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The spatial implications of rural business digitalization: case studies from Wales

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ABSTRACT

The rural–urban digital divide literature addresses the digital inequalities experienced by rural communities. However, little attention has been paid to how rural small and medium-sized enterprises (SMEs) can use improved broadband connection to address spatial inequalities. Furthermore, the integration of digital technologies into SME business models can ultimately lead to productivity gains and potential regional development impacts. In seeking to explore how rural firms digitalize and the impact on spatial inequalities, the paper evaluates 14 case studies of Welsh rural SMEs. The findings highlight that adopting a dynamic business model that is increasingly digitalized is beneficial to all firms, and that there is a potential for digital technologies to address spatial inequalities for rural SMEs.

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broadband infrastructure; digital technologies; business models; rural business; spatial inequalities; digital disadvantage

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INTRODUCTION

The challenges faced by rural businesses include increased operational costs and difficulty recruiting skilled staff (UK Parliament, 2019). In the digital age, insufficient broadband infrastructure and service provision contributes a further 'rural penalty' (Malecki, 2003, p. 201). The literature on the digital rural–urban divide shows that this penalty impacts both social and business life (Roberts et al., 2017). Where a lack of infrastructure provision is coupled with ineffective political support to promote technology use, social and geographical exclusion is exacerbated (Park et al., 2015; Roberts et al., 2017).

Information and communication technology (ICT) is considered a key factor in economic growth and social development (Srinuan & Bohlin, 2011). At the same time, little focus is given to business model experimentation and digital technology integration by small and medium-sized enterprises (SMEs) (Bouwman et al., 2019). In the context of rural SMEs, digital technology provides the opportunity to overcome spatial inequalities, but remains a niche topic in rural studies (Roberts et al., 2017). Using a business model framework, the aim of this research is to investigate how rural SMEs integrate digital technologies. Whilst rural

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SMEs must address location in daily activities, spatial aspects are not considered in the principal business model literatures (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Osterwalder & Pigneur, 2010).

The digital divide poses a challenge for policy-makers and academic researchers alike (Billon et al., 2009). In Wales, regional development funding has been used to install broadband infrastructure as part of the Superfast Cymru programme. Undertaken as part of a five-year collaborative programme between academics and policy-makers, the case study data provides an insight into the integration of technology in digitally disadvantaged SMEs. The findings highlight how firms that integrate digital technology into multiple areas of the business model can overcome the disadvantages reserved for rural SMEs. This usefully shows policy-makers that it is possible to enable SMEs to successfully digitalize the business model. Further, it is possible to outline what policy-makers can expect from such interventions with respect to business growth and regional development.

LITERATURE REVIEW

The Fourth Industrial Revolution will be catalysed by digital technologies, impacting the foundations of society and economy (Schmidt et al., 2015). The rural–urban divide literature extensively explores the spatial inequalities that stem from insufficient digital infrastructure (Townsend et al., 2013). A review of 157 papers that explore the link between digitalization and rural development is found in Salemink et al. (2017). Two key themes emerge: evaluating whether lagging regions would develop in the same way as advanced regions; and establishing that economic differences between places would grow due to a lack of access to information. Salemink et al. conclude that regional development would be constrained due to a lack of digital access, increasing regional disparities further. These literatures, however, do not focus on how rural SMEs digitalize.

The body of the literature encapsulated in Salemink et al. contributed to the increasing importance of ICT in European Cohesion Policy (EU Comission, 2014). This development was predicated on the evidence that improved digital connectivity can attract human capital to rural areas (Roberts & Townsend, 2016). However, studies find that digital technology-driven gross domestic product (GDP) growth adheres to core and peripheral region concepts (Kirschner, 2005; Tu & Sui, 2011). In order to close the regional development gaps 'rural areas need to grow faster than urban areas in order for economic cohesion to take place' (Salemink et al., 2017, p. 364). The present paper explores a context where European Regional Development Fund (ERDF) funds have been used to address market failure in broadband provision. Questions arise around how policy-makers might ensure the maximum regional benefit from using these funds. In order for economic growth to take place, 'digital infrastructure is a necessary, but not a sufficient, condition for economic development' (Tranos, 2012, p. 332).

There is a lingering preconception that rural SMEs are 'lifestyle' businesses – smaller, and do not prioritize growth such as that in urban areas (Galloway & Levie, 2001). This framing of rural business remains damaging to the potential of regional development through digital infrastructure. Broadband and mobile technology can be surmised to increase the probability of finding new information and opportunities to pursue, irrespective of location. In particular, digitalization has brought about unique opportunities for businesses such as e-commerce. E-commerce is a source of competition that can undercut local entrepreneurs, yet at the same time provides an impetus to strengthen the rural economy (Salemink et al., 2017). This might provide further motivation for the digital evolution of rural SMEs. If a product or service has no true value until it is commercialized via a business model (Teece, 2010), then integrating digital technologies potentially provides aspatial opportunities to rural firms.

Digitalization has the potential to overturn an entire business model (Hess et al., 2016). A business model describes the key components of a given business, providing an evaluative framework through which to characterize the main ways revenue is generated, payments accepted, and products made (Chesbrough & Rosenbloom, 2002). Notably, a mediocre technology backed by an excellent business model is likely to be more valuable than an excellent technology backed by a mediocre business model (Teece, 2010). The oft-cited example of business model failure is Blockbuster Video (or other 'in-person' video shops) that did not adapt to the digitalization of services undertaken by LoveFilm or Netflix. This suggests that to be successful, a business model must include an adaptive component.

Digitalization of business models can be achieved through the automation of existing activities and processes, the production of new processes that supplement existing practices, and extension activities where traditional methods are digitalized (Li, 2020). These changes offer potential across many sectors (Johann et al., 2016). Questions remain unanswered how rural SMEs can leverage these opportunities. The digitalization of supply chain businesses may also be an important driver for business model change (Forbes, 2017). Where problems exist for those businesses that cannot transform fast enough (Forbes, 2017), what penalties exist for rural firms with insufficient digital infrastructure access? In the UK, broadband proliferation has been a market-driven process: What capacity is there for policy-makers to address rural infrastructure provision to seek out regional development benefits?

CASE STUDY REGION

Wales has the largest number of areas without broadband connection in the UK (Roberts et al., 2017). This is a result of market failure where the provision of infrastructure was not profitable for private firms (Henderson & Roche, 2020). Welsh SMEs account for 62.4% of employment and 37.9% of turnover (Welsh Government, 2019). Importantly, around 42% of Wales' SMEs are based in rural counties (Stats Wales, 2019).

Regional development in Wales has suffered decades of decline. This comes as a result of the UK government's closure of coal pits across the UK in the 1980s. Coal as a major source of regional wealth was not replaced and there is limited industrial diversification in the region (Morgan, 2017). Following this downturn, the economy has become characterized by a high degree of services activity (Henderson & Roche, 2020; Marques et al., 2019). Wales underperforms in relation to the UK average and has the highest level of Structural Funding from Europe (Pugh, 2017).

Wales was established as a devolved nation in 1997, with further powers devolved in 2006 creating the Welsh Government. The Welsh Government has devolved responsibility for economic development. As a result, the GDP growth potential of digital technologies creates an imperative to support superfast broadband rollout. The Welsh Government's 2010 'Economic Renewal: A New Direction' programme identified five policy priorities, which included encouraging innovation, broadening the skills base and investing in access to next-generation broadband infrastructure.

In order to achieve these objectives, the £425 million Superfast Cymru programme was established (National Assembly for Wales, 2013). 'The Digital Agenda' for Europe (2015) allowed ERDF funding to support the installation of broadband infrastructure in Wales. There has been a significant evolution in the availability of superfast broadband between 2012 when the programme started and 2018 (with Superfast Cymru finishing in 2017). In 2012, many of the rural counties in Wales had no access to superfast broadband. As a result of the Superfast Cymru intervention, counties such as Pembrokeshire went from 0% superfast access to 83% within the six-year period (thinkbroadband.com). This could be considered a rapid evolution of the availability of superfast broadband in Wales (thinkbroadband.com).

Superfast Cymru was delivered in conjunction with Openreach and 'reflected the recognition that private sector deployment of infrastructure in largely urban areas had come to an end' (Henderson & Roche, 2020, p. 53).

In addition to the provision of infrastructure, and recognizing the digital skills needed by SMEs to transform, the Welsh Government also funded a raft of business engagement activities. This counters the narrative that rural businesses suffer from a reduced ability to access business support (UK Parliament, 2019). The Welsh Government sponsored workshops and one-to-one support covered a range of subjects, including social media use and customer relationship management software. The programme focused on SMEs as they are often drivers of employment, innovation and growth in national economies (Bouwman et al., 2018).

METHOD AND DATA

In seeking to examine how rural SMEs digitalize and how this may impact spatial inequalities, a case study approach was adopted. The case study region is Wales. Within this region 14 case studies were selected from varied size and sector SMEs to gain a depth of knowledge of digitalization approaches. These case studies were selected from a database of around 2000 respondents to a survey on digital technology use in Wales. A potential for bias comes from this established interest in digitalization. However, the case studies contain SMEs that had limited digital infrastructure right up to those that operated entirely online.

Through exploring a range of SMEs, it is possible to assert that the evidence is not a generalization from a single instance of an event (Mitchell, 2006). Where these insights are combined there is convergence on experiences and strategies, providing 'saturation' (Glaser & Strauss, 1967). This method of in-depth investigation generates observations that may be useful to policy-makers. The case context of digital infrastructure rollout and skills support evidences the benefit of using regional development funding to address shortfalls in market provision of broadband services.

The Business Model Canvas (Osterwalder & Pigneur, 2010) is one of the most widely used frameworks (Matt et al., 2015). It was integral to this research to outline the key areas of business activity and understand how they relate to one another. Table 1 summarizes the key findings of the 14 SMEs in relation to the Business Model Canvas. 'Value proposition' is the focus of the business model and satisfies the demands of 'customer segments'. Through identifying the 'customer segments', a business is able to ascertain the most important customers. In turn, the extent and nature of interaction between the business and the customer is defined in 'customer relations'. The way this 'value proposition' is delivered to 'customer segments' is defined by 'channels', which includes marketing and distribution. A business may gather payment through multiple 'revenue streams', including a one-off purchase or subscription. The 'cost structure' entails the key costs in a company's business model, identifying the possibility of cost-optimization strategies such as economies of scale. 'Key activities' and 'key resources' are the assets that specifically contribute to the delivery of the 'value proposition'. Finally, 'key partners' consist of important supply chain members. As highlighted previously, it may be that it is the digitalization of 'key partners' that drives business model digitalization (Forbes, 2017).

Using a semi-structured interview process allowed interviewees to highlight the issues that were most important and relevant to the SME. Secondary research was also conducted into the SMEs before the interview in order to guide the conversation. During the interviews, the Business Model Canvas framework provided a visual stimulus, highlighting the business activities under consideration. Participants were encouraged to speak about whether the SME's product ('value proposition') or the way the product was created ('key activities') had changed. As an example, B8 created the same product in the same way, but by using an online platform to sell

Table 1. Author's own summary of small and medium-sized enterprises (SMEs) and business model digitalization.

Business number support received	Sector	Size[a]	Innovation	Key partners	Key activities	Key resources	Value proposition	Customer relations	Channel	Customer segment	Cost structure	Revenue streams
B1	Information and communication technology	Small	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	
B2	Other service activities	Micro	No		Yes	Yes	Yes			Yes		
B3	Professional, scientific and technical activities	Small	No				Yes	Yes				Yes
B4	Accommodation	Medium	Yes		Yes		Yes	Yes			Yes	Yes
B5	Manufacturing	Small	No				Yes	Yes				
B6	Accommodation	Micro	Yes		Yes	Yes	Yes				Yes	
B7	Agricultural	Micro	No					Yes				
B8	Professional, scientific and technical activities	Micro	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
B9	Construction	Medium	No		Yes	Yes		Yes			Yes	
B10	Manufacturing	Small	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B11	Arts, entertainment and recreation	Micro	No					Yes		Yes		
B12	Arts, entertainment and recreation	Micro	No					Yes				
B13	Other service activities	Micro	Yes		Yes	Yes					Yes	Yes
B14	Manufacturing	Micro	Yes	Yes		Yes	Yes		Yes		Yes	Yes

Note: [a]Micro (0–9 firms), small (10–49 firms) and medium (50–249 firms). Bold signifies those businesses that have received digital business support.

digital files B8 had changed the target customer ('customer segment'), 'key partners', 'cost structure' and the way it was sold ('channels'). This gives some insight into how, in practice, the semi-structured details of each activity group and fine delineation between areas can make it difficult to group activities concisely. Therefore, whilst fruitful for interviews and the coding structure within NVivo for analysis, the discussion is not organized by Business Canvas Model themes. Instead, the discussion considers the influence of digitalization on business success, customer relations and enhanced business agility.

RESULTS AND DISCUSSION

A business model framework was used to characterize digitalization activities undertaken by rural SMEs. It is possible to conclude that digitalization within rural SMEs has enabled business success, changed customer relations and enhanced business agility. Using anonymised numbering, Table 1 summarizes the SME's sector, innovation in products or services (which can include new to the firm), and areas of business model changed through digitalization. With the proliferation of broadband infrastructure, an SME's ability to overcome difficulties as a result of geographical location and spatial inequalities was improved.

The Fourth Industrial Revolution focuses on automation and big data. However, the evidence suggests that a significant change in rural industrial life will come first from the adaption and extension of activities (Li, 2020). The case study SMEs had not invested in automation. With an entirely 'online' business model, human resources remained the 'key resource' for B1. The impact of day-to-day operational difficulties faced by SMEs due to insufficient and insecure broadband infrastructure is apparent. Human resources are particularly impacted, where the owner of B14 regularly works additional hours to compensate for loss of connectivity. Unreliable connection also accounts for additional working hours within B13 and a reduction in profits due to a day-rate cost structure.

A notable absence of change is within 'key partners'. B10 had the most notable change in key partners, engaging with a selling platform in China in order to reach a new 'customer segment'. A change in 'revenue stream' was required with new payment methods through WeChat. However, most SME commentary related to accessing suppliers through platforms such as Amazon, which did not constitute a change in 'key partners'. The literature has highlighted the threat to rural businesses through online selling platforms (Salemink et al., 2017). The evidence suggests that case study SMEs viewed this as an opportunity. However, B14 told how the SME's ability to bulk order was limited due to storage ability, but using online suppliers made it difficult to reorder the same model. This created a disconnect between the picture of the advertised product and what the customer received. It could be surmised that the evidence of the limited evolution of 'key partners' may be the result of recent access to sufficient broadband infrastructure. At the same time, a lack of 'key partner' change may be an indicator of lagging regions not developing in the same way as advanced regions (Salemink et al., 2017).

SMEs noted that digital technologies increased efficiencies through 'key activity' extension: eliminating paper procedures, directly inputting data in the field using tablet technology and the ability of workers to work from home or other satellite locations. The evidence highlighted in Table 1 outlines that many firms undertook changes throughout the business model, with the most significant area of change being 'customer relations'. Changes in 'customer relations' typically were in the form of communicating through social media, using customer relationship management software to manage client data, and the ability to make low-cost international phone calls rather than relying on email. Communication through social media was used by B3 to strengthen relationships with the immediate community who constitute the dominant 'customer segment'. Facebook allowed B14 to showcase the SME's work as a social enterprise that produces goods, increasing interest in the product and SME. The longevity of digital

personal contact information was also seen as a boon, with B10 highlighting how platforms such as LinkedIn meant that contact details of buyers remained up to date, unlike business cards.

The evidence highlights that these business model changes also enhanced agility – increasing the likelihood of innovating. Innovative behaviour was typically found within 'key resources' and 'value proposition', but innovation also took place within 'cost structure'. Case study SMEs confirmed that rurality created concern about the availability of talent (UK Parliament, 2019). Through digital technologies, several SMEs had widened their geographical reach and overcame these difficulties. B13 innovated in 'key resources' through the recruitment of new staff digitally through LinkedIn. In this way, B13 maximized the quality of human resources as location was no longer a factor in the selection process. Further, in order to improve the quality of life for employees and reduce operational costs, B13 became an entirely satellite SME. B13 employees now use broadband packages that are a part of household costs. Intra-team communication is enhanced through applications such as Skype. This highlights the potential of digital technologies to reduce operational costs whilst at the same time supporting team cohesion.

In terms of regional development, these business model developments evidence several opportunities. Importantly, businesses are not limited to the pool of talent in their locality. This means that there is greater possibility to diversify the skills base within the SME. SMEs are also more easily able to engage supply chain companies for ad-hoc services, such as B14 outsourcing website design to an SME some 100 miles (160 km) away. This presents an opportunity for rural SMEs to benefit from the same availability of 'key resources' as urban counterparts. At the same time, it provides further opportunities for those living in rural locations; digital technologies offer the potential to contribute to businesses located elsewhere. This in turn makes rural living more attractive to a wider range of potential inhabitants. Indeed, this is evidenced in the increased demand for large rural properties since working-from-home initiatives were introduced due to the Covid-19 pandemic (*The Guardian*, 2020). This evidence is perhaps an insight into the ability of quality human capital to migrate to rural areas, as suggested by Roberts and Townsend (2016).

A rural location can present a difficulty for SMEs that rely on in-person sales. B10 is a cultural heritage business, previously relying on tourist footfall and trade sales to sell high-end traditional goods. Following extension activities to introduce e-commerce there has been a significant change in 'key resources', 'channels', 'customer segment' and 'value proposition'. The SME has smoothed seasonality and is accessing high-value international markets with marketing 'channels' to truly capitalize on cultural history. However, it has meant a complete overhaul in how stock is managed. New stock systems were required due to the different demands of e-commerce one-time orders against the traditional bulk order from trade sales. This evidence highlights how cultural heritage businesses, often located in rural regions, are able to operate in international markets. At the same time, digital technologies ensure that the rural location of the SME and traditional methods used can be preserved. Counter to Salemink et al. (2017), improved access to markets has not had a negative impact on the case study SMEs.

The empirical data have shown that with increased broadband access the digitalization of rural SMEs presents an opportunity for regional development. The case studies dispense with the notion of 'lifestyle' rural businesses (Galloway & Levie, 2001), with profit maximization and operational efficiency emerging as themes throughout the interviews. Where it has been established that digital technologies enable greater recruitment and supply chain opportunities to rural SMES, the lower costs that come with rural locations can be turned to an advantage. A particular success story is that of B1. Digital technologies mean that B1 is able to operate remotely. Therefore, the SME has devised a new 'revenue stream' whereby clients are charged for a day of consultancy. Interacting with the client remotely means that the customer is then

able to use the prepaid day of consultancy in one-hour increments. Once this time is used, the customer simply purchases another day. This is particularly significant for a rural SME, as eliminating commuting can significantly boost profits. Further, as B1 offers a franchised service to customers, the lower costs of rural living mean that the SME is more competitive than other service providers located in London. This has allowed the SME to offer services to a wider range of 'customer segments', including charities. This outlines the power of digital technologies in addressing rural–urban discrepancies within the same sector.

The evidence in Table 1 highlights that those SMEs that integrate digital technology into several areas of the business model are more likely to innovate. It can therefore be concluded that SMEs should be supported to integrate digital technologies into multiple aspects of the business. Within Wales, this technology and skill integration has been supported by a series of business interventions by the Welsh Government. It is evidenced that this process has optimized the integration of digital technologies and closed the gap in digital technology exploitation in peripheral areas (Kirschner, 2005; Tu & Sui, 2011). At the same time, the evidence also suggests that access to the programme of business support does not necessarily lead to innovation. This perhaps reflects that where limited broadband connectivity has been present, SMEs are accessing support for 'basic' digital functions such as using social media. These digital functions do not impact the products or services offered. The evidence therefore suggests that digitalization of several business model aspects is more important to innovation than seeking business support. The depth of knowledge gained from these case studies within the context of rural SMEs of a less-developed region provides insight into digitalization. It is evidenced that SMEs can become more agile as a result of the inclusion of digital technologies within the business model. In this way it is possible to target more 'customer segments', increase 'channels' available and 'revenue streams'.

RECOMMENDATIONS

The evidence gathered pertains to business model digitalization, difficulties encountered by rural SMEs and how policy-makers can address spatial inequalities. These activities have been supported by ERDF funding, highlighting that governmental intervention is possible within the digital economy. The evidence suggests that attention must be paid to the range of skills present in the economy. In particular, where SMEs have had limited access to broadband, some skills that are considered 'basic' will be entirely new to business practices. It is vital to support these first steps of competence-building before pursuing more complex 'Industry 4.0' transformations such as artificial intelligence and automation. These latter aspects offer higher value-added growth (McKinsey, 2017), but there are many initial steps that can address the inequality between rural and urban areas.

SMEs must focus on framing broadband exploitation as more than an ICT function. Digitalization activities must permeate the business model. The evidence suggests under-explored possibilities in 'key partners', which are likely to bring new sources of information and opportunities for innovation (Wang & Wang, 2012). The evidence of B10 establishes the likely impact of supply chain digitalization (Forbes, 2017), so rural SMEs must anticipate future capacity requirements, regardless of current digital infrastructure access.

Businesses should be open to using digital technologies to expand and strengthen the supply chain. Indeed, key messaging for business support organizations should focus on the preparatory phase for rural firms in particular. Whilst access to sufficient broadband may not currently be in place, pre-adaptation to change will maximize the potential opportunities. The evidence also suggests that responsibility for driving this change should be attributed to an individual who has influence throughout the organization (B2–B4, B10, B14). Businesses should be supported

to understand the potential ways digital technologies could be incorporated, ranging from online web chat and booking functions to fully online business operations. The evidence suggests that support should focus on understanding how an SME might offer additional services or alter revenue streams. B1 is a clear success story: leveraging lower rural rents, remote support and hourly increments as a charging structure.

To support regional growth and development, support should be provided to businesses to reconfigure recruitment processes. The rapid change in business function as a result of Covid-19 restructuring shows that for many SMEs remote working has increased significantly. Civil servants should seek to support businesses to identify aspects of work that could be carried out remotely across both rural and urban areas. Rural businesses stand to gain through access to a wider pool of talent; rural inhabitants gain through access to a wider range of employment; and rural communities stand to address a range of the spatial inequality issues.

However, to address core–peripheral discrepancies, tailored support to rural SMEs is necessary. Whilst not the subject of this paper, B2 highlighted the time required to access support when travelling from a rural location. This would suggest that offering online support would stimulate further changes; micro and small businesses would not need to compare the time taken to commute to a training course with that of running the business. B2 also raised the possibility of civil servants enabling digital networking within rural communities. SMEs within the same rural communities could be matched to support one another with digital competencies and potential business practice symbioses. Through enabling business community support, a greater impact could be achieved from the publicly funded training. Fewer resources would be required than the current programme, and this peer-to-peer support could continue beyond the timeline of the current programme of support. In this way, it would be more possible to account for the likely skills lag within rural areas as SMEs access and gain confidence in digital technology use (Park, 2017). In this respect, the case studies contained within this paper provide evidence for the benefit of digital technology integration throughout an SME's business model.

CONCLUSIONS

This paper has explored business model digitalization of rural SMEs. This builds upon the rural–urban divide literature that extensively documents the impact of insufficient broadband infrastructure on rural firms (Salemink et al., 2017; Townsend et al., 2013). The evidence shows that the initial digitalization of rural SMEs in Wales has focused on the adaptation and extension of existing traditional processes.

Consulting the Business Model Canvas (Osterwalder & Pigneur, 2010) allows the consideration of the constituent parts of an SME's activity. It is therefore possible to better consider the integration of technologies and outcomes. At an SME level, time and process efficiencies have increased profits and enabled the potential for expansion or innovation. At a regional level, the evidence suggests that this translates to increased employment opportunities and prosperity within the region. Heritage or 'lifestyle' businesses are better able to engage in markets in a similar way to urban firms, overcoming distance using digital technologies such as e-commerce.

The evidence shows that those SMEs that digitalize across many areas of the business model are more likely to innovate. This insight is relevant to business, academics and policy-makers alike. The case study evidence suggests that it is perhaps important to focus support on integrating digital technologies into the 'value proposition', 'key resources' and 'cost structure'. It is also important to assert that innovative interaction with customers can support the business and gain new customers. Opportunities for breakthrough innovations are likely to come from new 'key partners' (Salemink et al., 2017; Wang & Wang, 2012), but the evidence suggests that this is a business activity that has received limited attention thus far.

However, SMEs such as B1 reap a range of benefits by putting digital technologies at the core of operations. Digital technologies enable the SME to have a UK-wide reach for a franchised service. Low-cost rural premises also mean that the SME is more competitive than many urban counterparts. At the same time, this ability to minimize operational costs means that the SME can expand 'customer segments'. B1 can be considered an example of the potential that is provided through digital infrastructure in rural regions. As such, B1 highlights the benefit of policy intervention to increase digital infrastructure engagement.

Set in the context of a less-developed region, the findings provide an insight into how policymakers might maximize regional benefit from digital technologies. The findings provide an insight into the digital divide that exists between countries, continents and within countries (Srinuan & Bohlin, 2011). The breadth of evidence within the 14 case studies, across a range of sectors, highlights that many of the difficulties and solutions are universal across rural SMEs.

Where ERDF funding has been used, the evidence outlines what can be achieved. This is both in terms of increasing broadband availability and supporting SMEs to integrate digital technologies into the business model. Crucially, the combination of these two aspects has the biggest impact for SMEs in less-developed or rural regions. This method of establishing broadband infrastructure shows the importance of government intervention alongside market competition (Picot & Wernick, 2007). In this way the government allowed market forces to undertake the main cost of supplying broadband to Wales, then corrected the shortfall. There is, however, a risk of spatial inequalities increasing should SMEs await a high-speed connection. The advanced adaptation towards a new business model will be more conducive than attempting to defend an existing market position (Saebi et al., 2017). It can be concluded that the evidence shows that policy support for infrastructure expansion, digital upskilling and business model coaching are necessary to promote potential regional development. In this light, it seems a necessary step to provide further support tailored to the needs of rural SMEs to maximize regional development benefits.

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