AGRICULTURAL INNOVATION CLUSTERS IN CANADA

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The article analyses the current Canadian system of agricultural innovation clusters. It examines the regional and sectoral clusters. Special attention is paid to the new national project to create innovative superclusters in Canada.

Keywords: *Canada, agriculture, regional innovation clusters, sectoral innovation clusters, superclusters***.**

Innovation clusters play an important role in enhancing the competitiveness of the regional and national economies. That is why Canada pays great attention to the cluster approach in the organization of scientific research. In agri-food sector, one of the most well-known regional innovation clusters is agricultural biotechnology cluster in the Canadian province of Saskatchewan. At the initial stage of cluster development in the 1980s, research and development activities addressed the issues related to genetics and plant breeding (cereals, oilseeds, legumes, forage grasses), as well as animal health and nutrition. At present, research on the use of biotechnologies in bioenergy, environmental protection, improvement of public health has become widespread. The cluster became the basis for the development of the province's bioeconomy and the region's competitiveness. The core infrastructure of the cluster includes the University of Saskatchewan and the science park "Innovation Place" created by the provincial government in 1977 on leased University land, as well as located in the scientific park territory such structures as Agriculture and Agri-Food Canada Saskatoon Research Centre, Institute of Plant Biotechnology, National Research Council Plant Biotechnology Institute, Saskatchewan Research Council.

Currently, about 162 companies and organizations working in the field of R & D and technology commercialization are based in the science park, where eighteen buildings and the corresponding infrastructure are located on the area of more than 1 million sq. Additional research opportunities are available in laboratories of the Organization for Infectious Diseases and Vaccines (VIDO) and Canada's only synchrotron also located at University [1].

In the last decade, along with regional clusters, the concept of cluster organization based on the sectoral principle initiated by the federal government has been actively used. Ministry of Agriculture and Food of Canada with the participation of industry representatives (business, academia) The basis for the investment of Federal funds in research programs are the scientific sectoral strategies developed by the Ministry of Agriculture and Agri-Food of Canada with the participation of representatives of the industry (business, academia) has developed the science sectoral strategies. These strategies is basis for investing federal funds in research programs [2]. Formation of agricultural scientific clusters on a sectoral basis (Agri-Science Clusters) has been carried out recently within the framework of the innovation subprogram "AgriInnovation Program", which was one of the directions of the national program for development of agro-industrial complex "Growing Forward 2" operated from 2013 to 2018. When implementing the initiative to create sectoral clusters, federal government provides financial support to projects stimulating public-private partnership in innovative sphere of agriculture [3]. Representatives of the industry (mainly industry associations) are coordinators for R & D in clusters. Private sector finances from 25 to 50% of research costs within the clusters.

Currently, there are fourteen sectoral agricultural scientific clusters in the agro-industrial complex of Canada. These are clusters for research in the field of crop production (wheat, barley, canola and flax, pulses, horticulture), livestock (beef cattle, dairy, poultry, swine), as well as for research in ornamental horticulture and organic agriculture. Among the relatively new clusters there are Canadian Field Crop Genetics Improvement Cluster, BioProducts Agriculture Science Cluster, Agri-Food Innovation and Prosperity Cluster [4].

One of the examples of sectoral cluster organization is Pulse Science Cluster. Between 2013 and 2018, federal government invested about CAD 13.3 million and private sector about CAD 5.1 million in implementation of 30 scientific projects within this cluster. Research topics include development of new varieties, improvement of agronomic practices, increasing use of pulses and pulse ingredients in the food processing industry, study of impact pulse influence on human health. Eleven federal research laboratories of Agriculture and Agri-Food Canada, located in Alberta, Saskatchewan, Manitoba and Ontario, as well as the provincial research center in

Alberta and research laboratories from the universities of Saskatchewan, Manitoba and Ontario, are participating in the work [5]. Clusters component still remains in the new five-year national program "Canadian Agricultural Partnership" started in April 2018 [6].

An additional impetus for innovative development of agricultural sector will be implementation of the Innovation Superclusters Initiative. Funds for this initiative have been provided by federal Budget 2017. It is expected that within five years the federal government will allocate CAN 950 million to create specialized superclusters of new technologies with the greatest potential to energize the economy and contribute to the competitiveness of Canada [7]. The project aims to support joint research and development initiated by business; development of cooperation between business, science and public sector; strengthening the position of Canadian firms in new markets. State support for clusters is based on the principles of private co-financing at a rate of not less than 50 percent. The superclusters are supposed to be managed by a non-profit organization representing a consortium representing a consortium of large and small business companies, educational institutions and non-profit organizations. Of more than 50 applications for superclusters, involving over 1,000 firms and 350 other participants, five were selected as Canada's new superclusters [8]. Since agri-food sector was included in the list of key technological areas with high potential for the growth of the national economy, it is not surprising that the project to create "Protein Industries Supercluster" devoted to plant-based proteins and related products was one of the winners (Table). Consortium Protein Industries Canada was established to implement this project, It is an industry-led alliance of over 120 private-sector companies (such as Parmalat, Viterra, Parrish & Heimbecker, Maple Leaf Foods et al.),

Table. Canada's superclusters under the Innovatiou Superclusters Initiative

Supeclusters	Regions	Objectives
Ocean Supercluster	Atlantic Canada	using innovation to improve competitiveness in ocean-based industries, including fisheries, oil and gas and clean energy
AI-Powered Supply Chains Supercluster (SCALE.AI)	Based in Quebec and spanning the Quebec-Windsor corridor	building intelligent supply chains through artificial intelligence and robotics
Advanced Manufacturing Supercluster	Ontario	building up next-generation manufacturing capabilities, incorporating technologies like advanced robotics and 3D printing

Protein Industries Supercluster	Prairies	making Canada a leading source of plant proteins
Digital Technology Supercluster	British Columbia	using big data and digital technologies to unlock new potential in important sectors like health care, forestry, and manufacturing

Source: Innovation, Science and Economic Development Canada

academic institutions, and other stakeholders across Western Canada aimed at fully developing the potential of plant-based proteins from crops such as canola pulses, grains, hemp, and flax. Activities within supercluster will focus on improvements and opportunities in four areas: crop breeding, sustainable crop production, value-added processing innovation, and export development [9].

Partnership within clusters has a positive effect. Clusters are production-oriented and reflect the most priority demands of the sector. They provide programming and effective public funding of scientific research to improve the competitiveness of the sector and to encourage the use of expertise of public research institutions and researchers.

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