Public administration & defence	2	0.4
P: Education	16	3.1
Q: Human health & social work activities	20	3.9
R: Arts, entertainment & recreation	27	5.3
S: Other service activities	35	6.8
Grand Total	513	100.0

Source: Digital Maturity Survey 2019, WERU.

Table A-4. Location, by local authority area

	Number of SMEs	Share of SMEs
Anglesey	9	1.8
Blaenau Gwent	7	1.4
Bridgend	19	3.7
Caerphilly	20	3.9
Cardiff	72	14.0
Carmarthenshire	31	6.0
Ceredigion	32	6.3
Conwy	19	3.7
Denbighshire	12	2.3
Flintshire	12	2.3
Gwynedd	44	8.6
Merthyr Tydfil	3	0.6
Monmouthshire	22	4.3
Neath Port Talbot	17	3.3
Newport	14	2.7
Pembrokeshire	26	5.1
Powys	39	7.6
RCT	27	5.3
Swansea	33	6.4
Torfaen	12	2.3

	Number of SMEs	Share of SMEs
Vale of Glamorgan	24	4.7
Wrexham	19	3.7
Grand Total	513	100.0

Source: Digital Maturity Survey 2019, WERU.

Table A-5. Employee size

	Number of SMEs	Share of SMEs
Micro (0 to 9 employees)	340	66.3
Small (10 to 49 employees)	131	25.5
Medium (50 to 249 employees)	42	8.2
Grand Total	513	100.0

Source: Digital Maturity Survey 2019, WERU.

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