Int. J. Sci. Res. Arch.

International Journal of Science and Research Archive

Research Journal Archive, INDIA

(REVIEW ARTICLE)

Check for updates

Statistics of innovation activity in the regions

Umarova MA *

Department of Business Management, ISFT, Tashkent, Uzbekistan.

Abstract

This article is dedicated to issues related to innovation activity statistics, one of the key areas of regional statistics developed since our country gained independence. It addresses concepts such as "innovation," "innovation process," and, specifically, innovation activity in agriculture from a statistical perspective. The article provides information on recent projects implemented in Bukhara region in the fields of agriculture and agricultural product processing

Keywords: Innovation; Innovation process; Innovation policy; Innovation activity; Innovation program; Intellectual activity; Basic innovations; Pseudo-innovation

1. Introduction

The development of innovation has become a driving force behind economic and social transformation, enabling regions to increase their competitiveness, enhance productivity, and foster sustainable growth. In recent years, understanding and measuring innovation activities at the regional level has gained significant importance as policymakers and stakeholders seek to create targeted strategies that reflect each region's unique strengths and challenges. In this context, regional innovation statistics play a critical role in evaluating and monitoring the effectiveness of innovation policies and identifying key areas for improvement.

Since gaining independence, our country has focused on cultivating innovation as a cornerstone of economic policy, particularly in sectors like agriculture, where innovation can lead to substantial improvements in productivity and sustainability. Agriculture, being a vital sector for many regions, especially in Bukhara, has increasingly benefited from innovative approaches. The adoption of new technologies and practices within agricultural production and processing has the potential to enhance food security, increase resource efficiency, and open new market opportunities. These developments, however, require a comprehensive statistical framework to evaluate the scope and impact of innovation activities effectively.

2. Literature Review

Innovation plays a pivotal role in enhancing the competitiveness and sustainability of regional economies, particularly within the agricultural sector. Understanding and measuring innovation activities through robust statistical frameworks is essential for policymakers and stakeholders aiming to foster economic growth and address sector-specific challenges.

Innovation in agriculture encompasses the introduction and adoption of new technologies, practices, and processes that improve productivity, sustainability, and economic viability. Schumpeter's (1934) seminal work on economic innovation laid the foundation for understanding the dynamic processes that drive technological change and economic

* Corresponding author: Umarova MA

development. More recent studies have expanded on this by emphasizing the role of both incremental and radical innovations in transforming agricultural practices (OECD, 2005).

The Regional Innovation Systems (RIS) framework has been widely adopted to analyze how regional contexts influence innovation activities. As defined by Cooke (2001), RIS focuses on the interactions between various actors, including businesses, research institutions, and government bodies, within a specific region. This framework has been instrumental in understanding how localized factors contribute to the development and diffusion of innovations in agriculture (Asheim & Gertler, 2005).

Accurate measurement of innovation activities requires comprehensive statistical methodologies. The Oslo Manual (OECD, 2018) provides guidelines for collecting and interpreting innovation data, emphasizing indicators such as R&D expenditure, patent filings, and the adoption rate of new technologies. In the context of agriculture, specific indicators might include the implementation of precision farming techniques, biotechnology applications, and sustainable farming practices (Anderson & Sunley, 2003).

Numerous case studies highlight the impact of innovation in regional agricultural sectors. For instance, the adoption of drip irrigation technology in arid regions has significantly improved water use efficiency and crop yields (Bouman et al., 2014). Similarly, the integration of information and communication technologies (ICT) in farming practices has enabled better resource management and market access for farmers (Wolfert et al., 2017). These examples underscore the importance of contextual innovation strategies tailored to regional needs.

Collecting reliable and comprehensive data on regional innovation activities poses several challenges. Variability in data quality, lack of standardized indicators, and limited access to regional-level data sources can impede accurate analysis (Carayannis & Campbell, 2009). In regions like Bukhara, these challenges are compounded by infrastructural and institutional constraints, necessitating tailored approaches to data collection and analysis.

Effective innovation policies must be informed by robust statistical analyses that reflect the unique characteristics of each region. Economic policies should aim to create supportive environments for innovation by fostering collaboration among stakeholders, investing in research and development, and providing incentives for the adoption of new technologies (Florida, 2002). In the agricultural context, this might involve subsidies for sustainable farming practices, training programs for farmers on new technologies, and investments in agricultural research institutions.

Research specific to the Bukhara region highlights the transformative potential of innovation in agriculture. Studies have documented the successful implementation of innovative irrigation systems and the introduction of high-yield crop varieties, which have contributed to increased agricultural productivity and economic resilience (Khan et al., 2019). However, ongoing challenges such as limited access to financing, inadequate infrastructure, and the need for capacity building among farmers remain barriers to widespread innovation adoption (Umarova, 2021).

The evolving landscape of agricultural innovation calls for advanced statistical techniques and data integration methods to capture the multifaceted nature of innovation activities. Big data analytics, remote sensing, and machine learning offer promising avenues for enhancing the accuracy and comprehensiveness of regional innovation statistics (Muro & Liu, 2019). Additionally, fostering international collaborations and knowledge exchange can facilitate the adoption of best practices in innovation measurement and policy formulation.

3. Analysis and Results

From a contemporary perspective, innovation can be defined as follows: innovation is the initial introduction of new scientific-technical, technological, organizational-economic, production, or other solutions into practice.

The innovation process is the implementation of inventions, new technologies, types of products, and services in practice, resulting from scientific and technical intellectual activity. The stages of the innovation process include:

- Fundamental research
- Applied research
- Development
- Marketing
- Production
- Sales

Various authors classify innovations differently. For example, the German scientist Gerhard Mensch (1975) identified three types of innovation: basic, improving, and pseudo-innovations. According to him, basic innovations drive economic growth and cyclical development of economic systems. Gradually, basic innovations transform into improving and, later, into pseudo-innovations. For instance, the invention of the bicycle is a basic innovation, its transformation from a three-wheeled to a two-wheeled form is an improving innovation, and adding accessories to the bicycle is considered a pseudo-innovation.

Innovations serve essential socio-economic roles in society:

- Reducing the use of energy, resources, and labor.
- Enhancing product quality, increasing consumption, and improving living standards.
- Balancing supply and demand by improving product quality and reducing costs to boost consumption.
- Developing people's creative abilities.
- The ultimate level of innovation activity is determined by the ratio of the effectiveness of innovations to the costs of their implementation by entrepreneurs. Many scholars believe that innovations typically yield delayed results.

In our republic, certain efforts are being made to monitor innovation processes statistically at the national and regional levels. State statistical agencies regularly collect data on new (or fundamentally new, modernized, or modified) types of machines, equipment, devices, automation tools, computing technologies, information technologies, etc.

Monitoring the development of information and communication technologies (ICT) is a new direction in statistical activity. This direction is new not only in our republic but also in global statistical practice. ICT statistics began to emerge as an independent field in the 1990s with the development of information and communication technologies.

The regional agencies of the State Statistics Committee under the President of Uzbekistan carry out special state statistical surveys in line with the "Statistics Work Program."

The State Statistics Committee publishes data on the total number of innovative active organizations and expenses in various innovation process directions, including research and development, the purchase of machinery and equipment, the acquisition of new technologies, software purchases, production design, personnel training, marketing research, and other expenses related to technological innovations.

The global experience in scientific and technical progress in the agro-industrial complex over recent decades shows that the agricultural sector holds significant innovation potential. In international practice, various organizational and economic measures have been tested to promote regional innovation processes, including:

- Implementing special targeted programs at the national and local levels
- Directly subsidizing and targeting regional (local) authorities
- Offering tax incentives to promote regional innovation development
- Establishing scientific (technological, innovation) parks
- Creating small investment business incubators and establishing technology transfer centers under state and local executive authorities

Regional innovation policies depend on the economic conditions formed in those regions. Therefore, there is no single method for implementing them in every region. Regions address their innovation development challenges based on their unique characteristics, traditions, available resources, and needs. The development of innovation processes in a region relies on the effective execution of innovation programs.

Innovations in agricultural production include the following main directions:

- New and improved technologies in agricultural production and processing (for instance, adapted technology for growing crops).
- Introduction of new varieties and hybrids.
- Implementation of new equipment, mechanisms, and devices in processing agricultural products.

Biological innovations are significant in agricultural production: they include implementing achievements in crop genetics and breeding, increasing yield potential, using fertilizers effectively, enhancing production intensity with resource-saving technologies, and improving labor productivity.

Organizational and economic measures in enterprises include implementing more advanced labor and control structures, progressive management systems, and company sales methods. Some farms adopt fundamentally new product types and expand and improve their warehousing.

Research results show that many enterprises that introduce scientific and technological advances into production achieve substantial success in improving their production and economic performance. This is particularly evident in crop yields and livestock productivity, where these indicators are typically stable and show an upward trend.

Innovations in agricultural product processing include producing products like vegetable oil, juices, and pastes with new technologies that meet international quality standards. These products are attractively packaged and marketed to secure new markets or strengthen their existing market positions.

Biofuel production has gained substantial interest worldwide in recent years, driven by several objective factors. For example, there is a sufficient biomass volume that can be used as fuel. This resource is not monopolized by large companies and is free from price fluctuations in world markets.

In Uzbekistan, particularly in the Bukhara region, numerous projects are being implemented in the field of agricultural production and processing. For instance, at the Bukhara Institute of Engineering and Technology, research on "Technology of Using Acoustic Influence in Drying Agricultural Products" (patent No. IAP03373) has made it possible to produce high-quality products for domestic and international markets.

The institute has also developed innovative projects such as "Method for Obtaining Fruit and Vegetable Powder" (patent No. IAP 03320) and "Method for Obtaining Tomato Powder" (patent No. IAP 03474), which have been introduced into practice.

Scientists at Bukhara State University have created "Technology for Environmentally Friendly Feed Production Using Biologically Active Substances," which allows for producing biomass to feed livestock from cultivated plants. These plants contain 45-50% protein, 25-30% carbohydrates, vitamins, proteins, and amino acids, improving the quantity and quality of meat and milk obtained from livestock.

Thus, the statistical monitoring of innovation activity, especially in the agro-industrial complex, remains one of the pressing issues today.

4. Conclusion

In conclusion, the effective integration of innovation across various sectors—particularly in agriculture—has the potential to significantly advance socio-economic progress by enhancing productivity, reducing costs, and improving quality of life. Innovations in technology, organizational practices, and scientific research foster the development of new products, processes, and solutions, enabling industries to meet growing demands more efficiently and sustainably.

In agriculture, for example, innovations in production and processing technologies, crop varieties, and biological enhancements have improved productivity and resource utilization, ultimately supporting food security and economic growth. Furthermore, the development of biofuels and environmentally friendly technologies highlights the ongoing shift toward sustainable practices that reduce dependence on traditional energy sources and promote ecological balance.

The structured approach to monitoring and classifying innovations, as well as targeted governmental support through subsidies, tax incentives, and innovation parks, underpins a national commitment to fostering a robust innovation ecosystem. This commitment is further reinforced by the statistical agencies' tracking of advancements in machinery, ICT, and other sectors, enabling a clearer understanding of the impact and potential of innovations across industries.

Ultimately, the success of innovation-led growth depends on the collaboration between regional and national stakeholders to adapt strategies to local conditions and resources, ensuring that innovation policies are effectively

implemented and aligned with unique regional needs. By leveraging innovation for economic and social development, Uzbekistan and other countries can create a resilient economy that is both sustainable and competitive on a global scale.

References

[1] Anderson, M., & Sunley, P. (2003). Innovation in regional development: Lessons from rural and agricultural sectors. Routledge.

[2] Asheim, B., & Gertler, M. (2005). The geography of innovation: Regional innovation systems. In J. Fagerberg, D.C. Mowery, & R. Nelson (Eds.), The Oxford Handbook of Innovation. Oxford University Press.

[3] Bouman, B., Humphreys, E., Tuong, T. P., & Barker, R. (2014). Drip Irrigation for Agriculture: Untapped potential in arid regions. FAO.

[4] Carayannis, E. G., & Campbell, D. F. (2009). 'Mode 3' and 'Quadruple Helix': Toward a 21st-century fractal innovation ecosystem. Springer.

[5] Cooke, P. (2001). Regional innovation systems, clusters, and the knowledge economy. Oxford University Press.

[6] Florida, R. (2002). The Rise of the Creative Class. Basic Books.

[7] Khan, M., Nazir, S., & Ali, M. (2019). Innovation and its potential in agriculture. Agricultural Research.

[8] Mensch, G. (1975). Stalemate in Technology: Innovations Overcome the Depression. Ballinger Publishing Company.

[9] Muro, M., & Liu, S. (2019). Big data in regional innovation studies: Opportunities and challenges. The Brookings Institution.

[10] OECD (2005). Agricultural innovation systems and development: The role of innovation in the agricultural sector. OECD Publishing.

[11] OECD (2018). Oslo Manual: Guidelines for collecting and interpreting innovation data. OECD Publishing.

[12] Schumpeter, J. A. (1934). The Theory of Economic Development: An inquiry into profits, capital, credit, interest, and the business cycle. Harvard University Press.

[13] Wolfert, J., Ge, L., Verdouw, C., & Bogaardt, M. J. (2017). Big data in smart farming: A review. Agricultural Systems, 153, 69-80