

The Benefits of Expanded Broadband for Missouri Farms and Agribusinesses

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Executive Summary

The gap in access to broadband internet service between rural and urban areas of Missouri is wide and growing. This has serious implication for the competitiveness and viability of farms and agribusinesses and for the quality of life for rural residents, especially farm families. Agriculture has become a highly information dependent industry. High speed internet is necessary to efficiently access markets information and to market their products locally, regionally, nationally and globally. Information is even more important for producers in higher value niche markets. Many farming technologies require high speed, wireless connectivity. Broadband combined with GPS, allows farmers to reduce inputs and increase quality and quantity of products. Similarly, broadband access allows Missouri's agribusinesses to compete in national and global markets. Broadband access allows agribusinesses reduce costs, increase markets, and more effectively manage branch offices. An overwhelming percentage (88%) of agribusinesses using dial-up would prefer a broadband connection.

Trends suggest that the current rural-urban gap will continue to grow wider. National, state and local policy can play a pivotal role in reducing this gap. We recommend that policy makers revisit the nation's history of enabling and encouraging other types of critical infrastructure. In particular, modernization of the Universal Service Fund must be finalized as quickly as possible. The state and local governments should review existing statutes and regulations to identify and address impediments to rural broadband build out. Policy makers and citizens must be made aware of the benefit of broadband access to them, their children, and businesses. Partnerships between the private sector (including providers and users of broadband), governments and not-for-profits must be encouraged. Finally, procedures must be established to ensure on-going collaboration, planning and investment in Missouri's information and communication technology as our needs evolve and grow.

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Background

The digital divide, defined as “the perceived gap between those who have access to the latest information technologies and those who do not”, has several dimensions. For instance, the information technology ‘haves’ and ‘have-nots’ may differ in terms of demographic characteristics such as age, race and ethnicity, or in terms of socio-economic factors such as income, education and household type, or by geographical characteristics such as region or degree of rurality. In terms of geography, the gap between rural and urban residents is particularly wide. The Pew Center (2009) reports that the digital divide between metropolitan counties and non-metropolitan counties is actually widening. Between the years 2001 to 2010 the broadband adoption rate increased from 9% to 70% in metropolitan counties while it increased from 3% to 50% in non-metropolitan counties, resulting in a gap of 20 percentage points. Furthermore, the rate of broadband adoption, available speed, and penetration rates are very uneven among states as well as among counties within states. Missouri ranks below the national average in household internet subscription rate as of June 2010.

The availability to broadband for businesses and homes has been a topic of keen interest to both policy makers and researchers because access to broadband is increasingly believed to be a key to regional economic opportunities. Empirical research has identified a long list of potential benefits from access and use of broadband. One study estimated that for every percentage points of increase in broadband penetration in an area, employment increases by 0.2 to 0.3 percentage points per year (Crandall et al. 2007). The study also found that broadband has its most significant impacts in the education, health care and financial services sectors. Other studies have found positive relationships between broadband expansion and economic growth especially when associated with industries that rely on information technology. A 2008 study estimated that by increasing the broadband adoption rate by 7 percentage points, 2.4 million jobs could be produced in the United States, including 49,000 in Missouri (Connected Nation, 2008).

Table 1: A State-by-State Summary of the Annual Economic Impact Associated with Accelerating Broadband for Each State by 7 Percentage Points

Region	Jobs Created or Saved Annually (thousand)	Economic Impact and value in (million \$)				
		Total Annual Economic Impact	Average Annual Healthcare Cost Saved	Average Annual Mileage Costs Saved	Annual Value of Hours Saved	Value of Carbon Offsets
Missouri	49	\$2,501	\$13	\$126	\$629	\$0.34
USA	2,353	\$134,235	\$662	\$6,413	\$35,215	\$18

Source: The Economic Impact of Stimulating Broadband Nationally, A report from Connected Nations, Inc., February 21, 2008.

Here we consider the potential benefits of increasing broadband adoption in two segments of the Missouri economy—farms and the overall agribusiness sector. County level data on broadband adoption is not universally available but many states have conducted their own residential surveys while several others are in the process of conducting such surveys. The state of Missouri through the *MoBroadbandNow* project has just completed a residential broadband survey and is using it as the basis for a needs assessment for regional strategic broadband planning. In addition, an online business survey was conducted in several sectors of the Missouri economy including agriculture. Farm level internet adoption is also reported in the 2007 Census of Agriculture. These data provide a picture of how broadband is used in rural areas and how enhanced access might contribute to opportunities for rural farm households and the agribusiness sector in Missouri.

Missouri Farms and Farm Families

While the contribution of the farming sector to Missouri’s Gross State Product is relatively small (less than 2%), farms provide a portion of the income for almost 108,000 Missouri farm families (MERIC, 2009). Missouri’s farms also provide inputs for the much larger food, fiber and biofuel sectors in the state. Missouri ranks 12th in the country in terms of value of agricultural products sold (USDA 2011).

Farming is a highly technological and information-based industry. To operate efficiently, farms generate, use and communicate large amounts of data and information. This information increases farm productivity and profits by reducing the costs of procuring inputs and services and

by aiding in the realization of higher prices or sales volumes of farm outputs. Traditionally, the primary sources of information on prices, market trends, and sources of inputs and farm services were radio, television, newspapers and the state extension services. In general, farms and farm families had roughly comparable access to these sources of information no matter how rural or remote their farms. Increasingly, the conventional means of gathering, processing and communicating this information is being replaced by the internet, cellular phones and satellite systems.

On the revenue side, high speed internet at the farm level increases access to markets, especially for smaller and specialty product farms. The internet allows farms to expand markets for their products locally, regionally, nationally and even globally. Missouri is ranked 10th in total agriculture exports by value (USDA, 2011). In today's global market place, timely and accurate information is the key to competing in commodity markets. But information is even more important for producers in higher value niche markets where value is determined by reliability, punctuality, customer service and lower transactions costs. Thus both commodities and niche products, at the global level require a web presence and high speed internet connectivity.

At the local level, current policy and rural economic development strategies call for expansion of local food systems and agri-tourism activities. Both of these strategies require low cost communication between farmers, consumers and agri-tourists. A check of "u-pick farms" in Missouri lists several farms along with their web-sites. In addition to web pages, some of these farms have more than 7000 twitter followers. Similar opportunities will exist for more and more Missouri farms as enhanced broadband access in rural Missouri is achieved. When farms become more visible online, urban residents can interact more with local and regional farmers thus enhancing rural-urban linkages, thereby increasing farm incomes and increasing consumption options for urban residents.

On the cost side, broadband promises to transform both large and small farms. More and more agricultural research, extension, federal, and state agencies are providing information and services electronically. Farmers' co-operatives and commodity organizations use the internet to offer numerous services to farmers as well as to organize advocacy activities for the benefit of

members. Farmers can use social media to network with other farmers to share information and techniques. Without reasonable internet access on farms, these services are available only at significant cost and incurred time delays. These costs and delays reduce the competitiveness of farms and reduce farm profits. Many of the most recent technologies work best with, or actually require, high speed, wireless connectivity. The amount of spatial data related to yields, fertilizer and pesticide applications, irrigation water application, etc. has increased exponentially in recent years. Broadband combined with GPS, allows farmers to use precision agriculture, irrigation management, and to implement technologies to improve management and reduce costs. While many of these technologies are still in their infancy, their potential impact in agriculture, especially with wireless technologies, is huge.

USDA (2011) estimates that within the past decade, the number of farms with internet connections has increased by almost 20%. According to USDA the gap between Missouri and the US has doubled in the last 5 years. In 2011, Missouri farms were 10 percentage points behind the US average (see Figure 1).

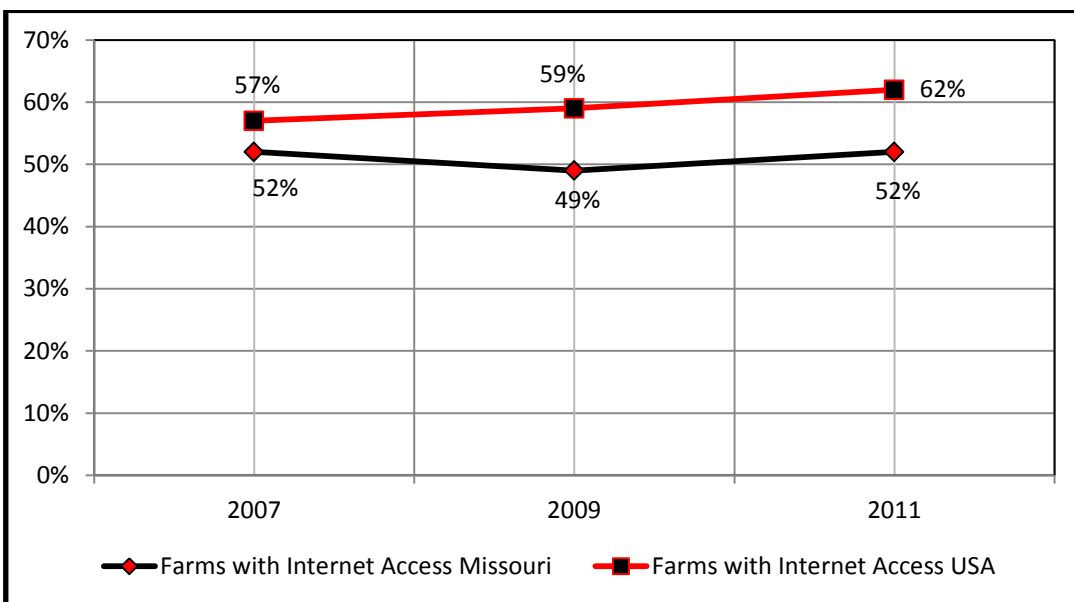


Figure 1: Percentage of farm households with internet access
(Data source: Farm Computer Usage and Ownership, August 2011, USDA)

The most common method of internet connection used by Missouri farms in 2011 was DSL, followed by wireless and satellite. Dial-up access has decreased significantly (see Figure 2).

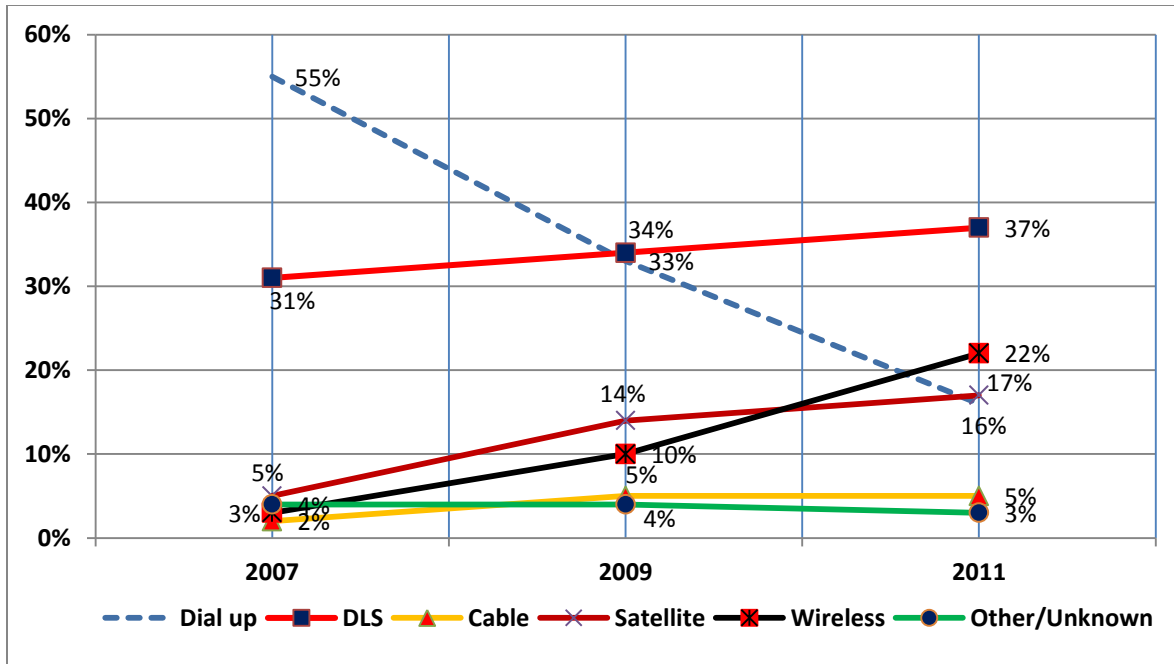


Figure 2: Type of internet connection for Missouri farms/farmers in various years (Data source: Farm Computer Usage and Ownership, August 2011, USDA)

Missouri farmers use the internet for a wide range of farm related activities (see Figure 3).

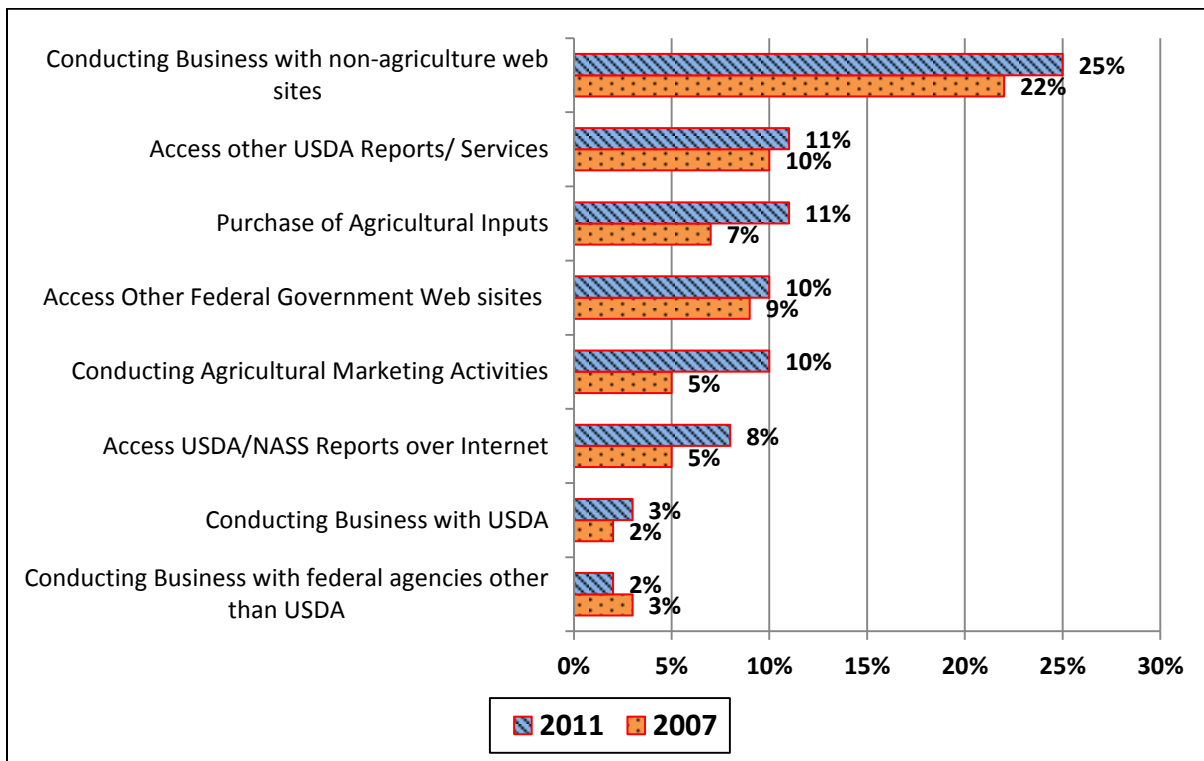


Figure 3: Application of internet by farm households in Missouri (Data source: Farm Computer Usage and Ownership, August 2011, USDA)

The benefits to farms and farm families of access to the internet, especially broadband, is difficult to quantify, but is clearly significant. One indicator of the direct benefit is the difference in profits of farms ‘with’ and ‘without’ internet access. Recently, Kandilov et al. (2011) evaluated the impact of USDA broadband loans and estimated that increased access to high speed internet (as a result of the loans) led to a 6% growth in farm revenue compared to a 3% growth in production expenditures resulting in a 3% net increase in farm profits.

We analyzed farm profit data for Missouri and found a positive and significant relationship between the percentage of farmers with high speed internet at the county level and farm profits (see Figure 4).² We also compared the growth of farm profits in counties with higher than average farm household use of high speed internet with that of counties with lower than average rates. While farm profits in high and low adoption counties were close to the state average in 2002, growth in profits has been much higher in counties with above average rates of high speed internet adoption (see Figure 5).

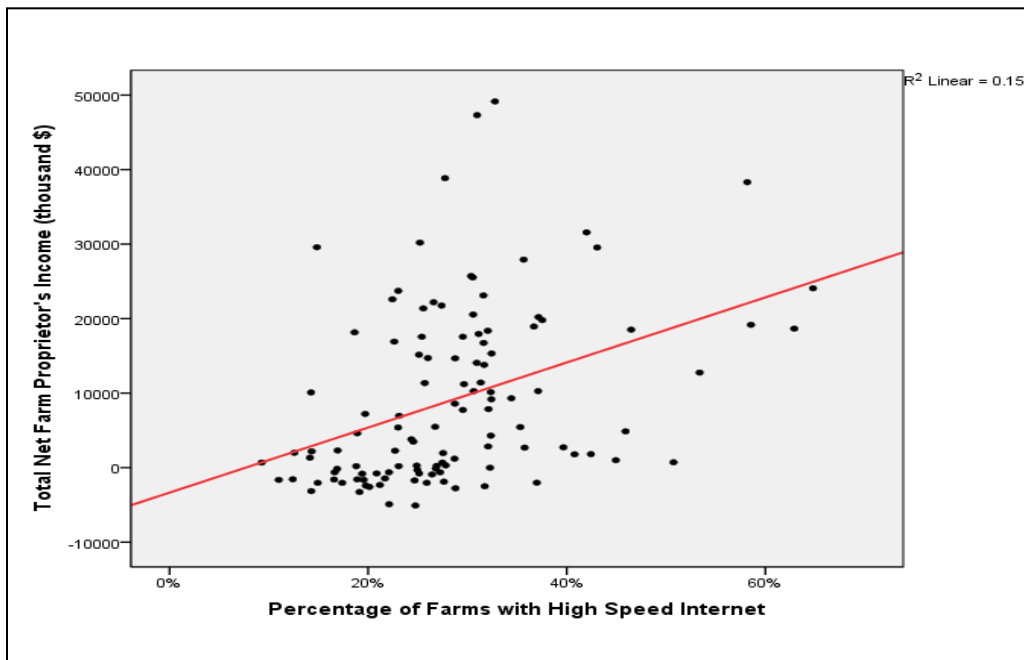


Figure 4: Relationship between farm profit (total net farm proprietor’s income) and high speed internet for Missouri counties.

²This simple correlation does not prove that the higher profits are the result of internet use alone.

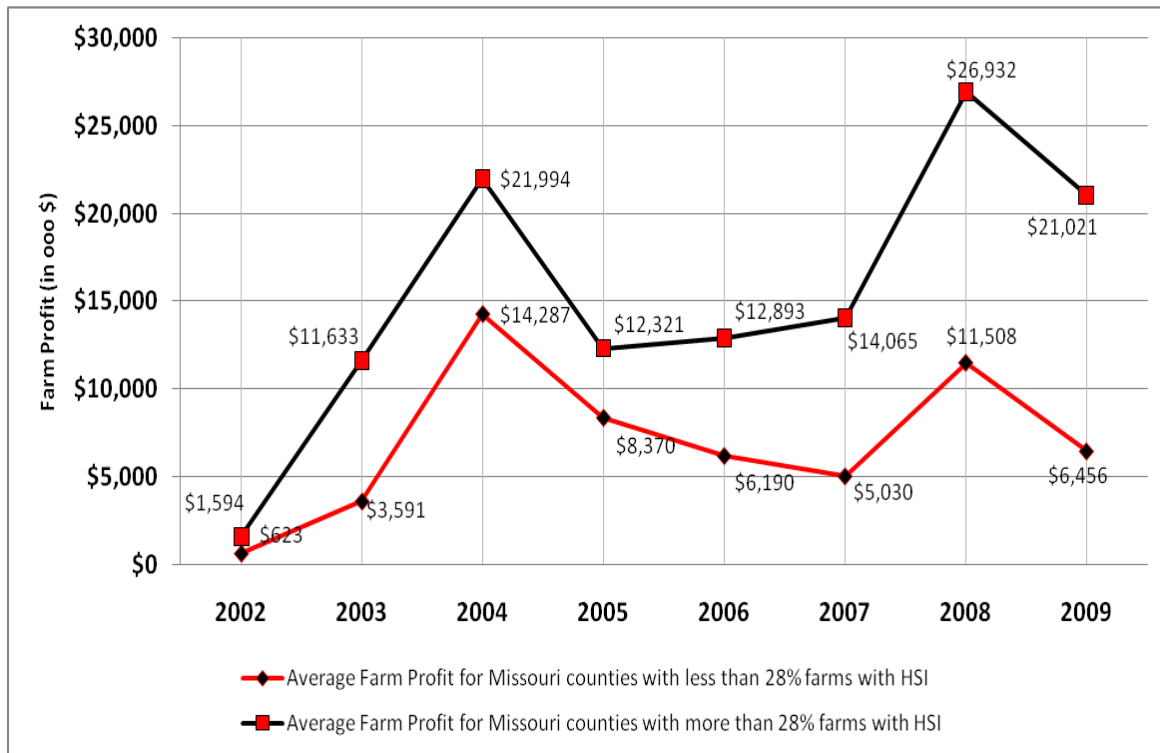


Figure 5: Average Farm Profit (Net Farm Proprietor's Income) for Missouri counties based on farm HSI adoption.

Together these analyses suggest that broadband is at least associated with more vibrant agricultural economies.

The Missouri Agribusiness Sector and Broadband

Missouri's agricultural production, agricultural processing and other agribusiness sectors together accounted for \$12.4 billion (7 percent of the gross state product) and provided employment to almost 245,500 workers in 2007 (MERIC, 2009). This has become a highly technological sector with a very high level of dependence on information and communication technology.

In 2011 the Missouri Broadband Business Survey collected information from 1167 Missouri businesses of which 122 were within the agribusiness sector. These firms operated mostly in Missouri's 59 non-metropolitan counties. Since the survey was administered online the respondents are typically those with access to the internet. Table 3 below provides an indication of the role broadband plays in their businesses including the type of internet connection, how they typically use the internet, and how long they have had access to internet service.

Table 3: Internet usage statistics for Missouri’s agribusiness sector

	Percentage of Businesses (n=122)
Have business web-site	34%
Use Dialup or satellite connections (slow speed)	36%
Employ less than 5 persons	76%
‘Very Dissatisfied’ or ‘Dissatisfied’ with the Cost of connection	33%
‘Very Dissatisfied’ or ‘Dissatisfied’ with the Speed of connection	60%
Robust High Speed Internet access is ‘Very Important’ or ‘Important’ for day-to-day business operations	87%
Paid less than \$100 per month for internet service	70%
Either is a business with a satellite office elsewhere or is a satellite location of a business headquartered elsewhere.	18%

Data source: Missouri Broadband Business Survey, 2011.

The majority of agribusinesses that responded to the survey would be considered small businesses. While many (33%) were dissatisfied with the cost of their internet service, significantly more (60%) were dissatisfied with the speed of their internet connection with 54% of these having either dial-up or satellite connection. Twenty percent of the businesses responding to the survey use dial-up and 16% use satellite connections which are frequently perceived as insufficient for their needs. Figure 9 below summarizes how these agribusinesses use the internet.

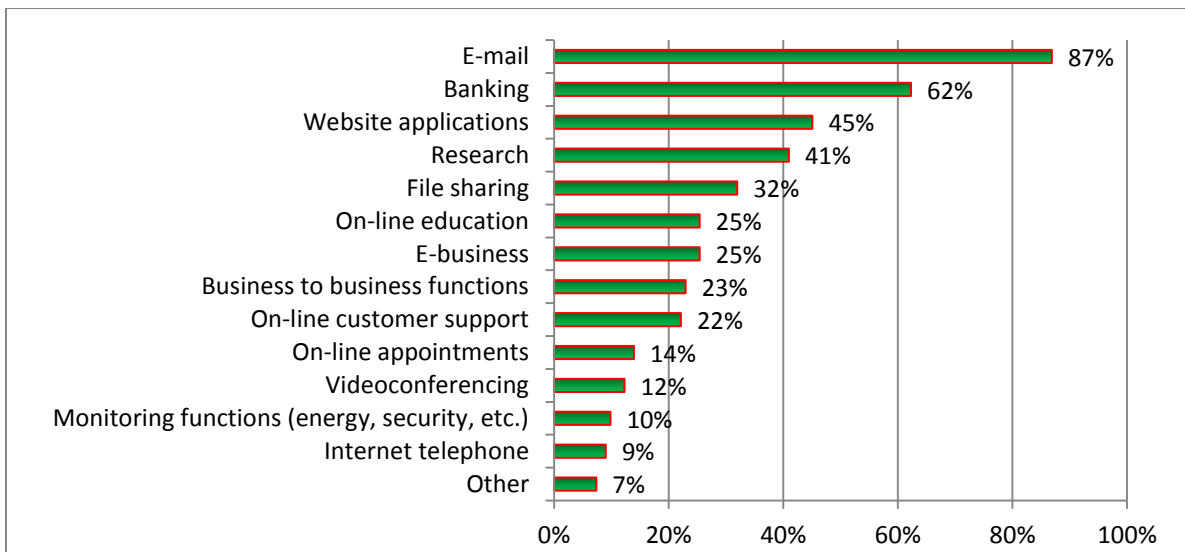


Figure 9: Usage of Internet in the Agribusiness Sector in Missouri.

Data source: Missouri Broadband Business Survey, 2011.

The data indicate a very strong relationship between speed of connection and the uses made of the internet. For instance, businesses that do not have higher speed connections do not use the internet for purposes such as video conferencing and e-business. The data in Table 3 suggest that many agribusinesses feel their current speed is insufficient for meeting their needs. Some of those respondents who currently have broadband connections need even better speed (from DSL to cable, for instance).

The list of benefits from high speed internet access for agribusinesses is long. The benefits of the internet identified by the businesses themselves include the ability to: 1) telecommute and thus allow their businesses to remain in rural communities; 2) have an online presence and thus increase their customer base; 3) connect directly with satellite offices; 4) save time (with faster file loading); 5) achieve greater efficiency because the telephone and internet can be used simultaneously; and 6) access real-time market prices, weather and other news. A variety of other advantages were mentioned as well. An overwhelming percentage of the businesses report that robust high speed internet is very important for day-to-day business. A staggering 88% (22 of 25) of the dial-up users desire to switch to a broadband connection.

Policy Implications

As Missouri moves forward with its broadband planning efforts it has become clear that there is little difference in the information and communication needs of rural and urban residents. As one farmer stated, ‘A business is a business and a child is a child – it shouldn’t matter where they live or work’. The realization of this fact underscores the seriousness of the rural-urban gap in broadband connectivity.

Our survey and subsequent discussions with both residents and providers in rural areas identified serious limitations on economic opportunities in communities with no broadband / high-speed internet access. To date, private sector providers alone have not been able to establish sound business strategies for extending this critical infrastructure to many rural areas. Local providers require more and more bandwidth to service their current customers as the scope and nature of their applications expand. Several providers stated that they must double their bandwidth purchases 2 or 3 times per year. Much of the providers’ revenue is being invested in increased bandwidth to satisfy this growing demand by current customers. This suggests that the

current digital divide may actually get worse in the future because the limited amount of revenue providers have to invest in capacity will be focused on the increasing needs of current clients, thus limiting their ability to expand services to the growing number of underserved rural residents.

National, state and local policy makers must first recognize the seriousness, urgency and complexity of this growing gap between rural and urban residents and businesses, and then accept responsibility for creating the conditions necessary to narrow and ultimately eliminate the gap. National and state policy makers could begin by revisiting the nation's history of enabling and encouraging other types of critical infrastructure in previous eras. The discussions surrounding the Universal Service Fund and other funding sources and approaches must be finalized as quickly as possible so that rural regions do not fall further behind in the global marketplace.

The state of Missouri and its local governments must review existing statutes and regulations to identify impediments to rural broadband build out. Frank discussions between private sector providers and policy makers should provide insights into needed policy changes. Furthermore, it is important that providers with a variety of technological solutions (i.e. wired and wireless) be involved in these discussions since the impediments faced by the various players can be quite different, and policy changes to permit and encourage developments of one solution could preclude development of others. For example, in many rural locations mobile wireless coverage may be the best solution in the short term, and for certain applications, but we must be certain that future applications requiring even higher bandwidths and speeds are also supported.

It is likely that a variety of potential solutions to the rural broadband problem will be identified depending on the regional issues and actors involved. For rural areas to retain population, experience sustained economic growth, and contribute fully to the quality of life of both rural and urban residents we must educate policy makers and citizens about the benefit of broadband access to them, their children, local businesses and the entire state. We must allow and promote the development of effective partnerships between the private sector (including providers and users of broadband), governments and not-for-profits. Finally, we must establish

procedures and institutions for assuring that the various stakeholders continue to collaborate, plan and invest as the Missouri's information and communication technology needs evolve and grow in the future.

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