The Rural Innovation Policy Project

Final Report

Comprehensive Economic Recovery Initiative – Technical Assistance Projects

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Executive Summary

For decades, the market-oriented nature of technological innovation, the high-tech economy, and the infrastructure that supports it, has primarily catered to urban areas. This urban-centric approach has resulted in a concentration of opportunity in urban areas and a failure to keep rural America's infrastructure up to date. Policymakers are beginning to recognize these failures, responding with massive public investment in broadband infrastructure, and beginning to show signs of widespread support for regional innovation to support diversifying economies. Yet, it is unclear how rural innovation is supported directly through legislative action. This report presents the findings of a pilot study that developed a method for evaluating federal policy support for rural innovation and the creation of a Rural Innovation Typology. Using our typology on a corpus of federal programs, we find growing support for rural innovation, particularly through broadband infrastructure and support of digital agriculture. However, we argue that there is additional opportunity to support endogenous innovation that is culturally and geographically specific to rural regions. We outline opportunities for future research and applications for this work.

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1 Introduction

For decades, contemporary technological advancement, innovation, and the economies that support them have primarily clustered in urban areas. Technology and urban planning scholar Annalee Saxenian wrote in-depth about how this process happened in Silicon Valley in her book *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (1996). She argues that a combination of dense social networks and open labor markets, paired with the informal communication and collaborative practices that were at the foundation of early computing culture, helped solidify Silicon Valley as the center of innovative business structures and economic relationships. Recent scholarship (Hardy, 2019; Hardy, 2022) argues that the concentration of technological advancement and innovation in urban areas is also largely due to the market-oriented nature of technological innovation, its embeddedness in the private sector, and the inability to develop the infrastructure necessary to support the high-tech economy in rural and low-resourced communities. It's become increasingly clear that this practice has resulted in a concentration of economic opportunity in America's "superstar cities" (Gyourko et al., 2013) and a total failure to keep rural America's infrastructure up to date.[1]

An industry-aware regional approach to developing innovative economic sectors, in other words, is the key to the success that resulted in the high-tech boom of the late 20th and early 21st centuries. Many in economic and community development circles are keenly aware of this. In fact, agricultural economist Thomas Johnson wrote in a 2007 article, "Place-Based Economic Policy: Innovation or Fad?," about the emergence of place-based economic policies and their rising popularity beginning in the late 1990s. This trend has largely continued, but some (e.g., Hardy, 2019; Hardy et al., 2019) argue that it is time to reimagine what innovation can look like in 21st century rural America. Rather than assuming that rural communities need exactly what urban areas have, how might we think about innovation differently? What does innovation look like that emerges from rural places? These are the kinds of questions that interest me, and are the questions that motivate the Rural Innovation Policy Project.

State and federal policymakers seem to be coming around to the problem of innovation and rural development. Think tanks in particular have responded en masse in recent years. Some of the nation's biggest policy think thanks are jockeying for their place in reimagining rural America: the Aspen Institute, with their Thrive Rural Framework; the Urban Institute, who has promoted the

[1] The decline of rural American infrastructure is well documented. The July 2017 House Hearing, "The State of Infrastructure in Rural America" (transcript), is a particularly eye-opening place to begin an inquiry into this topic.

Community Capitals Framework out of rural development scholarship; and the Brookings Institution, who has advocated for a reorganization of federal assistance for rural development into a central federal body. And it seems like federal and state policymakers are listening. The 2020 Democratic Primary witnessed many candidates with extensive rural platforms; the Rural Digital Opportunity Fund authorized by the FCC in 2019 is bringing over $20 billion in rural Internet infrastructure; and the EDA is set to award $1 billion for its Build Back Better Regional Challenge, with many rural regions vying to develop new high-tech ecosystems.

Yet, it is still unclear how rural innovation and rural technological advancement is being supported *directly* through legislative action and whether that action is actually designed for rural communities, or is projecting urban expectations of innovation onto rural regions. To address this issue, we began the work documented in this report as part of the Rural Innovation Policy Project. We are seeking to answer very fundamental questions related to rural innovation and policy in America right now: First, how do state and federal governments support innovation in rural America through policy? Second, what are the downstream impacts of this legislation? Based on research funded in Summer 2022 by the MSU Center for Community and Economic Development's Comprehensive Economic Recovery Initiative (CERI), we began tackling these questions. Our first step, and the process documented in this report, was to develop a new method for analyzing and understanding the support of rural innovation in government, and we used this approach to analyze a subset of federal policy documents, investigating a subset of recent federal policy documents for their support of rural innovation.[2]

This report is structured as follows. First, we will give an overview of our method and how it was developed. This will include our process of bill selection and establishment of our search criteria. Second, we will explain our Rural Innovation Typology, which was used to analyze our policy corpus. Third, we will provide details about our findings, focusing on the number of programs supporting rural innovation across our final corpus of eight federal bills and the focus of those programs. Finally, we will share the implications we believe this research has for rural innovation support at the federal level and outline next steps for this work.

[2] An important note regarding definitions: while innovation is defined broadly as the creation of new ideas or products, this project focuses primarily on digital innovation (i.e., that innovation associated with digital technology). This was done because of growing interest specifically in digital innovation and the broader regional economies that support it.

2 Developing Our Policy Analysis Search & Data Collection Approach

In the first few weeks of our project, we quickly realized that the policy analysis we were attempting to do was not your typical policy analysis. Scholars in critical policy analysis argue that normative policy analysis is done almost exclusively through evaluation and implementation studies (Taylor, 1997). The policy analysis textbooks and literature on "doing" policy analysis more broadly show how you can evaluate individual pieces of legislation and their outcomes. But there was little for us to draw from in setting up a study that would take an approach to understand how federal policy *more broadly supported complex ideas and topics, such as innovation*. Our project and our approach differed from typical policy analysis in that, 1) we weren't focusing on one specific policy, or a more confined group of policies, and 2) we were unlikely to be collecting typical implementation data that would allow us to extrapolate and measure effectiveness of specific policy interventions. Our first step, then, became the creation of our own policy analysis method that was built on the PI's previous experience conducting systematic literature reviews (e.g., Hardy et al., 2019). This included: conducting exploratory research on policies of interest, solidifying our policy corpus, utilizing the rural innovation literature to develop an analytical search strategy we would use on our corpus, and creating a data collection tool where we would store our data.

2.1 Policy exploration

We were initially inspired to conduct this research because of increased attention paid to rural needs and rural regions in recent legislation such as the Coronavirus Aid, Relief, and Economic Security (CARES) Act and the Infrastructure Investment & Jobs Act. We began our exploration with a purposive search strategy, selecting two recent federal policies, the CARES Act and the Agriculture Improvement Act of 2018 (hereby referred to as the 2018 Farm Bill), that we believed would include mentions of technological innovation and promote different forms of technology adoption (e.g., telehealth in the CARES Act, precision agriculture in the Farm Bill). During this purposive search, we documented what kinds of programs related to technology adoption and digital innovation were included, the language they used, and what other federal policies were mentioned in those sections. In doing so, we were able to identify other bills of interest that we could include in our initial search.

After combing through the full text of bills, utilizing the Congress.gov search engine, we settled on five bills that would constitute our initial policy corpus: the 2018 Farm Bill, the

Consolidated Farm and Rural Development Act (1961), the American Innovation and Competitiveness Act (2022), the Stevenson-Wydler Technology Innovation Act (1980), and the Infrastructure Investment and Jobs Act (2021). We conceptualized these bills as "rural bills that support innovation," "innovation bills that support the rural," and "infrastructure bills." For purposes of our analysis of each policy, we utilized full texts of the original bills provided by Congress.gov. However, in the cases of the Stevenson-Wydler Technology Innovation Act and the Consolidated Farm and Rural Development Act, we used the most recent amended versions of the bills as of July 2022, which we secured through GovInfo's Statute Compilations corpus. Hence, some of the bills we analyzed contain support for contemporary innovation programs despite being originally passed approximately 50 years ago.

As a brief aside, we'd like to acknowledge that we did this work largely manually, utilizing our best search strategies (the PI has an American Library Association accredited Master's degree and a background working in libraries and conducting systematic reviews) and PDFs of legislation that was digitized and processed using optical character recognition (OCR). Due to the manual nature of this work, we had to scope down our search to the bills that we believed to be most likely to focus on the intersection of rural and innovation topics. Future work could develop a computational tool to replicate the manual work described here.

2.2 Search criteria & data collection

Once we solidified our initial federal policy corpus, we developed the search criteria we would use for identifying programs and sections in each of the larger bills that support topics related to digital innovation in rural places. We drew from studies on rural innovation to develop our search keywords. In particular, we looked to scholarship that evaluated regional innovation systems (Cooke, 2001; Dabson, 2011; Saxenian, 1996), the economic development tactics used to promote entrepreneurship and innovation in rural regions (Cowie et al., 2020; Aspen Institute, 2019; Munnich Jr. and Schrock, 2016; Naldi et al., 2015; Stephens et al., 2013), and studies that sought to measure innovation activity in rural areas (Liu, 2022; Mann and Loveridge, 2020). In doing so, we settled on the following keywords:

Keyword	*Additional inclusion*	*Exclusion*

Tech*	Technology, technological, technical, etc.	Technical assistance, technical committee, technical corrections.
Innovat*	Innovation, innovative innovate, etc.	
Entrepreneur*	Entrepreneurship, entrepreneurial	
Incubat*	Incubator, incubation	
Broadband		
Cluster		
Digital		
Infrastructure		
Internet		
Invention		
Rural		
Spillover		
Venture		

Table 1: The keywords used in our policy search strategy.

With our solidified keyword list, we used the OCRed PDFs of the five policies above and conducted simple keyword searches going keyword by keyword. We kept track of our search in a spreadsheet. For each mention of a keyword, we documented the keyword, the section number in the bill, the section name, the page number in the corresponding PDF, the program name (if it was different than the section name), other bills mentioned in association with the program or section, and a brief summary of the program. In total, we collected 376 bill sections across the five bills. These 376 sections became the data corpus upon which we would evaluate actual support for rural innovation. In other words, these 376 sections of federal policy were merely sections that mentioned keywords we'd expect to be associated with rural innovation, not sections that actually demonstrate support for rural innovation through policy. In order to understand that, we developed an analytical typology for evaluating support across the different policies which we report on next.

3 A Rural Innovation Typology

3.1 Creating the rural innovation typology

Following the creation of our data corpus spanning 376 federal policy sections across five federal policies, our next step was to create what we referred to as an "analytical typology" that would help us determine whether a particular policy section or program was to be included or excluded as part of our final policy corpus. To develop our typology, we drew on Korsgaard and colleagues' (2015) distinction between what they call "rural entrepreneurship" and "entrepreneurship in the rural." Entrepreneurship in the rural encompasses entrepreneurial activities conducted in rural communities that do not contribute to the "overall well-being and development of the rural area…[having] only limited engagement with the locality as a meaningful location" (p. 11). Rural entrepreneurship, on the other hand, "engages with its location not primarily as a space for profit but with 'place' as a location of meaningfulness and social life" (p. 13). In other words, entrepreneurship in the rural does not engage directly with rural place, but just so happens to be done there, whereas rural entrepreneurship explicitly centers rural place. Using this distinction, we settled on a three-part typology that would capture three types of rural innovation:

1. Technological innovation that isn't explicitly rural, but is happening in a rural place.
    a. For example, the Advanced Energy Manufacturing and Recycling Grant Program was classified in this way. As part of the Infrastructure Investment and Jobs Act, this program funds advanced energy projects, prioritizing projects in locations where dislocated coal mining and manufacturing workers exist.
2. Technological innovation that deals with explicitly rural issues.
    a. For example, the Forestry Rural Revitalization Program was classified by this typology. As part of the Food, Agricultural, Conservation, and Trade Act, this program focuses on promoting entrepreneurship in rural areas related to new forest technology in biomass.
3. The resources and ecosystem that are necessary to support technological innovation in rural areas.
    a. For example, the Expansion of Middle Mile Infrastructure into Rural Areas was classified in this way. As part of the 2018 Farm Bill, this program focuses on developing broadband infrastructure in rural areas.

Using our three-part typology, we returned to our 376 policy sections and evaluated them based on their explicit support for rural innovation, classifying each of the included programs with at

least one of the three typology categories. Returning to some of the distinctions we made over the course of scoping our research, because we focus on digital innovation rather than innovation more broadly, some programs identified in our search supported research and development more broadly, but didn't specify digital topics specifically. Because of this, they didn't make the final cut for inclusion in our programs below. Further, some programs that supported innovation more broadly didn't include mention of how they were going to be geographically targeted. Because of that, we excluded those as well.

3.2 Expanding our search

Once we had a list of all the bill sections/programs that fit our analytical typology, we returned to the other bills mentioned in each of these sections. We expanded our search to include any other bills that were mentioned more than once, specifically focusing on rural bills. This decision was made because our initial search and inclusion/exclusion criteria resulted in programs that were almost completely from rural oriented bills (we will share this in more detail later). From our search expansion approach, we selected three additional bills and repeated our keyword search and analysis with each of them: the Farm Security and Rural Investment Act (2002); the Food, Agriculture, Conservation, and Trade Act (1990); and the Food and Agriculture Act (1977). In the following section, we report the results of our analysis across the corpus of eight bills.

4 Results

In total, we identified 37 programs across the eight federal bills. In this section, we share two tables: one table documenting the 37 programs and their distribution across the bills and one table documenting the broader topics/issues these programs address.

Program/section name[3]	**Typology**
2018 Farm Bill	
Next Generation Agriculture Technology Challenge	2

[3] Sections/programs are listed in the order that they appear in the associated bill rather than alphabetical order.

On Farm Conservation Innovation Trials	2
Access to Broadband Telecommunications Services in Rural Areas	3
Innovative Broadband Advancement Program	1, 3
Federal Broadband Communication Program Coordination	3
Rural Broadband Integration Working Group	3
Council on Rural Community Innovation and Economic Development	3
Rural Innovation Stronger Economy Grant Program	2, 3
New Era Rural Technology Program	2
Agriculture and Advanced Research and Development Authority Pilot (AGARDA)	2, 3
Urban, Indoor, and Other Emerging Agricultural Production Research, Education, and Extension Initiative	2, 3
Centers of Excellence at 1890 Institutions	2, 3
Specialty Crop Research Initiative	2
Extension Design and Demonstration Initiative	2, 3
Community Wood Energy and Wood Innovation Program	3
Office of Urban Agriculture and Innovative Production	3
Task Force for Reviewing the Connectivity and Technology Needs of Precision Agriculture in the United States.	3
Expansion of Middle Mile Infrastructure into Rural Areas	3
Smart Utility Authority for Broadband	3
Strategic Economic and Community Development	3
Infrastructure Investment and Jobs Act (2021)	
Advanced Energy Manufacturing and Recycling Grant Program	1, 3
Critical Minerals Mining and Recycling Research	1, 3
Clean Energy Demonstration Program on Current and Former Mineland	1, 3
Broadband Equity, Deployment, and Access Program	3
Enabling Middle Mile Broadband Infrastructure	3

High Speed Broadband Deployment Initiative	3
Distance Learning, Telemedicine, and Broadband Program	3
Consolidated Farm and Rural Development Act (1961)	
Community Facilities Grant Program For Rural Communities With Extreme Unemployment and Severe Economic Depression	3
Rural Business Development Grants	2, 3
Appropriate Technology Transfer for Rural Areas Program	2
Rural Innovation Stronger Economy Grant Program	2, 3
Farm Security and Rural Investment Act (2002)	
Animal Disease Prevention and Management	2, 3
Agriculture Innovation Center Demonstration Program	3
Community Wood Energy and Wood Innovation Program	3
Food and Agriculture Act (1977)	
Next Generation Agriculture Technology Challenge	2
New Era Rural Technology Program	2
Agriculture and Advanced Research and Development Authority Pilot	2, 3
Food, Agriculture, Conservation, and Trade Act (1990)	
Centers of Excellence at 1890 Institutions	2, 3
Forestry Rural Revitalization	2, 3
Stevenson-Wydler Technology Innovation Act (1980)	
Office of Innovation and Entrepreneurship	3
Regional Innovation Program	3
American Innovation and Competitiveness Act (2022)	
Computer Science Education Research	3

Table 2: The 37 programs identified as supporting rural innovation for the purposes of this study. Note that some programs appeared in multiple pieces of legislation.

The final thing we did was classify each of the programs by their focus or issue that they addressed. This classification schema was based on the summaries we created for each of the identified sections/programs. We document the program name and the bill it is associated with.

Program or section name	**Associated bill**
Broadband (n=13)	
Access to Broadband Telecommunication Services in Rural Areas	Farm Bill (2018)
Innovative Broadband Advancement Program	Farm Bill (2018)
Federal Broadband Communication Program Coordination	Farm Bill (2018)
Rural Broadband Integration Working Group	Farm Bill (2018)
Task Force for Reviewing the Connectivity and Technology Needs of Precision Agriculture in the United States	Farm Bill (2018)
Expansion of Middle Mile Infrastructure into Rural Areas	Farm Bill (2018)
Smart Utility Authority for Broadband	Farm Bill (2018)
Strategic Economic and Community Development	Farm Bill (2018)
Broadband Equity, Deployment and Access Program	Infrastructure Investment and Jobs Act (2021)
Enabling Middle Mile Broadband Infrastructure	Infrastructure Investment and Jobs Act (2021)
High Speed Broadband Deployment Initiative	Infrastructure Investment and Jobs Act (2021)
Distance Learning, Telemedicine, and Broadband program	Infrastructure Investment and Jobs Act (2021)
Community Facilities Grant Program For Rural Communities With Extreme Unemployment and Severe Economic Depression	Consolidated Farm and Rural Development Act (1961)

Agriculture (n=13)	
Next Generation Agriculture Technology Challenge	Farm Bill (2018), Food and Agriculture Act (1977)
On Farm Conservation Innovation Trials	Farm Bill (2018)
New Era Rural Technology	Farm Bill (2018), Food and Agriculture Act (1977)
Agriculture and Advanced Research and Development Authority Pilot	Farm Bill (2018)
Urban, Indoor, and Other Emerging Agricultural Production Research, Education, and Extension Initiative	Farm Bill (2018)
Centers of Excellence at 1890 Institutions	Farm Bill (2018), Food, Agriculture, Conservation, and Trade Act (1990)
Specialty Crop Research Initiative	Farm Bill (2018)
Extension Design and Demonstration Initiative	Farm Bill (2018)
Office of Urban Agriculture and Innovative Production	Farm Bill (2018)
Task Force for Reviewing the Connectivity and Technology Needs of Precision Agriculture in the United States	Farm Bill (2018)
Animal Disease Prevention and Management	Farm Security and Rural Investment Act (2002)
Agriculture Innovation Center Demonstration Program	Farm Security and Rural Investment Act (2002)
Appropriate Technology Transfer for Rural Areas Program	Consolidated Farm and Rural Development Act (1961)
Energy transitions (n=5)	
Advanced Energy Manufacturing and Recycling Grant Program	Infrastructure Investment and Jobs Act (2021)
Critical Minerals Mining and Recycling Research	Infrastructure Investment and Jobs Act (2021)

Clean Energy Demonstration Program on Current and Former Mineland	Infrastructure Investment and Jobs Act (2021)
Community Wood Energy and Wood Innovation Program	Farm Bill (2018), Farm Security and Rural Investment Act (2002)
Urban, Indoor, and Other Emerging Agricultural Production Research, Education, and Extension Initiative	Farm Bill (2018)
Education and workforce development (n=3)	
New Era Rural Technology Program	Farm Bill (2018), Food and Agriculture Act (1977)
Rural Business Development Grants	Consolidated Farm and Rural Development Act (1961)
Computer Science Education Research	American Innovation and Competitiveness Act (2022)
Entrepreneurship (n=3)	
Office of Innovation and Entrepreneurship	Stevenson-Wydler Technology Innovation Act (1980)
Regional Innovation Program	Stevenson-Wydler Technology Innovation Act (1980)
Forestry Rural Revitalization	Food, Agriculture, Conservation, and Trade Act (1990)
Forestry (n=2)	
Forestry Rural Revitalization	Food, Agriculture, Conservation, and Trade Act (1990)
Community Wood Energy and Wood Innovation Program	Farm Bill (2018), Farm Security and Rural Investment Act (2002)

Clustering and regional innovation (n=2)	
Regional Innovation Program	Stevenson-Wydler Technology Innovation Act (1980)
Rural Innovation Stronger Economy Grant Program	Farm Bill (2018), Consolidated Farm and Rural Development Act (1961)

Table 3: An overview of the different topics or issues addressed by the programs and their associated bills. Note that some programs appeared in multiple pieces of legislation and some programs fell under multiple categories (e.g., Forestry Rural Revitalization was qualified as both entrepreneurship and forestry).

5 Implications

What we demonstrate above is an approach to understanding federal policy support for rural innovation, particularly digital innovation. Through our CERI funded project, we:

- Developed a customized policy analysis search and data collection approach because existing policy analysis tools and methods were inappropriate for our desired outcomes.
- Developed an analytical typology, what we are calling the Rural Innovation Typology, for evaluating policy for its support for rural innovation.

In what follows, we provide a brief overview of what the implications are for our findings and corresponding analysis, highlighting opportunities for future work in this area.

5.1 Support for rural innovation

Using our Rural Innovation Typology we were able to evaluate federal policy and its resulting programs for their support of rural innovation. In doing so, we found that support for rural innovation is much more present in rural-oriented bills than it is in innovation-oriented bills. Of the 37 unique programs, 26 of them appear in the five rural-oriented bills, with 20 alone appearing in the Farm Bill of 2018. There were only three unique programs that appeared in our selected innovation bills, with an additional seven appearing in our one infrastructure-oriented bill. This demonstrates to us that there is significant opportunity for federal innovation programs to do additional geographic targeting in rural areas. However, the Infrastructure Investment and Jobs

Act may be a sign that broader federal policy is becoming more intentional about its geographic targeting. Though, the primary way that the Infrastructure Investment and Jobs Act supports rural innovation is through broadband infrastructure and clean energy programs. Going back to our typology, this is evidence of federal support for innovation that happens to be rural, as well as the infrastructure that supports rural innovation, but it does not bode well for support of rural specific innovation.

5.2 Agriculture and broadband dominate (and limit) federal support for rural innovation

As is evident in Table 3, agriculture and broadband dominate the attention of federal legislation supporting rural innovation, with each issue addressed by 13 out of 37 programs identified. Energy transitions comes in a distant third with five programs. While agriculture and broadband are definitively important for rural innovation, they are just surface level issues, with agriculture as an employment sector in decline in rural America, and broadband as a largely stand-in issue for digital equity more broadly. If we were to remove these inclusion criteria, we would eliminate two-thirds of the identified programs supporting rural innovation from our federal policy corpus. This is particularly problematic in that it represents a very narrow approach to the United States' support for rural innovation in the 21st century.

5.3 Future work

The research presented in this report is only a first step towards understanding federal and state policy support for rural innovation. In particular, one of the things we were not able to systematically address was how each of the programs identified in our analysis were appropriated or funded. Though, at a cursory glance, some of the most promising innovation programs, such as the Council on Rural Community Innovation and Economic Development, passed as part of the 2018 Farm Bill, have still not been appropriated at the federal level. Because this report cannot report on what's been appropriated or not, we also do not claim to measure the impact of each of these programs. Future work will continue evaluating this policy corpus to determine, 1) what has been appropriated to support these policies, and 2) what the outcomes of the appropriations were.

6 Conclusion

The outcomes of this study as presented are most prescient for how we understand what public legislative priorities look like for rural innovation at the federal level. Taken at their face-value, based solely on the spread and inclusion of topics and approaches above, it seems as if support for technological innovation was almost exclusively based on agriculture and broadband. This is at odds with the majority of the existing academic literature on rural innovation that advocates for a more place-based, endogenous approach to understanding innovation, technological needs, and regional advancement. Based on this preliminary work, we recommend a greater focus on federal policy that supports rural innovation from an endogenous and regional perspective; a focus that, in particular, highlights the existing regional capacity for innovation.

References

Aspen Institute. (2019). *Rural Development Hubs: Strengthening America's Rural Innovation Infrastructure*. https://assets.aspeninstitute.org/content/uploads/2019/11/CSG-Rural-Devel-Hubs.pdf

Cooke, P. (2001). Regional Innovation Systems, Clusters, and the Knowledge Economy. *Industrial and Corporate Change*, *10*(4), 945–974. https://doi.org/10.1093/icc/10.4.945

Cowie, P., Townsend, L., & Salemink, K. (2020). Smart rural futures: Will rural areas be left behind in the 4th industrial revolution? *Journal of Rural Studies*, *79*, 169–176. https://doi.org/10.1016/j.jrurstud.2020.08.042

Dabson, B. (2011). Rural Regional Innovation: A response to metropolitan-framed place-based thinking in the United States. *Australasian Journal of Regional Studies*, *17*(1), 7–21.

Gyourko, J., Mayer, C., & Sinai, T. (2013). Superstar Cities. *American Economic Journal: Economic Policy*, *5*(4), 167–199. https://doi.org/10.1257/pol.5.4.167

Hardy, J. (2019). How the Design of Social Technology Fails Rural America. *Companion Publication of the 2019 on Designing Interactive Systems Conference 2019 Companion*, 189–193. https://doi.org/10.1145/3301019.3323906

Hardy, J. (2022). The Rural Information Penalty. In M. Smits (Ed.), *Information for a Better World: Shaping the Global Future. IConference 2022* (pp. 33–41). Springer International Publishing. https://doi.org/10.1007/978-3-030-96957-8_4

Hardy, J., Phelan, C., Vigil-Hayes, M., Su, N. M., Wyche, S., & Sengers, P. (2019). Designing from the rural. *Interactions*, *26*(4), 37–41. https://doi.org/10.1145/3328487

Hardy, J., Wyche, S., & Veinot, T. (2019). Rural HCI Research: Definitions, Distinctions, Methods, and Opportunities. *Proceedings of the ACM on Human-Computer Interaction*, *3*(CSCW), 196:1-196:33. https://doi.org/10.1145/3359298

Johnson, T. G. (2007). Place-Based Economic Policy: Innovation or Fad? *Agricultural and Resource Economics Review*, *36*(1), 1–8.

Korsgaard, S., Müller, S., & Tanvig, H. W. (2015). Rural entrepreneurship or entrepreneurship in the rural – between place and space. *International Journal of Entrepreneurial Behavior & Research*, *21*(1), 5–26. https://doi.org/10.1108/IJEBR-11-2013-0205

Liu, S. (2022). The Urban–Rural Divide: The Effects of the Small Business Innovation Research Program in Small and Nonmetro Counties. *Economic Development Quarterly*, *36*(3), 208–227. https://doi.org/10.1177/08912424211029709

Mann, J., & Loveridge, S. (2020). Measuring urban and rural establishment innovation in the United States. *Economics of Innovation and New Technology*, *0*(0), 1–18. https://doi.org/10.1080/10438599.2020.1846248

Munnich Jr., L. W., & Schrock, G. (2016). Rural Knowledge Clusters: The Challenge of Rural Economic Prosperity. In N. Walzer (Ed.), *The American Midwest: Managing Change in Rural Transition* (pp. 159–176). Taylor & Francis Group.

Naldi, L., Nilsson, P., Westlund, H., & Wixe, S. (2015). What is smart rural development? *Journal of Rural Studies*, *40*, 90–101. https://doi.org/10.1016/j.jrurstud.2015.06.006

Saxenian, A. (1996). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Harvard University Press.

Stephens, H. M., Partridge, M. D., & Faggian, A. (2013). Innovation, Entrepreneurship and Economic Growth in Lagging Regions. *Journal of Regional Science*, *53*(5), 778–812. https://doi.org/10.1111/jors.12019

Taylor, S. (1997). Critical Policy Analysis: Exploring contexts, texts and consequences. *Discourse: Studies in the Cultural Politics of Education*, *18*(1), 23–35. https://doi.org/10.1080/0159630970180102