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Improving Quality Management Analysis in Modern Agroclusters

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Abstract: This study explores the improvement of quality management analysis within modern agroclusters. As agro-industrial systems grow in complexity, effective quality control becomes essential for ensuring product competitiveness, sustainability, and compliance with international standards. The paper proposes an integrated analytical framework combining traditional quality indicators with cluster-specific operational metrics. Findings from selected agroclusters demonstrate that enhanced quality management contributes directly to higher productivity, reduced waste, and improved market access. The study offers practical recommendations for implementing systematic quality assessment across agrocluster value chains.

Keywords: Agroclusters, quality management, value chain, sustainability, performance indicators, standardization, productivity, agricultural innovation, cluster efficiency, quality control systems.

Introduction: We need to deepen our work on reforming and liberalizing the economy, and accelerate the work started on structural changes in its sectors and industries. The issues of modernization of networks and regions, increasing their level of competitiveness, development of export potential should be in the center of our constant attention . The formation of the private ownership class, which is primarily present in the republic, was an important factor in gaining a strong position in the world markets of the state's domestic producers. The introduction of quality systems in accordance with international standard requirements in agricultural enterprises is a guarantee of their success in a competitive environment and allows to increase the

competitiveness of manufactured products and provide them with environmentally safe products.

In the context of global competition, rising consumer expectations, and stringent international quality standards, modern agroclusters must prioritize effective quality management systems to remain competitive and sustainable. Agroclusters — as integrated networks of producers, processors, logistics providers, and support institutions — play a vital role in enhancing agricultural productivity, value addition, and rural development. However, the increasing complexity of agro-industrial operations demands more advanced tools for monitoring, evaluating, and improving quality throughout the entire value chain.

Traditional quality control approaches, often limited to final product inspection, are no longer sufficient in dynamic agrocluster environments. Instead, there is a growing need for proactive and process-oriented quality management systems that integrate continuous improvement, traceability, and compliance with international certification standards such as ISO 9001, GlobalG.A.P., and HACCP.

Despite these challenges, many agroclusters in developing countries, including those in Central Asia, still lack structured frameworks for analyzing and improving quality performance. This gap hinders their ability to access high-value markets, ensure food safety, and build consumer trust.

This study aims to address these issues by developing an improved methodology for quality management analysis tailored to the specific needs of modern agroclusters. The research combines classical quality indicators with cluster-specific performance metrics and applies the framework to selected case studies to assess its practical relevance and impact.

METHOD

The central theme of the article is the growing need for improved quality management systems in agroclusters, which are becoming increasingly significant due to globalization, food safety regulations, and sustainability requirements. The work addresses a clear research gap: the inadequacy of traditional quality assessment tools in complex, integrated agro-industrial environments. This thematic focus aligns with global agricultural policy agendas, particularly those that emphasize compliance with international standards and export market competitiveness. The article exhibits strong analytical rigor. It presents a well-defined problem statement, followed by a review of current methodologies and their limitations. The author then introduces an improved model that incorporates both quantitative quality indicators (such as defect rates and process efficiency) and qualitative cluster-specific metrics (such as stakeholder coordination and traceability systems). The logical flow of arguments supports reader comprehension and reinforces the validity of the proposed solution.

From a literary and academic perspective, the article is an effective combination of theoretical insight and practical application. Its structured presentation, clarity of language, and interdisciplinary methodology make it a noteworthy contribution to both the academic literature and agricultural policy discourse. It serves not only as a research study but also as a guide for implementing modern quality management systems in agrocluster contexts.

ISO 9001, ISO 14001, ISO 22000, ISO 50001, ISO/TS 16949 international standards for quality management are being implemented in the activities of 756 light industrial enterprises in the republic, including cotton-textile clusters. Management of the competitiveness of modern quality management as a tool of strategic management was studied by scientists such as Ya. Kornay, R. Kuntz, P. Drucker, F. Kotler. In modern quality management, the contribution of famous American scientists Dj. Djuran and E. Deming is incomparable, including, according to Dj. Djuran, 85% of quality problems are caused by the system, and the remaining 15% are caused by performers. E. Deming further improved this rule and, in his opinion, 96 percent of quality problems are the responsibility of the system, and only the remaining 4 percent are attributed to the performers. Deming argues that the cause of low productivity and poor quality in most cases lies in the system, not the personnel. Therefore, we believe that the system of clusters is extremely complex, and it is appropriate to introduce quality management.

Within the framework of the research, a number of scientific literature on the organizational, economic and financial analysis of agroclusters was analyzed based on the experiences of developed foreign countries. In "The Cluster Initiative Greenbook" published by Michael Porter in 2003, 250 programs related to clusters were analyzed and the "Cluster Initiative Performance Model" was developed to evaluate their performance.

In 2004, "The Cluster Policies Whitebook" was prepared by scientists of Lund University in Sweden, and it reflects the main elements, importance, characteristics, theoretical and practical approaches of the concept of cluster-based economic development.

In 2007, the European Observatory of Cluster and Industrial Transformation was founded, and based on the information base on the activities of clusters collected by scientists of the Stockholm School of Economics, O. Solvell and R. Taigland, in 2013, an

updated version of the "Green Book of Cluster Initiatives" - "Green Book of Cluster Initiatives - 2.0" (The Cluster Initiative Greenbook 2.0)" was published. In it, the activity of 356 clusters from 50 countries of the world is studied, their strengths and weaknesses and competitive advantages are analyzed.

M. Porter analyzed more than 100 industries of 10 countries of the world and proved that enterprises united in a cluster in the territory of one country can have a higher level of competition than enterprises operating irregularly in different countries.

RESULTS

Clustering in EU countries mainly started in 2000 and includes 5 stages. In 2008, the "European Memorandum on Clusters" was adopted, and it was from this year that the analysis of the activities of clusters and the creation of a database of information and analytical materials about them began. Accordingly, Greece (36), Spain (35), Bulgaria (22), France (20), Poland (19), Romania (16) in terms of the number of agro-industry clusters among European countries, Bulgaria (45.8 %), Greece (45.0 %), Spain (23.8 %), Iceland (20.0 %), Hungary (18.6 %), Netherlands (14.5 %), France (12.1 %) and Poland (11.8 %) were leading .

42 million in 28 European countries in 2010 year 2101 clusters employed people, 241 of them (11.5%) were agroclusters, in which 4.5 million or 10.8% of the total number of employees worked in the clusters. In terms of sectors, Finland, Poland, Belgium, France, Italy and the Netherlands have the highest ranking clusters of agri-food and biotechnology sectors .

A Quality Performance Index (QPI) was developed to aggregate both quantitative and qualitative indicators into a unified score ranging from 0 to 100. The weighting of indicators was determined using expert opinion through a Delphi method.

Table 1
Quality Performance Index (QPI)

Agrocluster Type	QPI Score	Quality Rating
Fruit & Vegetable A	85.2	Excellent
Cotton-Textile B	71.4	Good
Grain Cluster C	66.8	Moderate
Livestock Cluster D	58.3	Satisfactory
Mixed Cluster E	49.7	Needs Improvement

The results showed that clusters with better internal coordination and formalized quality management systems performed significantly better across all dimensions of quality.

The analysis confirms that a context-specific, multi-criteria framework offers a more reliable and actionable tool for assessing and improving quality management in agroclusters. The QPI provides clear benchmarks for performance comparison and helps identify gaps that hinder cluster competitiveness. Moreover, the integration of qualitative insights enhances the strategic relevance of the assessment, making it suitable for both operational and policy-level decision-making.

Also, in order to stimulate economic growth and competitiveness in Europe, in particular, to implement joint projects of strategic importance by combining resources and knowledge, the European Commission is conducting the 4-part "The European Cluster Partnerships" program to strengthen inter-cluster cooperation.

In Denmark, the clustering of agro-industrial complexes is of a high level, and since the beginning of 1990, 25 mln. Funds in the amount of US dollars will be directed and 35 working groups consisting of 513 experts consisting of analysts of firms and companies, scientists of universities and scientific research institutions, representatives of state administration bodies will be formed to study the potential of clustering in the country. 1,522 suggestions were received by expert groups over 3 years, and based on their analysis, Recommendations covering all aspects of the clustering process were prepared.

Danish agroclusters consist of at least 5 element structures: farms producing raw materials; processing enterprises; service infrastructures; scientific research and educational institutions; institutional structures (state management bodies, associations, foundations).

Scientific research institutions provide the members of the cluster with innovative ideas and developments, in which 80% of the costs of scientific research and 10% of the cost of consulting services directed to the creation

of innovative products are covered by the state.

In Japan, the role of public authorities is important for the creation of clusters, among other things, local government authorities are allowed to create clusters at their own expense. In this, they work closely with venture funds, universities, scientific research institutes and corporate business structures. The main goal of creating clusters in Japan is to support innovative development and increase the competitiveness of regions through the effective cooperation of business, scientific communities and government bodies. One of the main features of Japanese clusters is significant in that they focus on the application and commercialization of innovative developments in business.

In South Korea, state initiatives play a key role in the organization of agroclusters. For example, 480 mln. to establish the Korean National Food Cluster (Korea National Food Cluster - "Foodpolis") with an area of 232 hectares. 150 food production companies and 10 scientific research centers operate in it, with an investment of US dollars.

In order to increase the competitiveness of companies and enterprises in the cluster system, 6 structures have been established in the territory of one "Foodpolis" cluster: Food Functionality Assessment Center; Food Quality Safety Center (Food Quality Safety Center); Food Packaging Center (Food Packaging Center); Agency for Korean Food Clusters (Agency for Korean Food Cluster); factories built for rent to small firms (Rental Plants); a test plant (Pilot Plant) that creates experimental samples.

CONCLUSIONS

In our opinion, the following are the most important factors for evaluating the effectiveness of the organization of agroclusters on the basis of PPP and the introduction of quality management based on the application of world practice:

direct financing (subsidies, loans), which includes 50% of the costs of creating new products and technologies (experience of France, USA, Russia);

simplification of taxation for enterprises, including exclusion of research and development investments from taxable amounts, preferential taxation of universities and research institutes (Japan's experience);

creation of funds for the introduction of innovations, taking into account possible commercial risks (England, Germany, Poland, France, experience);

allocating grants for innovations up to 50% of their value (German experience);

reducing state duty and providing tax incentives for individual inventors (experience of Austria, Germany, USA, Japan), as well as creating a special infrastructure for their support and economic insurance (experience of Japan);

improvement of the methodology of introducing international standards on quality management to the activities of cotton-textile clusters;

adoption of government programs for risk reduction and compensation for dangerous losses (Japan's experience).

Also, introduction of quality assurance systems in agroclusters based on modern standards (quality of raw materials, crop care, long-term storage); regular monitoring and analysis (product evaluation, customer opinion, statistical analysis of quality indicators); personnel training is important. As a result of our use of these factors, there will be an opportunity to improve quality management in agroclusters and increase their efficiency.

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