

**A review of the economic impact of broadband on businesses in
regional and rural communities**

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A Review of the Economic Impact of Broadband on Businesses in Regional and Rural Communities

ABSTRACT: The widespread use of broadband is expected to result in substantial economic benefits in Australia, but its likely impact on individual businesses in regional and remote areas is unclear. This paper reviews research on broadband at the national, regional, community and business levels to discuss its expected impact on businesses in regional and remote communities. Improvements in both productivity and employment are reported at all levels including remote communities. Individual businesses benefit from more efficient operations, better communication, reduced costs, higher staff satisfaction, opportunities to innovate and, in some cases, improvements in marketing. Changes in business operations do not appear to adversely affect local employment or population, so the overall impact on businesses in smaller communities appears to be beneficial

INTRODUCTION

Harnessed effectively broadband connectivity will be the key driver of Australia's Gross Domestic Product (GDP), jobs and wages growth. Broadband technologies will be the roads and railways of the 21st century, generating the next wave of economic expansion. Just as transport opened up new economic horizons in the last century, advanced communications networks will pave the way for productivity gains across global economies in the new century (DCITA, 2003).

As the quotation above indicates, the widespread use of broadband is expected to deliver substantial economic benefits in Australia. Empirical studies have identified factors associated with broadband adoption, and there is some evidence confirming that there are positive effects on employment and productivity, but there remains a critical shortage of research literature concerning the economic impact of broadband on communities (Goggin, 2002; Annis et al, 2005; Clayton, 2005) and on individual businesses. The purpose of this paper is to review existing studies of the economic impact of broadband and to discuss its likely impact on businesses in regional and rural communities in Queensland.

Some regional centres in Queensland are highly dependent on large businesses for their economic vitality, particularly the mineral processing towns on the coast. However many regional and rural areas of Queensland are dominated by small and medium sized businesses (SMEs), and it is these businesses that are the focus of this paper as they are particularly dependent on their local communities for their survival. This review considers broadband studies at a number of levels – national, regional, community, and at the level of individual businesses – in order to explore broadband impacts in non-urban business contexts. There are

a limited number of studies in the Australian context, so studies conducted in rural areas of Canada, the UK and the USA are reviewed and the implications for the Australian situation are discussed.

There are a variety of definitions for what constitutes broadband although a key dimension of the term incorporates notions of high rates of transmission along with the “always-on” operating characteristic. This ensures levels of access which at the very least allow simultaneous use by multiple users on-line. The bandwidth of broadband varies in accordance with the type of network technologies in operation. Perhaps the lowest qualifying transmission speed is 256 Kbps (for low entry services in Australia) whereas minimum speeds in other countries, such as Hong Kong, are in the order of 1Mbps with ‘true broadband’ speeds in excess of 10Mbps (Allen Consulting Group, 2003). It is widely accepted that future increases in speed are anticipated to be in an order of magnitude 10 to 100 times greater than that commonly found today and at comparable, if not lower, price levels (Allen Consulting Group, 2003; Madden, 2003). The studies referred to in this review all refer to ‘broadband’, although various definitions are used.

BROADBAND AND ECONOMIC DEVELOPMENT

Numerous studies have predicted that countries with widespread rates of broadband adoption are likely to benefit from higher productivity. In the US, the adoption of broadband was projected to benefit the economy by more than US\$400 billion per year (Crandall, 2001; Crandall, 2003). The US Bureau of Economic Advisors estimated that for each US\$1 invested in broadband, the economy would benefit by nearly US\$3 (Ford and Koutsky, 2005). In the UK, an increase in GDP of up to £21.9 billion was projected to result from productivity gains.

Empirical studies have confirmed that broadband adoption results in enhanced economic growth. In Korea, broadband is estimated to have contributed \$17 billion in production gains, \$5.8 billion in value added services and created 590,000 jobs between 1998-2002 (Dal Yong Jin, 2005). At a community level, Lehr et al (2005) reported that US communities in which

mass-market broadband is available experience more rapid growth in employment, an increased number of new businesses, and more businesses in information and communication technologies (ICT) intensive sectors. A study by Hicks and Burton (2005) of communities with and without broadband availability reported that new firms are generally locating where broadband is available, and that these new firms are generally more productive than those of similar age outside the broadband area.

Australian studies also forecast substantial benefits for states. The ACIL Tasman (2004a) forecast that broadband take-up in Victoria would result in average annual growth of Gross State Product of 0.82% from 2004-2015 , contributing \$15 billion in NPV to the Victorian economy. In Queensland, the Allen Consulting Group (2003) study forecast an increase of 1,155 new jobs and an increase in Gross State Product with a NPV of \$4,180 million resulting from a take-up of broadband. In each state, regional communities were also expected to benefit. Across the states, benefits were expected to vary by industry (Allen Consulting Group, 2003; ACIL Tasman, 2004b), but productivity benefits were expected to be higher in metropolitan areas than in rural areas (ACIL Tasman, 2004b).

In sum, these economic studies suggest that broadband is required in regional areas, if new businesses are to be attracted to the area. Businesses in areas boasting broadband availability are more productive than those in areas without it. Also, businesses in regional areas will not benefit from broadband to the same extent as those operating in metropolitan areas.

BROADBAND, COMMUNITY DEVELOPMENT, AND BUSINESS

Although the studies above provide some evidence that broadband does have positive effects on the economy, they say little about the impact of broadband on businesses in smaller communities. Firth and Mellor (2005) discuss how, at the community level, the adoption of broadband can affect the provision of basic services such as education, health and entertainment as well as social relations, jobs and prosperity. These authors also emphasize that the impact of broadband in each area can be positive or negative, depending on the

integrity with which it is used and the quality of the content it carries. For businesses in regional areas, improved education, health and entertainment services would be expected to change perceptions of the 'lifestyle' offered in the area, and thereby make it easier to attract people and businesses to the area. Improved education may also impact on the level of skills available in the community to make better use of broadband. However, for regional businesses, broadband may be an additional cost of maintaining levels of competitiveness, and employment may actually decrease. Moreover, it may result in social/financial problems within the community from excessive gambling, educational and health disadvantages as face-to-face contact is displaced by the less personal Internet, and a decline in social relationships, which may in turn impact adversely effect local businesses activity (Firth and Mellor, 2005).

While Firth and Mellor (2005) identify broad potential benefits and problems of broadband adoption in communities, Matos, Langford *et al.* (2005) focus on the positive impact of broadband on innovation. They argue that "broadband communication can facilitate development of structures that provide right conditions for learning and tacit knowledge interaction enjoyed by their urban counterparts."(pp.1-2) Matos et al (2005) use scenarios to discuss how broadband can be expected to stimulate learning, networks, alliances and virtual organisations, overcoming problems associated with the small size and isolation of businesses in rural areas and small towns. The Hicks and Burton (2005) study reported higher productivity in firms in broadband areas compared with than those located elsewhere of a similar age, and also comparatively high standard deviations in productivity. This higher variability would be consistent with higher risk or innovative activity.

BROADBAND AND SMES

The adoption of ICTs by business can be described in stage adoption models in which usage progresses from simple applications using basic technology to more advanced applications requiring more complex technology. With broadband, it could be expected that businesses

would develop sophisticated applications in areas such as e-commerce, intranets, interactive websites, and web-based customer and supplier networks. However it is recognised that usage depends also on individual personal readiness of the business owner/manager, organisational readiness and external social, technical and business readiness (Figure 1) (Gray, 2003). These factors mean that the initial use of broadband may focus on activities such as improved communication and ordering products on-line.

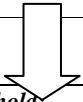
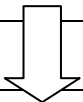

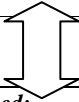

Stages	Readiness issues		
	<i>Individual/personal</i>	<i>Organisational</i>	<i>Business environmental</i>
Uninvolved: Naïve, indifferent, hostile	Conflicting personal lifestyle/career motivations.	Lack of resources, structure; Not employed.	Wide local use of computers but low ICT contact; Cultural barriers.
	Drivers: Peer/family pressure; Growing ICT work, home, leisure domains. Barriers: Educational; Low ICT contact/familiarity; Anti-tech lifestyle.		
Threshold: Keen to benefit from ICT but not sure how	Low technical knowledge; Curious re: ICT business potential.	Customer, staff demand for internal & external connectivity; PCs, not connected to Internet.	Customers/peers online; supplier, government pressure; Local ISPs, ADSL
	Drivers: Business pressures; CEO curiosity; Staff ICT familiarity Barriers: Lack of resources technical expertise; Loss of CEO power to staff		
Beginner: Recently online but unsure of where to go next	Owner keen on business advantages from ICT; Some staff with technical capability	E-mail used internally + sales/customer activities; Dependent on key workers; Technical + people constraints on Internet options.	Low awareness of ICT of applications; Some access to external ICT advice; Sources of helpful business advice always not obvious
	Drivers: Strong supply-chain/marketing pressures; Need to justify ICT investments. Barriers: Inter-operability; Systems/standards compliance; cost/supply of expert support.		
Intermediate: Internet, e-mail limited use of website, no ICT strategy.	Owner develops ICT knowledge; Staff with basic – advanced ICT skills Motivated to develop the ICT potential of the firm	Internet used for specific external and business information; E-mail contact with suppliers; Static website; Faster response to customer feedback	Need for and use of advice and support networks; ICT-based systems and services in widespread use; customer expectations of ICT capabilities growing
	Drivers: Strong supply-chain/marketing pressures; Need to justify ICT investments. Barriers: Inter-operability; Systems/standards compliance; cost/supply of expert support		
Advanced: Intranet/extranet online with staff, customers, suppliers as integral part of business strategy.	Owner/CEO and most staff continuously developing ICT knowledge and skills;	ICT integral to business strategy; Staff developed to boost firms ICT capabilities; Internal e-mail intranet; Web based customer, supplier networks; Interactive website part of marketing strategy	Growth in access to suitable ICT-based services and ASPs; Strong competitor and customer ICT capabilities; Clear regulatory and legal frameworks
	Drivers: Competitive advantage from ICT expertise/organisational knowledge Barriers: Keeping up with pace of change in technology and market demands		

Figure 1: SME stages of adoption and use of e-commerce (Gray 2003)

There are mixed views concerning the ability of SMEs to advance to higher adoption stages and compete using ICTs. On the one hand there is the conventional view that SME uptake of

personal computers, modems, and fax machines and other information systems related technologies lags behind their larger counterparts (Burke, 2005). On the other hand there is a contrary view which asserts that the competitive pressures to “cooperate more in networks, [and] to share information” are felt more acutely at the level of the small firm than previously thought (Gray, 2003, p.1). Even with “limited resources and significantly weaker market power”, small firms are quick to embrace the use of email and the internet as part of their overall communication requirements (Gray, 2003). Broadband offers the technological means to move to the next stage of ICT usage. However the studies reviewed below suggest that there are significant issues in accessing broadband in regional areas, and that usage to date has not led to more advanced e-commerce applications.

Adoption of Broadband

Gregor et al (2004) reported that businesses primarily adopt broadband because either speed or connection is important, or, if speed is not important, the ‘always on’ feature is. Take-up rates varied by industry for subgroups, whereas the ‘always on’ feature was considered to be important (Gregor, 2004). However broadband adoption is affected by a number of factors.

The availability of broadband in rural and regional areas is a major factor affecting take-up of broadband in Australia (ABS 2005a). Moreover, even where it is available in regional and rural areas, the residential broadband market tends to be poorly developed, leading to a lack of both demand for on-line services and lack of a regional IT skill-base (Cameron, 2005).

The lack of perceived benefits (ABS 2005a), the perceptions of low availability and reliability of services, nature and cost of services available, access to content, and lack of education and support programs (Gregor *et. al.* (2004) contribute to low uptake.

The initial costs of connection and ongoing usage costs seem to be of less importance in explaining uptake (Gregor *et. al.* 2004) although around 20% of small business Internet users in the ABS (2004) survey indicated that costs were a factor inhibiting their use of broadband.

Costs appeared to be a major issue outside large townships where ADSL could not be accessed and satellite connections were costly and unsuitable for some applications.

A range of other factors can affect business uptake of broadband. Improved data accounting and security was given by some as a reason for adopting broadband (Cameron 2005). The decision to move to broadband also depended on the current state of ICT networks and investment levels needed to maintain and expand existing ICT networks. In businesses terms the cost and an ability to handle increasing demand prompted some businesses to switch from narrowband to broadband (Cameron 2005).

Poor information on broadband may partly explain why some businesses perceive that there are few benefits to broadband. Several studies indicate that business people often found information about broadband confusing (Gregor et al 2004), there was ignorance about government support initiatives (Spurge and Roberts 2005) and in regional areas it has been noted that there was a general lack of information on and exposure to new technologies (Cameron, 2005).

Impact of Broadband

When adoption issues are put to one side, the overall impact of broadband on individual small and medium-sized businesses appears to be positive. In a DCITA study (2005), almost 80% of SMEs using broadband Internet connection reported positive impacts overall on business activity, and only 1% reported a negative impact.

The major impacts of broadband are to lower costs and increase productivity. The Fletcher Advisory (2001) study shows that even within a few months of adoption, half of the respondents claimed to have increased productivity, and three-quarters expected further gains. Over one-third reported reductions in costs, and over two-thirds expected future cost savings. Some examples given of cost cutting in the studies are: cheaper internal phone calls (Cameron, 2005; Strategic Networks Group 2003), costs reduction in the staff time required for communicating (Strategic Networks Group 2003), speedier delivery of documents which

reduces customer complaints, lower costs of postage (Annis et al, 2005), lower costs of training by not having to send staff away or bring in trainers (Annis et al 2005; Strategic Networks Group 2003), lower costs of education by not having staff travel to other areas (Annis et al 2005) , and lower costs of managing across multiple sites because of improved communications (Annis et al, 2005). In their study of broadband in isolated Canadian communities, Annis et al (2005) highlighted the benefits of broadband in making services available from regional or urban centres and cutting some of the costs of isolation. They concluded that broadband allowed organisations to remain competitive in more isolated areas: without broadband they might be forced to relocate.

Broadband also changes the working practices of employees and the ways in which operations of the business are conducted. A major impact is on business communication (Strategic Networks Group 2003), for instance, with the use of email, sending and receiving large files (Cameron 2005; Fletcher Advisory 2001) and for managing operations at dispersed locations (Annis et al 2005). The Internet is increasingly used for document sourcing and information sharing, for lodging forms and assessing applications or claims. These activities are facilitated by broadband (Cameron 2005).

Staff satisfaction appears to increase with the adoption of broadband. Increased numbers of staff can be given access to the Internet, and staff frustration is reduced because they no longer have wait for access to the Internet, there are fewer customer complaints, and they do not have to redo as many failed tasks (Fletcher Advisory, 2001). Broadband also increases the options for staff to work at home (Spurge and Roberts 2005; Cameron 2005). Areas with broadband tend to have higher wages (Burton and Hicks 2005). Overall, the Fletcher Study (2001) reports asserts that broadband gives employees the “tools they need to do their jobs adequately”.

There is evidence that broadband usage can also increase sales or output. In the Fletcher Advisory (2001) study, 12% of respondents claimed that broadband use had resulted in increased revenue, and another 39% expected it to do so over the next 1-2 years. Cameron

(2005) reported that clientele and industry are expecting more on-line services and the use of narrowband was resulting in lost work or inability to complete tasks. The Strategic Networks Group (2003) reported that improved product training was expected to lead to better informed sales and service staff, more satisfied customers and higher sales. Substantial increases in sales were recorded in the study of remote Churchill (Annis et al 2005). Indeed, in this instance it does appear that in the tourism industry at least, broadband is a very important for online bookings.

Broadband is an important tool in innovation, opening up the possibility of new business models, as illustrated by case studies in the Fletcher Advisory (2001) study. It was also used to drive innovation with low-cost low risk experimentation; 35% of respondents in the Fletcher Advisory (2001) study state that it is now very important for launching new products, and over 40% expect it to be important in the future.

Around two-thirds of respondents in the Spurge and Roberts (2005) study were considering upgrading their Internet connectivity/bandwidth systems in the future. This suggests that businesses do indeed derive substantial benefits from their broadband usage and perceive that more benefits will flow from increased usage.

Improvements in the productivity of individual businesses can have adverse consequences for communities. Autor (2003) found that ICTs tend to complement workers that perform non-routine problem-solving and complex communication tasks, but substitutes for workers who perform cognitive and manual tasks that can be accomplished by following explicit rules.

While both effects could be expected to increase productivity, the overall effect on employment is ambiguous and would depend on the mix of different types of jobs in the economy and the region. Employment in the community could therefore fall because of improved productivity, reducing the customer base and the local support for businesses. It is important therefore to consider the impact of broadband on communities overall in assessing how businesses are likely to be affected. Studies of the impact of broadband on South Dundas, Parsboro and Churchill, all towns in regional or rural Canada, plus a study of a

regional area in Australia provide information on how business communities are affected by broadband.

The critical impact of broadband that came through in the studies of South Dundas, Parsboro and Churchill was in relation to job, company and community retention. Employment rose or at least was kept in the community, because broadband was available, companies remained in operation within the communities, revenues rose and costs declined. Concerns about loss of jobs in rural communities as a consequence of broadband adoption therefore appears to be unfounded.

An Australian study by Cameron (2005) highlighted factors at the regional level which impeded the development of broadband networks in the Northern Rivers region of NSW. Broadband was available to businesses within the larger townships but many businesses could not access ADSL, and found satellite connections to be costly. Demand for services was affected by both the presence of branch offices and government service providers with little local autonomy to choose broadband, plus an underdeveloped residential market which contributed to lack of a regional skill-base and lack of demand for on-line services. The region suffered from an inadequate integration of local, state and federal communications initiatives. The paucity of IT skills affected the small to medium sized businesses in particular, and there was also a serious shortage of information and exposure to vagaries of the new technologies. Government initiatives were uncoordinated and sometimes conflicting. The study highlighted in particular the interdependence of residential, business and government broadband use.

IMPLICATIONS FOR BUSINESSES IN SMALL REGIONAL TOWNS IN QUEENSLAND

From the studies outlined above, it can be concluded that there are indeed clear, measurable economic benefits associated with the adoption and use of broadband technology that generate positive returns to businesses in rural and regional areas. For businesses, the major benefits appear to be in promoting efficiency and reducing the costs of conducting business.

The studies reviewed indicate that the lowering of administration and transaction costs as well as reducing labour results in enhanced productivity. It also appears that broadband reduces staff dissatisfaction with their jobs. Broadband allows businesses to create more choice and convenience for customers, expands their markets, and facilitates research of principal competitors and innovation in new products and processes. For businesses in regional areas, there are additional benefits as broadband improves communication between geographically isolated areas, and allows staff to access educational and training facilities at low cost. The case studies appeared to indicate that with the introduction of broadband, businesses are using the Internet more intensively, but not necessarily moving to the next level of sophistication in applications as the stage adoption models (eg Gray 2003) might suggest. However, this may come with time as the models do recognise that movement to higher stages of use requires personal readiness of the business owner/manager, organisational readiness and external social, technical and business readiness.

The adoption of broadband technology appears to have its greatest immediate impact on the management of an organisation's human resources, its marketing and the efficiency of its administrative processes. In human resource management, it can affect the way tasks in the organisation are completed, improve access to training and development, change where staff are located as they work, and increase employee satisfaction. In marketing, there was little evidence of advances in e-commerce, but businesses are better able to research their competitors and they are more innovative in trying new products in the market. Broadband can also facilitate much better communication both within organisations and between organisations and their suppliers, an important consideration for more remote communities.

Improvements in business efficiency in rural and regional areas can potentially result in lower employment in the area, leading to an erosion of the local market and local support services with flow-on effects to local businesses. The potential for broadband to overcome locational barriers may also have mixed impacts. On the one hand, it might enable firms to outsource certain functions and consumers to purchases out of their local area. If this means that some

tasks are completed by local contractors, there would be a flow-on benefit for the local economy. However, if the task is completed at another location (or for a regional branch, in the central office), there could be a negative impact on the local economy. The research to date suggests that communities do not contract. Instead, broadband is required to attract new businesses to rural and regional areas. In some cases broadband helps retain existing businesses with resulting increases in employment, a critical issue in rural and regional areas.

Within any community, the extent to which broadband can be effectively used appears to depend on characteristics of both the firms and the environments in which they operate. The type of industry in the area determines to a degree the benefits to be gained from broadband. Evidence in the case studies suggests that firms in the tourism sector are likely to benefit from broadband even in the most remote places (ACIL Tasman 2004; Annis et al. 2005; Bay Area Economics 2003).

Other factors which may affect the benefits gained from broadband in communities are the autonomy of local operations and residential uptake. Government agencies and branch offices often have limited ability to innovate and may fail to take advantage of the technology, limiting the benefits in regional communities where these organisations can be a significant part of the local economy. However, as a major employer in some communities, government may lead broadband use in the area. Demand for online business services also depends in part on residential use of broadband, and residential use assists in developing the skill base necessary in the community for businesses to manage their technology. Broadband can also be viewed as necessary to attract people to rural communities. It can assist in the delivery of education to more remote areas which has both direct and indirect impact on local business, and also result in wider entertainment choices and improved health services which may make the community a more attractive place to live.

There is some discussion that urban areas will benefit more from broadband technology than rural areas. ACIL Tasman (2004b) predict that benefits will accrue mainly to metropolitan areas and the peri-urban periphery (where there is rapid residential development), and to large

regional towns. The only noted benefit for small regional towns is if they are a tourist centre. In contrast, those studies that have directly surveyed businesses in rural areas have found that positive economic benefits are felt even in small and very remote areas (Annis et al. 2005; Strategic Network Group 2003).

In summary, it appears that broadband technology will bring economic benefits to businesses in Queensland, even in the smallest and most remote communities, and it will change the way businesses operate in those communities. This indicates that government programs to facilitate the introduction and uptake of broadband are fitting at least from the standpoint of encouraging adoption. Where broadband has recently become available, there will be a period of adjustment as businesses become familiar with the technology and its potential. The main gap in the literature is the need for more community level case studies that analyse the economic interactions within a community after broadband has become available. In particular, there is a need to examine the wider implications of labour productivity gains and other cost reductions on the population of businesses in a small community.

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