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Broadband Internet to Promote Economic Development in Southside Virginia

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Introduction

In 2018, Mecklenburg Electric Cooperative (MEC), an electric cooperative in Southside, Virginia, received a $2.6 million grant from the Virginia Tobacco Region Revitalization Commission to provide last-mile broadband service to their existing customers ("MEC Receives Grant | Mecklenburg Electric Cooperative," n.d.). Broadband internet may be defined as: "connection speeds of at least 25 Mbps downstream and 3 Mbps upstream." The project was based on a case study of a successful installation by Prince George Electric Cooperative in 2016, and, the feedback from the first three MEC customers who received online services in September of 2018. David Lipscomb, MEC's Vice President of Member Services, asked us to explore how broadband internet can empower the agriculture and forestry industries to drive economic development in their service area. Agriculture and forestry sectors are historically close to the hearts of many in the region and employ anywhere from 1.5% to 10% of county populations (Figure 1).

Employment in Farming (% of total employment)					
Geographic Area	2012	2013	2014	2015	2016
Brunswick, VA	5.65%	5.62%	5.93%	5.80%	5.71%
Charlotte, VA	11.37%	11.42%	11.75%	11.28%	10.85%
Halifax, VA	6.10%	6.27%	6.45%	6.19%	6.08%
Lunenburg, VA	9.77%	9.84%	9.67%	9.47%	9.28%
Mecklenburg, VA	4.10%	4.42%	4.64%	4.36%	4.19%
Sussex, VA	3.66%	3.77%	3.97%	3.74%	3.62%
Greensville + Emporia, VA*	1.70%	1.78%	1.84%	1.75%	1.69%
Pittsylvania + Danville, VA*	3.02%	3.10%	3.21%	3.05%	2.95%
Southampton + Franklin, VA*	3.71%	3.96%	4.28%	4.03%	3.93%
United States	0.56%	0.56%	0.56%	0.56%	0.55%

Figure 1: Share of Employment in Agriculture, U.S. and Select Counties in Southside Virginia Area. (Source: BEA Interactive Data Tables, 2012-2016)

While agriculture is an important employer in Southside, farming employment has decreased within the past five years. This trend prevails in Southside and across the United States. We will explore the success of other rural areas that have adapted smart farming and determine the potential for agriculture and forestry to promote economic development.

Broadband Internet Availability

There exists a broadband internet dilemma in the rural United States. Farmers depend on broadband just as they do on large-scale public infrastructure such as highways, railways and waterways, to ship food, fuel and fiber across the country and around the world. Many of the latest yield-maximizing farming techniques require broadband connections for data collection and analysis performed both on the farm and in remote data centers. However, 29 percent of U.S. farms do not have access to the Internet, according the USDA report “Farm Computer Usage and Ownership,” (2017). Without broadband infrastructure, farmers have limited access

to current precision agriculture information, such as the online courses that are available through Alabama Cooperative Extension. While Virginia Cooperative Extension (VCE) does not yet offer a similar web-based program, any online program may not be readily accessible to farmers. Current broadband internet access of counties included in the Southside, Virginia, area is shown in Figure 2.

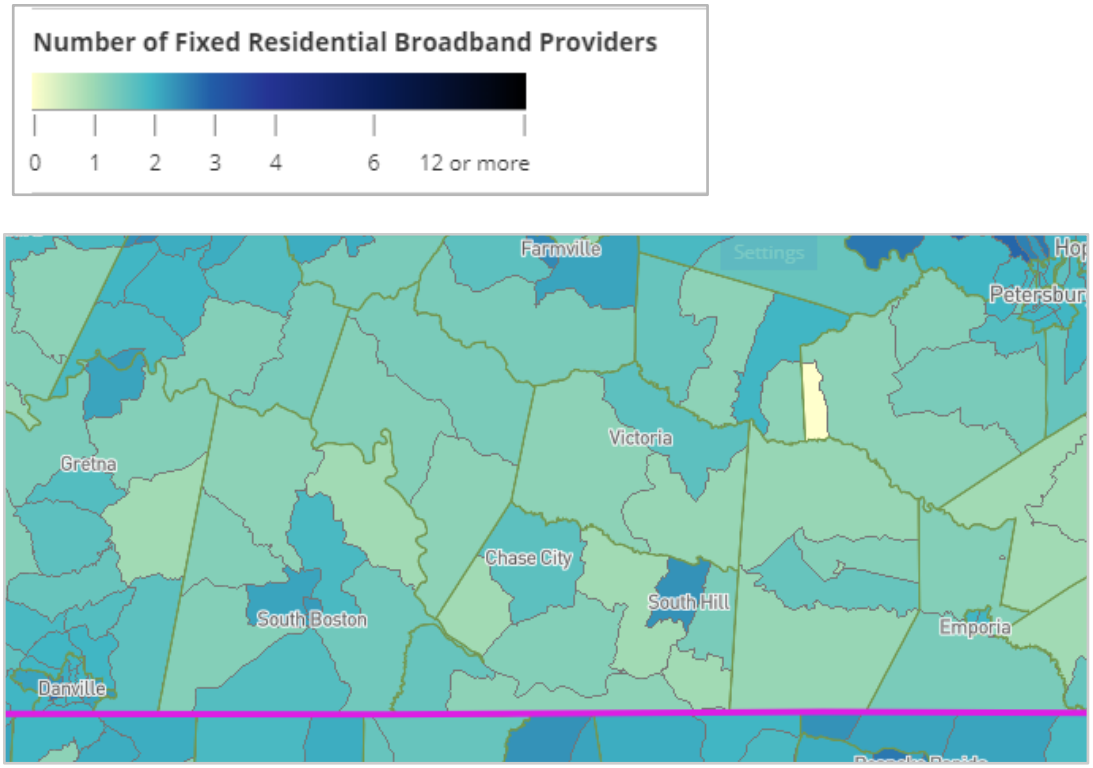

Figure 2: Broadband internet providers in Southside, VA. (Source: FFC Fixed Broadband Deployment)

The lighter blue colors represent limited broadband internet connection, meaning that these areas have one or two broadband internet providers. The dark blue areas, seen in the top right corner clustered around Richmond, represent high speed internet connections offered by six or more broadband providers. Access to multiple providers both increases the quality of internet speed and reliability and, lowers the prices, due a relatively more competitive environment.

Broadband and Agriculture

We discovered a distinct gulf between what is *possible* with smart farming and what is *feasible*. Land-grant universities across the country are integrating broadband and smart farming techniques into their agricultural research in an effort to remain on the cutting edge of the industry. For instance, the University of Georgia has a program focused on mapping cotton fields to forecast changes in input requirements across the field, and even forecast profitability by geographical area ("Precision Agriculture – Vellidis Research Group," n.d.). Livestock producers can use the internet to market their livestock and gain access to better genetics via online seedstock sales. Both livestock and crop farmers can use the internet to hedge their products against price fluctuations. However, as our testimonials show below, the use of broadband internet in agriculture is not as unquestionably useful as some of these programs would imply.

Precision Farming: Turning Data into decisions & success stories

The South Dakota State University Extension (SDSUE) system runs an online education platform called iGrow. In the 2012 SDSUE article titled *Precision Farming: Turning Data into Decisions & Success Stories*, the authors provided concrete examples of the results of precision agriculture for participating SD farmers. The authors highlight the successes soybean farmers have found using autosteer technology, variable rate application, and yield mapping. These technologies, according to the farmers interviewed, may allow them to conserve resources (such as seed, fertilizers, or pesticides) while increasing yields. The authors noted that too few

producers are trained in how to utilize the data they collect, which can be a critical downfall for the profitable implementation of precision agriculture.

Testimonial: Personal Interview with a Southside, VA Grain crops farmer

John Shepard uses variable rate sampling from season to season to apply fertilizers and manipulate plant populations across his fields to increase yield and efficiency. Every season he gathers data and then overlaps corresponding maps after the season is finished to use next year. John invests roughly $40,000 annually into his smart farming operation, and claims that it has actually made his life harder than easier, but that his profits have increased since implementing these new practices. Key take away points from our interview are that broadband internet connectivity might not be a necessary input to his adoption of precision agriculture technologies, given he has already increased his profits without access to internet. Instead, he indicates that a GPS base in or near Southside, Virginia would be more beneficial as he often loses signal when planting (Sheppard, 2018), resulting in lost data and added time needed to return to the location to complete the field scans.

Testimonial: Dr. David Reed, Virginia's tobacco specialist

Based on his years of experience working with tobacco producers in the area, Dr. Reed sees broadband as a risk management tool for tobacco growers in the region. Even though the Tobacco Transition Payment Program (more commonly known as the tobacco buyout or simply "the buyout") of 2005 caused the exodus of roughly 75% of quota holders from the industry, flue-cured tobacco is still a major source of income for Southside, Virginia. A number of growers that

Dr. Reed works with currently use cellular apps to monitor the seedlings in their greenhouses or the conditions in their curing barns. If, for instance, a fan goes out in a curing barn, growers can lose an average of $10,000 of cut tobacco. Dr. Reed sees the move away from cellular data to broadband adoption for these monitoring systems as an added convenience for farmers (Reed, 2018).

Testimonial: Rebekah Slabach, Virginia Cooperative Extension Agent, Halifax County

Ms. Slabach describes several areas of potential for high-speed internet to help the farmers she works with on a daily basis. Large swaths of Halifax County lack reliable internet of any kind, making it harder for her farmers to access online resources and trainings. Additionally, lack of internet makes registration and recordkeeping for her programs--particularly the cattle auctions she helps to host to improver producer access to markets --much more difficult, decreasing farmers' likelihood of participation. Although the auctions are conducted in person, she still has to collect spreadsheets full of data from participants, which is much more difficult in the absence of reliable internet. As a result, Ms. Slabach has to spend more time in the field to make up for the lack of reliable email and online resources. In short, broadband would save her time and effort, resulting in more effective connections with producers and improved delivery of educational workshops, online resources and up-to-date communications.

Economic Development Theories

One of the simplest and most commonly accepted economic theories for primary production industries such as agriculture and forestry, is the Structural Change theory. (Johnston & Mellor

(1961) and (Norton, Alwang, & Masters (2015) describe the manner in which labor shifts from primary production to secondary industries driven by the adoption of labor-saving technologies. This pattern of development, where workers move from low-wage agricultural jobs to higher paid manufacturing and service jobs, requires excess employment in agriculture, as well as demand in other sectors for employees. As shown in Figure 1, the share of employment in agriculture in Southside is generally higher than the national average. This hints at potential for development to follow the structural change model. However, educational attainment in Southside tends to be lower than the state and national averages, as shown in Figure 3. Therefore, the ability of labor to move into higher-paying jobs may depend on further education and workforce development efforts.

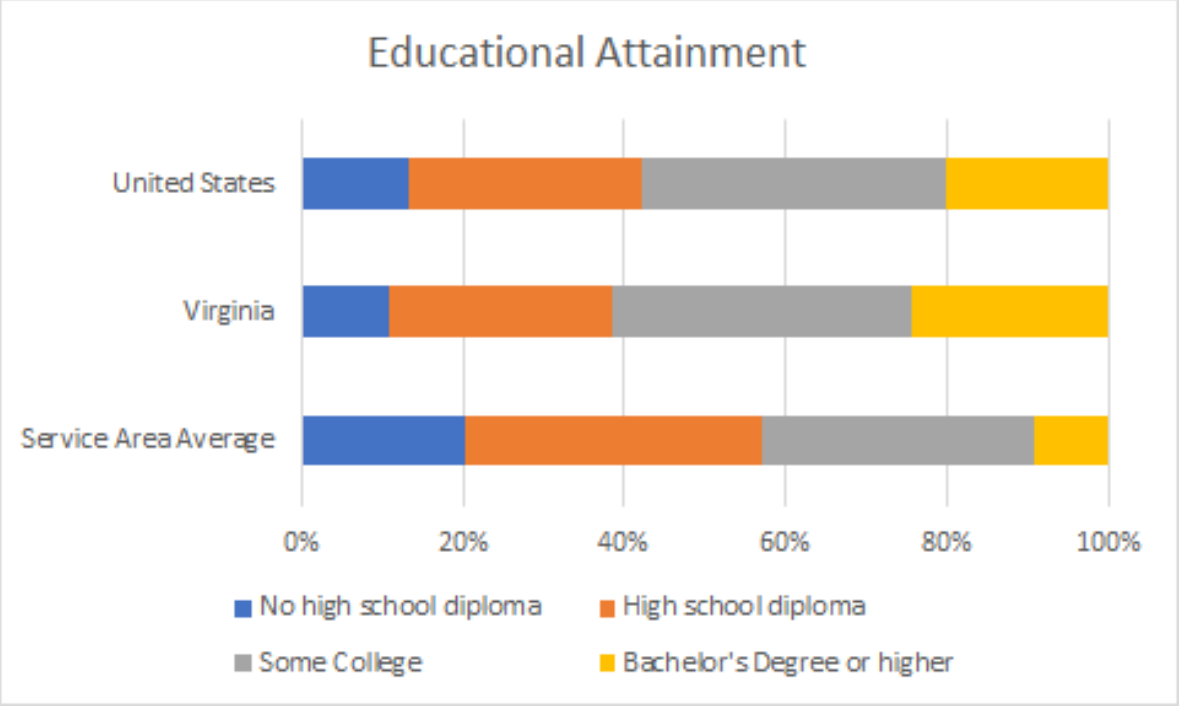

Figure 3: Educational Attainment in Southside, Virginia, and the United States, dates? [add data source]

Another theory that provides insight into identifying those factors that economic development is the New Growth theory, as described by (Barros, 1993), among others. Viewed through this lens, economic development is a result of capital investment; however this capital does not flow freely from areas of surplus to areas of shortage. Rather, firms and individuals invest more in areas where they expect high returns to investment, such as areas with improved infrastructure or beneficial regulations. In the case of Southside, VA, increased access to broadband may function as improved infrastructure and attract further investment in the area from young adults looking for new job opportunities and business start-ups.

Conclusion

It is likely that precision agriculture will directly help the farmers of Southside, Virginia. However, there is no concrete evidence to conclude that precision agriculture will be a primary driver of economic development throughout the region, even if it does raise the annual salary of the farmers we spoke to. Still, one can assume that increased farmer profits will encourage increased spending, some of which will be at local businesses, fostering some economic development in the area. The most beneficial externality that stems from an area receiving access to high speed, dependable internet is that the area becomes more attractive for secondary businesses and new educational opportunities, such as online classes, become increasingly available. While the introduction of precision agriculture and other internet-supported techniques will likely be helpful, it is sure that an increase in the flow of new business and higher education levels will be a stronger driver of economic development in the area.

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