Center on Rural Innovation

THE FUTURE OF RURAL AMERICA

UNDERSTANDING THE PROMISE AND PROGRESS OF TECH-BASED ECONOMIC DEVELOPMENT IN SMALL TOWNS

CHANGING THE LANDSCAPE OF THE NATION'S TECH ECONOMY

SUMMARY

This document provides context around many of the key terms and theories that underpin the mission and work of the Center on Rural Innovation (CORI), backed by both our research and external literature.

PROBLEM STATEMENT

Due to the automation of jobs in traditional rural industries, rural America has fallen behind and is experiencing significant job and population loss. To solve this economic opportunity gap, rural communities need to adopt new models for economic development and create new pathways for rural people to gain the skills, resources, and support necessary to enter into high-paying tech jobs and scalable technology entrepreneurship. This is critical to the nation's future as we look to build a more inclusive and equitable tech economy that everyone, regardless of geography, can benefit from.

OVERVIEW OF KEY QUESTIONS

- **Defining our focus: What counts as rural America?**

  To determine which communities we engage and in our research, we primarily use the nonmetropolitan definition of rural along with the Rural Urban Commuting Areas to identify places that are "rural in character" but fall within metropolitan counties.

- **Understanding rural economies: What do rural economies look like today? How do they differ from more metropolitan economies?**

  The industries with the largest share of rural employment today include: government (16.5%), manufacturing (11.6%) and retail trade (11%). Metropolitan areas are stronger in sectors like finance and professional and technical services. Rural economies have seen significant job losses in the past 20 years in its three largest sectors; and unlike in metro areas, where similar job losses were mostly offset by gains in the professional services sectors, rural economies have largely not been able to replace their lost jobs with those from the professional services sectors.

- **Experiences of economic decline: Why is rural America's economy stuck?**

  The rural American economy has fallen behind because it has not been able to replace the automation-driven decline in tradable goods sectors — manufacturing, mining, agriculture — with growth in tradable services sectors — banking and financial services, consulting, and tech.

- **Sources of economic growth: Why is the tech economy important in efforts to reverse economic decline in rural places?**

  Tech-based economic development offers an approach for growing a tradable economy from within — in other words, a way to create new companies that export services and import wealth in rural places. Tech jobs are some of the highest-paying jobs, afford a high level of job security and career growth opportunities, and are conducive to non-traditional training pathways for rural Americans.

- **Inclusive economic development: Who benefits from the tech economy, and who is being left behind?**

  Nationally, the tech sector is disproportionately made up of workers who are white, male, and urban. For example, only 4% of tech jobs created were in rural places between 2014 and 2019; women account for only 25% of technical roles at large tech companies; Latinx workers make up less than 7% of tech occupations, while Black workers comprise only 3.7%. Inclusive tech economies should mirror the demographic makeup of their regions.

- **Setting the stage: What makes a tech economy possible in a rural place today?**

  There are four major ways in which technology has offered new pathways to build a tech economy from within: access to ideas, access to talent, access to capital, and access to customers.

A CLOSER LOOK

Defining our focus: What counts as rural America?

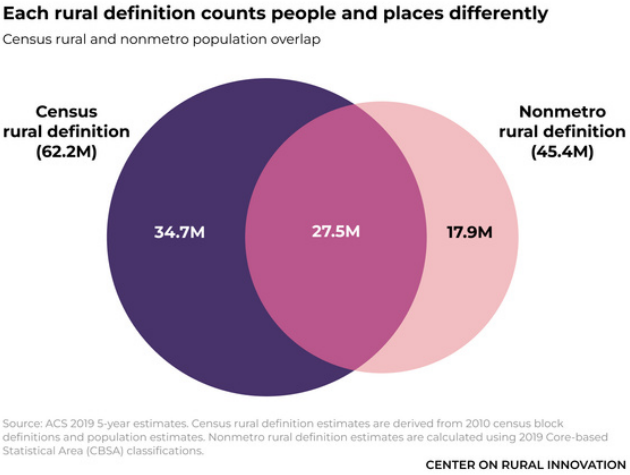
If you were to search the internet to find a count of the number of rural Americans, you're likely to find two very different answers. In some cases, you might find the rural population is reported as 62 million people, and in other cases, it is reported as 46 million people. In fact, there are over a dozen different federal definitions of "rural." Yet even the two most readily accessible — the U.S. Census rural definition and the nonmetropolitan rural definition — offer different conclusions about the population, demographics, and economic state of rural America. Furthermore, rural definitions often disagree with each other about what places should be considered rural. When combined, the places that see the most disagreement account for 37.5 million people. This can lead to confusion about who is actually eligible for different programs and resources.

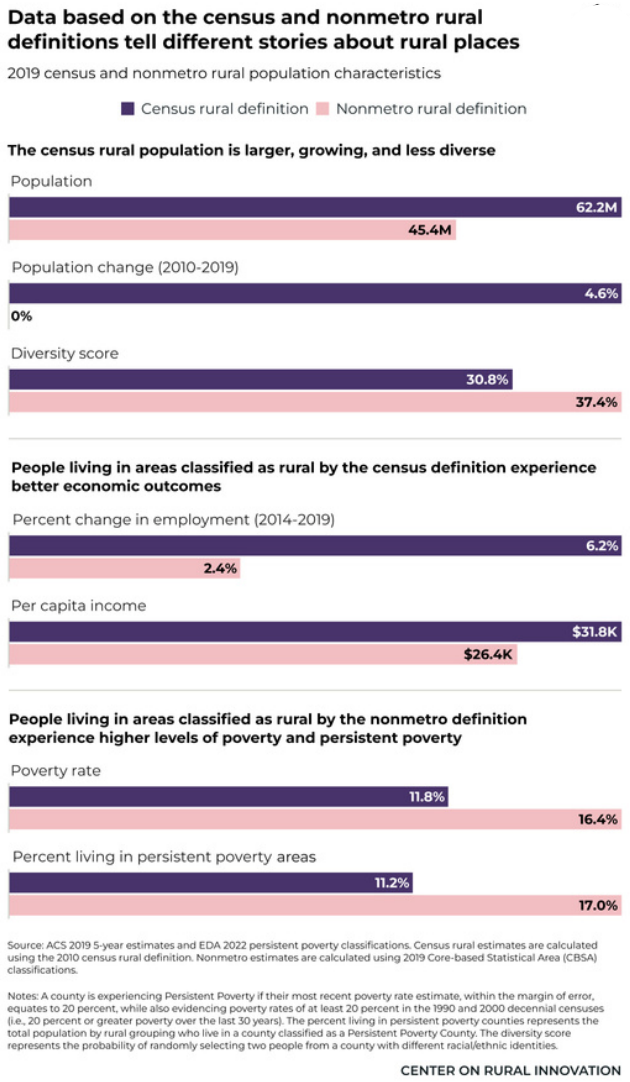
How do we tend to define rural?

Making decisions about how to define rural America comes up in our work in several ways, including setting eligibility for communities we engage, and how we define rural America in our research work. Our goal is to use a definition that captures places that are "rural in character." As we explain in Defining Rural America: The consequences of how we count, the nonmetro rural definition offers the best starting point for defining places that are "rural in character." The nonmetro definition includes the 543 Micropolitan counties that include small towns with populations of 5,000 to 50,000, and other rural counties without small towns.

Yet, one of the shortcomings of the nonmetro definition is that it excludes some areas that are "rural in character" that fall within metropolitan counties. This is particularly an issue in Western states like Arizona, California, and Nevada which have very large counties. There are many cases where small towns fall within a metropolitan county, but are more than 100 miles away from the large anchor city in the metropolitan area.To address this issue, we also include USDA's Rural Urban Commuting Area (RUCA) codes to include communities that are in metropolitan areas but are "rural in character" in our definition of rurality whenever possible.

[For more information, check out our new publication: Defining Rural America: The consequences of how we count]





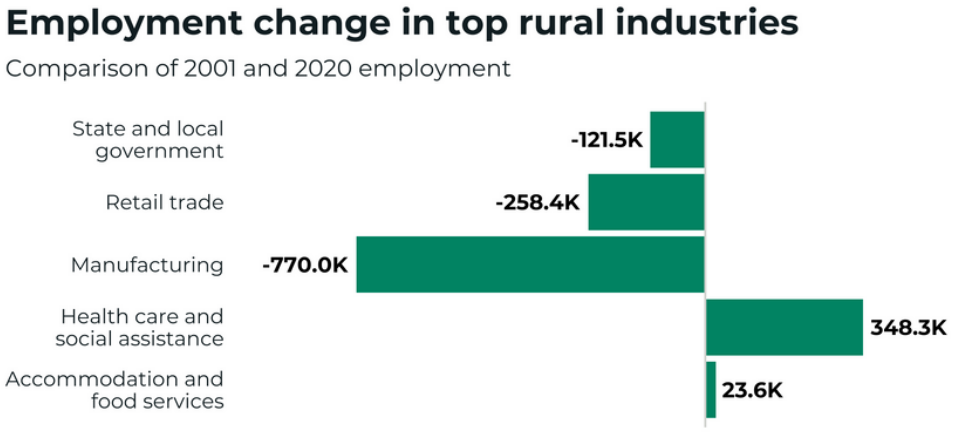
Understanding rural economies: What do rural economies look like today? And how do they differ from more metropolitan economies?

Anecdotally, when someone mentions the word "rural," there is one major traditional rural industry that comes to mind: agriculture. Historically, this is based in fact. Rural economies have been centered on resource-based activities and products, like agriculture, forestry, and mining. But when looking at the economic data, it becomes clear that these resource-based activities are not the lead economic driver producing the most income for the greatest number of people in rural communities today — and agriculture accounted for just 6% of total rural employment in 2020 (Bureau of Economic Analysis).

The current economic makeup of rural places looks quite different. The industries with the largest share of rural employment include (BEA):

- Government (16.5%)
- Manufacturing (11.6%)
- Retail trade (11%)
- Healthcare and social assistance (10.7%)
- Accommodation and food services (7.8%)

And as the chart below shows, three out of the five largest rural industries saw significant job loss between 2001 and 2020. In particular, manufacturing and state and local government experienced large declines in employment, representing the loss of nearly 900,000 jobs that were relatively high-paying and provided quality benefits. These losses have been somewhat offset by increased employment in healthcare, accommodation and food services, and temporary employment, all sectors in which the median worker earns less than the median rural worker.

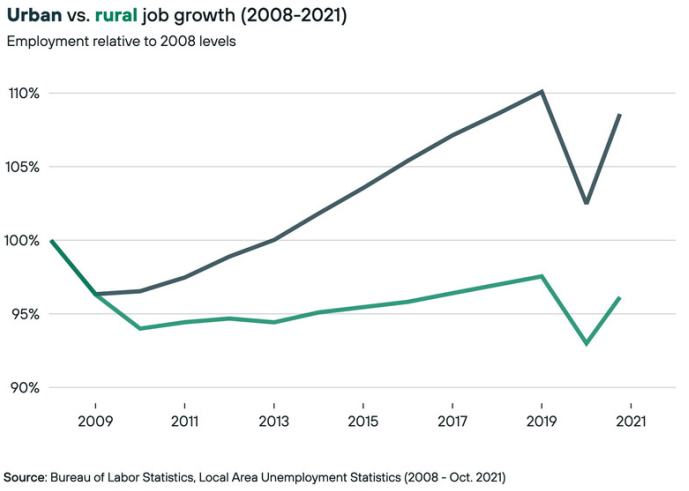


Source: Bureau of Economic Analysis. Rural includes all counties classified as nonmetropolitan by the Office of Management and Budget.

Automation has played a major role in driving these changes.

Much of the job loss in traditional rural industries stems from automation, as machines and processes come to replace the routine tasks that had been completed by workers. Automation changes the jobs people do, the skills workers need to be successful, the structure of work arrangements, and the way workers engage with technology. Generally speaking, rural workers are more likely to be impacted by automation because of the types of industries and jobs discussed above that tend to be dominant in rural places.

For example, there are six categories of jobs that are most likely to see tasks be automated — food preparation, production, farming, transportation, office and administrative support, and construction.



Source: Bureau of Labor Statistics, Local Area Unemployment Statistics (2008 - Oct. 2021)

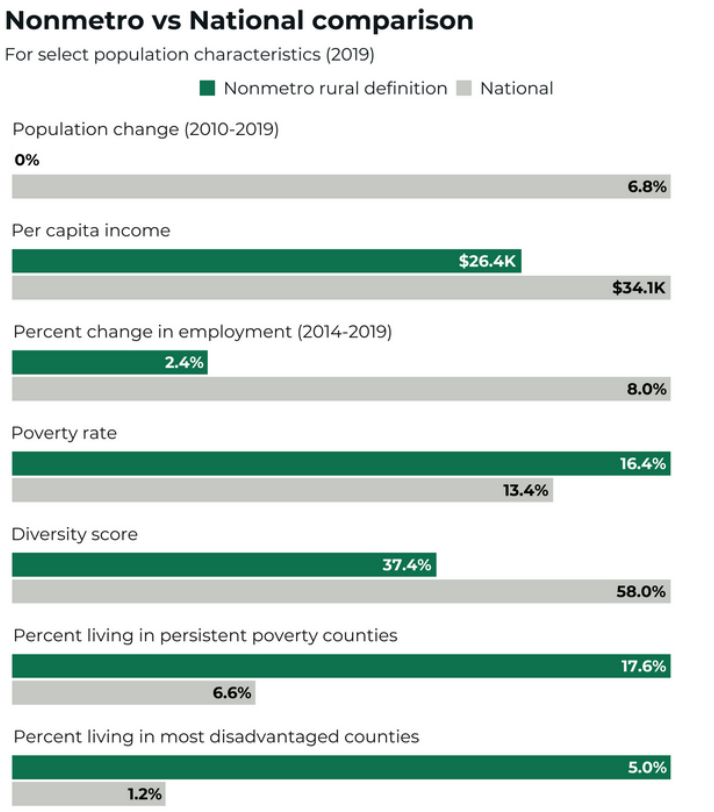
Occupations in these categories account for 43% of total employment in rural areas, as compared to just 34% in metropolitan areas. This helps to explain why of the 100 counties most likely to be impacted by automation, 83 are rural.

While metropolitan areas also experienced significant job losses in the manufacturing sector over the past 20 years, these losses were offset by a different set of jobs. Metro area employment in professional and business services sectors including finance, professional and technical services, and management of enterprises increased by 7 million jobs between 2001 and 2020, more than double the number of metro manufacturing jobs lost over the same period (BLS). Jobs in these sectors include high-tech jobs and management jobs, are very high paying, and have contributed to significant economic growth in metro areas. In rural America, employment in these same high paying and high-growth professional services sectors increased by just 295,000 jobs between 2001 and 2020, equal to fewer than half of the nearly 770,000 manufacturing jobs over that same period (BLS).

These dynamics contributed to a growing economic opportunity gap between rural America and the rest of the country. There are fewer jobs in rural America today than there were before the Great Recession, while employment in the rest of the country has more than recovered.

As a result, rural America lags behind the rest of the country across several key economic and social indicators (ACS). Rural America has:

- Seen more population loss over the past decade
- Lagged behind the rest of the country in employment growth
- Seen significantly lower per capita income
- Seen significantly higher poverty rates
- Had a larger percentage of the population living in persistent poverty and in disadvantaged counties



Source: ACS 5-year estimates (2019). Rural includes all counties classified as nonmetropolitan by the Office of Management and Budget.

Experiences of economic decline: Why is rural America's economy stuck?

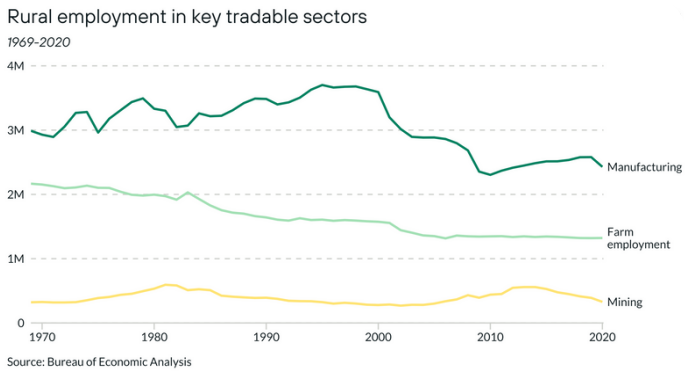
To understand why rural economies have gotten stuck and fallen behind the rest of the country, we need to establish a few key concepts related to economic development. When we think about a rural community, we can think of it being made up of two components.

First is the tradable economy. The tradable economy is made up of businesses that produce both goods and services that are sold to customers outside of the local economy. Traditionally, tradable goods have been produced by sectors like agriculture, mining, fishing, forestry, and manufacturing. These sectors have historically been critical to rural economic development. The tradable economy plays an integral role in that it exports goods and services, and imports wealth to the community. In recent decades, the growth of information technology has supported the growth of more tradable services, including banking, finance, consulting, tourism, and technology. The size of the overall tradable economy is determined by both demand from customers outside of the community and competition from other domestic and international businesses.

As demand for products and services produced by the tradable economy in a community grows, wealth, income, employment, and population are also likely to grow.

The second component is the population-serving economy. The population-serving economy serves the people and businesses that are located in a community, including sectors like retail, restaurants and food services, construction, real estate, healthcare, education, and government. When we refer to "Main Street" businesses we are referring to businesses in the population-serving economy. The population-serving economy circulates wealth and income in an area, but does not generate additional wealth or income for the community. The number of people employed in the population-serving economy in a community is going to be determined by the size of both the residential population and the business community in the area. Thus, growth in the population-serving economy is driven by growth in the tradable economy in an area.

Looking back over the past 50 years, rural America has experienced a decline in employment in its core tradable sectors. Since 1969, there has been a steady decline in farm employment, with nearly 40% fewer rural people employed in farming in 2021 than 1969 (BEA). Manufacturing has also fallen dramatically in rural America, particularly since 1999. There were 1.2 million fewer people working in manufacturing in rural America in 2020 than in 1999, representing a fall of more than 33%. Mining and natural resource extraction has a history of boom and bust in rural America. In 2020, part of a period of employment decline, there were 266,000 fewer rural Americans working in mining than in 1951, the 50 year peak (BEA).



The Rural American economy has gotten stuck and fallen behind because it has not been able to replace the decline in the tradable goods sectors — manufacturing, mining, agriculture – with growth in the tradable services sectors — banking and financial services, consulting, and tech. Since 2001, 98% of growth in tradable services sector jobs has been concentrated in metropolitan areas. Over that time, 7.3 million tradable service sector jobs were created in metro areas, compared to just under 295,000 in rural areas. Many of the new jobs created by the growth of the tradable service sector were tech jobs.

Between 2010 and 2020, employment in tech occupations grew by 1.6 million, yet, just 70,000 of those new tech jobs (less than 5%) went to people living in rural areas (BEA).

This has had devastating consequences for rural areas. As the tradable sector was shrinking in rural areas, wealth and employment also started to decline. Workers who lost their jobs were pushed to pursue jobs in the population-serving economy like retail, healthcare, and accommodation and food services. Yet, there wasn't enough of a tradable economy to support the people working in the population-serving economy, and as a result businesses closed, employment fell, and wages in these population-serving sectors declined. Rural people saw their economic opportunities become more limited, leading to worry about the future of rural communities and population decline.

Rural communities have tried to reverse these trends by seeking to attract employers in the tradable economy to locate in their community. Efforts to attract employers often involve building industrial parks, building roads and utilities, giving away free land, or paying companies financial incentives. Based on overall lagging rural employment growth, this strategy has not demonstrated itself to be successful. It is estimated that for every company looking to move or expand in a new location, there are 10 economic development organizations competing to attract them. When incentive programs are successful at attracting businesses, they have been shown to only return $0.22 in economic impact for each $1.00 spent on incentives (Bartik, 2018). These dynamics result in a "race to the bottom," in which rural areas waste time and and financial resources trying to attract companies that are unlikely to locate in their area, and in which the cost of attraction often means that the winners end up losing in the end.

Sources of economic growth: Why is the tech economy important in efforts to reverse economic decline in rural places?

An alternative approach — new model for economic development — is for rural communities to grow a tradable economy from within through innovation and entrepreneurship. Tech provides a possible new pathway for growing a tradable

economy. The tech economy encompasses industries that design, build, and maintain computer-based automation technologies that make processes and markets more efficient. The tech sector builds and supports the software and infrastructure that enables the broader economy including economic activity like e-commerce and the production and sale of digital products and services, such as graphic design and digital marketing.

Tech jobs are occupations directly involved in building and maintaining computer, automation, and information technologies. These jobs include software engineers, cybersecurity analysts, IT specialists, data scientists, and network engineers. These occupations are found both within tech companies — companies primarily focused on building and selling technology — as well as in non-tech companies like manufacturers, hospitals, and government. We have found that rural employers in these non-tech industries under-employ tech workers, leading to "missing" rural tech jobs (which refers to the gap between the expected and actual number of rural tech jobs).

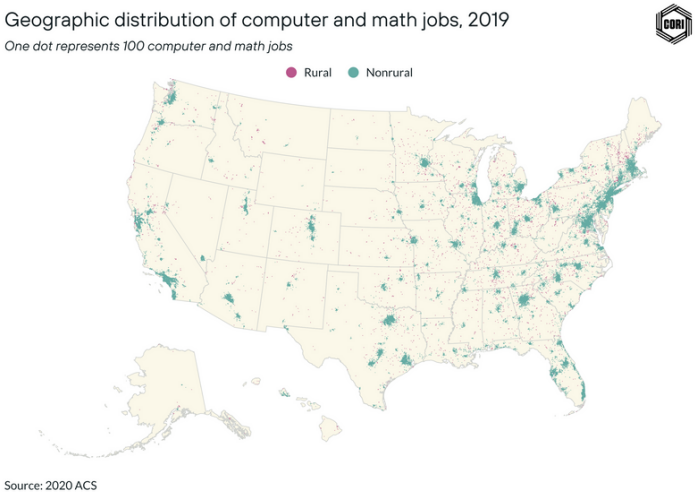
The growth in tech employment has a critical impact on economic development. Studies have found that each high-tech job leads to the creation of three to five additional jobs in the local economy. Tech jobs enable the growth of many different types of jobs within tech companies, like sales, operations, business development, creative, project management, and others. Together, these effects help to expand demand for the population-serving economy — including retail, restaurants, and healthcare — which leads to increased employment in those sectors as well. For our context, this means that as more scalable tech entrepreneurs create local startups that require the skills of tech workers, it can lead to many positive economic spillover effects in their rural communities.

In both rural and urban places, tech jobs are some of the highest paying in the area, and afford a high level of job security and career growth opportunities. For example, software developers in rural areas earn an average of $38 per hour — more than twice the median hourly wage of the average rural worker ($14.68/hr) (CORI analysis of Lightcast data). And between 2011 and 2019, employment in these types of jobs grew by 17% in rural America — the third-fastest-growing rural occupation category (ACS).

Inclusive economic development: Who benefits from the tech economy, and who is being left behind?

Equity for rural places is at the center of CORI's s work, and one of its core tenets is fostering inclusive economic development. In our work, we focus on both geographic equity and racial and gender equity.

Geographic equity



The vast majority of opportunities, and investment, in tech have been centered on urban areas. Between 2014 and 2019, metropolitan areas were home to 96% of new tech jobs — meaning that only 4% of all newly-created tech jobs were based in rural areas (ACS). Yet, as we found through surveys in our 2022 report on rural tech employment, nearly 60% of rural adults find tech work appealing. Slowly, there have started to be some shifts: Between 2017 and 2020, venture capital in rural areas grew from $3.2 billion to $42.5 billion — an increase from 0.5% to 2.5% of total venture capital across the U.S. This dynamic creates the potential for more startups outside of innovation centers — including in rural America — to access the venture capital they need to scale.

The intersection of race and gender in tech

Since its inception, the tech economy has not been equitable, with its benefits largely going to workers who are white, male, and reside in urban areas.

When we look at the racial breakdown of the tech sector on a national level, we see that:

- Despite comprising 18% of the U.S. workforce, Latinx workers comprise less than 7% of tech occupations.
- While Black workers comprise 13% of the national labor force, they make up only 3.7% of technical roles at the largest U.S.-based tech companies.
- In 2021, while $290 billion was invested into the national startup ecosystem, just 1% ($3.7 billion) was allocated to Black founders.
- In 2020, 69% of boot camp participants were white, as compared to 17% Asian, 6% black, and 2% indigenous.

When we look at the gender breakdown across the tech sector, we see that:

- Women account for only 26% of the roles in computer and math occupations.
- Within large technology companies, women account for 32.9% of the 2022 workforce, and account for only 25% of those in technical roles at these companies.

Now, when we look at the intersection of race and gender, we see that:

- Less than 2% of all tech workers in Silicon Valley are Black, Latinx, or Native American or Alaska Native women.
- Of all women employed in computer and math occupations, only 12% are Black or Latinx women;
- Women of color account for 80% of new female-led small businesses, but in tech, Black women account for less than 4% of female-led startups.

What does this dynamic look like in rural areas? In 2020, there were nearly 14 million rural people identifying as Black, Hispanic or Latino, Native, Asian, or multiracial, a population larger than New York City and Los Angeles combined (2020 census). Rural people of color are some of the most economically marginalized people in the country: 60 of the top 100 most economically disadvantaged counties in America are located in Tribal lands or Southern regions with large Black populations.

The inequities that have led to women and BIPOC people being excluded from tech economy broadly are even more severe in rural America:

- Just 1% of rural Black, Hispanic, and Native American workers are employed in tech occupations (ACS)
- Women comprise just 16% of rural tech workforce (ACS), even though our nationally representative survey of rural adults found that rural men and women are equally interested in pursuing tech careers.
- Women represent less than one-third of business owners in rural America.

In rural places — where local tech economies are often being built from the ground up — it is essential for rural development practitioners to foster an inclusive tech economy from the start to limit these systemic tech culture norms from taking root. We believe that inclusive tech economies should mirror the demographic makeup of their regions, across identities ranging from gender, to race, age, education, religious beliefs, socioeconomic status, and more.

Nationally, the tech sector is disproportionately made up of workers who are white, male, and urban. We believe inclusive tech economies should mirror the demographic makeup of their regions.

Setting the stage: What makes a tech economy possible in a rural place today?

Data shows that rural America has historically been left out of the tech economy. But what has changed to make rural tech economies possible today? There are several ways in which technology has changed the game, offering new pathways for rural communities to build a tradable economy from within by supporting tech startups:

1. Access to ideas

innovation is born out of new ideas, and new ideas are often generated by engaging with people with diverse backgrounds and experiences. Cities facilitate the sharing of ideas by bringing people together in workplaces, bars, cafes, and neighborhoods. The development of new ideas is also supported by the presence of colleges and universities, where faculty and students leverage the assets at these institutions to facilitate research, development, and the commercialization of emergent technology. The opportunity to engage with others attracts potential innovators to cities, further increasing the chance that new ideas will emerge. For example, as the number of inventors in an area increases, the number of patents produced per inventor also increases.

The internet has massively expanded access to information, ideas, and knowledge over broad geographical areas. For those connected to high-speed broadband, the internet is often used as the primary source for learning and ideas. As the internet has developed, the quality of knowledge has increased along with quantity. For example, the growth in online videos has made it easier to communicate knowledge that is difficult to put into words — also known as tacit knowledge. In the early phases of the internet, the only way that information could be shared was through text. Video has greatly expanded the knowledge and ideas that can be exchanged, allowing viewers to learn through observation. For example, a 2015 Google report showed that searches for how-to videos had increased more than 70% year over year, that more than 100 million hours of how-to videos were watched in the U.S. in 2015, and that 91% of smartphone users report using their phone to find ideas while completing a task. As the forms of information and ways to exchange ideas expand — from text, to video, to podcasts, to virtual reality — potential innovators no longer need to be in population centers to learn from others or exchange ideas. Social media platforms also help to share knowledge and ideas online. For example, there are rich and active communities on Twitter that generate a constant feed of information and ideas related to emerging technologies like artificial intelligence and blockchain.

2. Talent

When entrepreneurs seek to commercialize innovations, they typically require business and technical talent on their teams. Startups benefit from locating near large talent pools in cities where they can rapidly hire the talent they need. As startups in a region realize success and grow, they create lucrative employment opportunities, increasing the demand for talent and attracting new workers to the region. This grows the talent pool, making the location more attractive for startups, driving further innovation.

These dynamics have led to the concentration of people with technical, business, and finance skills in big cities with large innovation sectors. As a result, startups located in other areas have historically faced a disadvantage because they lacked access to talent. The rise of remote work has the potential of countering this urban advantage. The pandemic showed that many of the key occupations needed by startups — workers who build and maintain technologies, management professionals, finance professionals — can be done remotely. During the height of the pandemic, workers in these occupations worked remotely at a much higher rate than in other occupations. The rapid growth in remote work during the pandemic has led to a growth in new technologies and services to support remote work, making businesses and startups who leverage remote workers more productive. Remote work both enables people with the skills needed to support innovation to live in more diverse areas and allows startups to tap into national talent pools. Both effects expand the opportunity for startups to thrive outside of innovation centers.

3. Access to capital

Startups that are commercializing innovations need access to venture capital in order to rapidly scale the business to reach profitability. As centers of wealth and financial expertise, cities offer large capital pools that entrepreneurs can leverage. Given the high-risk nature of venture capital, investors often play an active role in supporting startups in their portfolio through board membership, management recruiting, management coaching, and making introductions and connections. These activities have historically been most effective when investors and their portfolio companies are in the same area. Thus, venture capitalists have historically opened offices in areas where there is a high degree of startup activity. This increases the pool of venture capital in the area, attracting startups seeking investment, which in turn attracts more venture capital.

While venture capital investors have historically been more likely to invest in startups in their geographic vicinity, the pandemic has shifted investing practices. A survey of 100 venture capital firms in May 2021 found that 97% reported completing a fully remote investment, compared to just 40% a year earlier. As venture capital investors

become more accustomed to completing deals and supporting founders in a remote environment, it opens the opportunity to source promising investments from a much broader geography.

4. Access to customers

Startups that are commercializing innovations need access to customers to grow. Cities facilitate access to customers as centers of commercial activity. Proximity to customers has historically offered an advantage to startups located in large cities, yet the internet is making it easier for businesses to reach customers at a distance. Professional networking platforms like LinkedIn have made it possible to find and network with potential customers — with 96% of B2B businesses reporting that they used LinkedIn as part of their marketing strategy in 2022 — while customer relationship systems like HubSpot or Salesforce allow businesses to track and engage potential customers through online channels with detailed analytics. Additionally, startups developing innovations for consumers can leverage social media marketing channels to find and engage potential customers. These technologies are enabling businesses to find and build a customer base from a distance.

Innovation is already happening in rural America.

Research shows that there is a significant amount of innovation happening across the country by household innovators — individuals developing new processes or products on their own time, as opposed to by firms and their paid employees. It is estimated that in 2017, 16 million U.S. household innovators invested more than $47 billion in household R&D activities, equivalent to 50% of what producers spent in the same year to develop new products for consumers. Yet much of this innovation is never commercialized because potential entrepreneurs — especially those in rural areas — lack access to the programming and resources to turn new ideas into startups. Just 9% of household innovations are secured by intellectual property protections, yet this does not mean the household innovations lack potential to become scalable startups. Case studies on the banking industry found that 44% of the most important innovations related to the digitization of retail banking and 50% of the most important innovations in mobile banking originated from household innovators. The innovations were often implemented by individuals that were "hacking" together solutions to meet their own needs.

Learn more

To learn more about the Center on Rural Innovation and the communities it partners with, visit our website: ruralinnovation.us