

Innovation Issues

A research brief series that examines innovation in rural businesses and communities



Research Brief No. 2020-2

published June 29, 2020

The Impact of External Knowledge Sourcing on Innovation Outcomes in Rural and Urban Businesses in the U.S.

A summary of "The impact of external knowledge sourcing on innovation outcomes in rural and urban businesses in the U.S.," by Kathryn R. Dotzel^a and Alessandra Faggian^b.

Published in *Growth and Change*, 2019; 50: 515– 547. <https://doi.org/10.1111/grow.12289>

What's the Issue?

Innovation is often thought of as consisting of a new product, or a technology or a process that results in a patent. In fact, innovation can represent or result in a wide range of other outcomes, such as a new production process or marketing strategy, or an enhancement to an existing product. In a competitive global marketplace, innovation is critical to the success of many businesses—big or small, urban or rural.¹

Rural businesses face challenges to their ability to innovate that are often greater than those faced by urban firms. Compared to their urban counterparts, they are more likely to be geographically isolated and embedded within smaller population centers, which limits their opportunities to develop social and professional networks, reduces the pool of local knowledge, and also translates into less demand for their products. Nonetheless, successful rural businesses also are integral

^a U.S. Food and Drug Administration. Any views, findings, or opinions expressed in this paper are solely those of our own and do not reflect any official position of the U.S. Food and Drug Administration or the U.S. Department of Health and Human Services.

^b Gran Sasso Science Institute, L'Aquila, Italy

¹ We use the terms business, firm, and establishment interchangeably.

Key Takeaways

- This study explored the relationship between innovation and knowledge management—the formation of structures that allow businesses to acquire and integrate new knowledge. The specific focus was on external knowledge sourcing—which outside sources firms target for information that supports the development of new and improved products and production processes.
- For both rural and urban businesses, sources of information characterized by strong ties and high degrees of trust ("primary" sources) had larger positive impacts on most considered innovation outcomes (compared to "secondary" sources).
- When primary knowledge sources were distinguished by industry orientation relative to the business, sources with knowledge bases outside of the business's industry ("extra-industry" primary sources) had stronger positive relationships with the majority of considered innovation outcomes for rural businesses. Urban businesses, however, seemed to derive relatively equal benefits to innovation from relationships with their extra-industry and "intra-industry" primary sources—those with knowledge bases within the same industry.

(Continued on next page.)

About the Rural Establishment Innovation Survey

In 2014, the USDA Economic Research Service (ERS) conducted a Rural Establishment Innovation Survey (REIS) – a comprehensive and nationally representative survey of more than 10,000 business establishments that employ five or more employees. Survey respondents reported on their business's innovation technologies and practices, along with other relevant establishment data such as human resource and finance information. Because the survey over-sampled from rural areas, it provides the researchers the ability to address questions about the ways in which business innovation is happening in rural areas, and its dependence and impact on rural communities and regional economies.

In 2016, through a cooperative agreement with the ERS, the Northeast Regional Center for Rural Development administered a competitive funding program that provided three research teams the opportunity to utilize REIS data to study pressing issues related to rural innovation and economic development. The funded research teams presented papers on their projects at the North American Regional Science Council in Vancouver, BC, in November 2017. This research brief, prepared by Kristen Devlin and Stephan J. Goetz, describes one of the funded research projects.

to economically vibrant and resilient communities. Knowing how to support innovation among rural businesses is one way to promote economically healthy rural economies.

However, most of what we know about how innovation occurs in the U.S. is based on research that examines only urban firms, and often only those within a single industry or a limited group of industries. Furthermore, much of this existing research relies on patent data as a proxy for innovation, ignoring a number of other innovation activities in which rural businesses may engage.

The research described in this brief addressed these limitations by utilizing a new data source: the Rural Establishment Innovation Survey (REIS). Released by the USDA Economic Research Service in 2015, the REIS is the first nationally representative survey of self-reported innovation among more than 10,000 non-farm rural businesses (see sidebar).

Research Objectives

To support current and future innovation, businesses must tap into their existing knowledge base and, to varying degrees, reach outside of their business to acquire new knowledge from sources including customers, suppliers, universities, competitors, and firms outside of their industry. This research specifically focused on how businesses' relationships with their external knowledge sources impact innovation incomes and whether the nature of these impacts differ between urban and rural businesses.

Research Methods

The researchers used the REIS as the primary data source for their statistical analyses. The REIS provides data on the business innovation practices and outcomes of 10,721 rural businesses from all 50 U.S. states and the District of Columbia. As part of the survey, businesses were asked to rate their sources of external information about new opportunities or new ways of doing things (e.g., suppliers, customers, media, etc.).

Table 1. Seven Types of Innovation; Source: Adapted from Dotzel and Faggian (2019)
 The researchers defined innovation as “a development that is new to the firm, but not necessarily new to the market or industry.” They included seven types of innovation, described below, in their analyses.

<i>A firm that engaged in:</i>	<i>Exhibited these behaviors:</i>
Patented innovation	participated in at least one patent application in the past three years
Protected innovation	registered an industrial design or trademark, used trade secret protections (e.g., non-disclosure agreements), or produced copyright-eligible materials in the past three years
Product innovation	sold goods or services with new features or service capabilities between 2012 and 2014
Process innovation	improved flexibility or capacity of a production or service provision or reduced labor costs or materials and energy required per unit output in the past three years
Marketing innovation	increased its market share, entered new markets, or began exporting goods or services in the past three years
Green innovation	produces products or provides services in any of five green sectors (renewable energy; energy efficiency; natural resource conservation; pollution prevention, reduction, or cleanup; clean transportation fuel production)
Failed innovation	had any abandoned or incomplete innovation between 2012 and 2014

The researchers used these data to identify the relationship between external knowledge sourcing and several types of innovation (see Table 1). They also examined the effects of community-level variables, including rural-urban status, employment by industry, population density, and workforce education, in addition to business-level variables, including extent of technology integration, design activities, start-up status, employee benefits, and presence of in-house R&D or design programs.

They also conducted several secondary analyses to study the effects of three additional factors on innovation:

- the extent to which businesses reached outside of their industry for primary sources of information
- the geographic location of businesses’ most valuable sources of information
- specific sources of information

Lastly, the researchers examined the possibility that the different types of innovation interacted with one another. This could mean that they reinforced one another in producing the different outcomes or were competitive.

Research Findings

The researchers found that for both rural and urban businesses, “primary” sources of information—those characterized by the strongest ties and highest degrees of trust—had measurably larger impacts on most considered innovation outcomes than “secondary” sources, which are marked by weaker relationships and lower degrees of trust. Specifically, primary sources of information were positively associated with the incidence of product, process, and green innovation among rural and urban businesses, and also reduced the odds of failed innovation in the rural case and marketing innovation in the urban case (see Table 1).

Of particular importance was whether a business’s external information sources seemingly possessed a knowledge base within the business’s industry (an “intra-industry” knowledge base) or outside of the business’s industry (an “extra-industry” knowledge base). While results when primary sources of information were divided by industry orientation failed to indicate that extra-industry sources play a dominant role in the innovation processes of urban

(Continued on next page.)

businesses, findings provided evidence of an outsized impact of these relationships within rural establishments and suggested that external knowledge sourcing from extra-industry organizations is most critical for promoting successful innovation in rural firms.

Results additionally indicated that knowledge sourcing from non-local organizations is more critical for supporting innovation in rural compared to urban markets.

Conclusion/Discussion

Previous research has shown that intra-industry relationships, in which both parties share a common knowledge base and similar approach to problem solving, may be inversely related to innovation success. Therefore, the results suggesting that extra-industry external knowledge sourcing is particularly important for supporting innovation in rural firms are not surprising. What is surprising, however, is that this dominance cannot be detected for urban firms.

The relative geographic isolation of many rural firms may contribute to a greater reliance on organizations outside of their industry. By definition, rural firms are less likely than urban firms to co-locate with suppliers and competitors. Additionally, in contrast to the highly concentrated demand that characterizes urban markets, rural businesses operate in fragmented markets characterized by diverse customer needs and modes of competition.

These results suggest that different external knowledge sourcing strategies should be pursued depending on a firm's urban or rural status and also provide support for government programs that allow rural firms to better recognize, assimilate, and apply new knowledge from organizations outside of their industry. These may include financial assistance programs that improve the absorptive capacities of rural businesses, including loans and grants that provide support for improved telecommunications infrastructure in rural regions. ❖