## ANALYSIS OF THE AGRICULTURAL SECTOR IN THE NORTH-WEST REGION OF ROMANIA FROM THE POINT OF VIEW OF CLUSTER EXCELLENCE

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### Abstract

The cluster of excellence in the agri-food sector could function as a significant driver for promoting innovation and advanced technologies throughout all aspects of the supply chain. This collaboration can facilitate the exchange of knowledge and experiences, promoting innovation and the development of efficient solutions. Innovative clusters have an impact on regional growth because they enable new technology applications, cost savings, and research. Romania's North West area is well-known for having the highest number of gold-certified clusters in a variety of disciplines, including the lone gold-certified cluster in the agro-industrial sector. For the gold clusters in the North West region, the study finds less meaningful indicators for the agro-industrial sector using the ESCA standard technique for management excellence indicator evaluation.

Key words: agro-industrial clusters, ESCA excellence indicators, management performance

## INTRODUCTION

As instruments for promoting economic transformation and enhancing productivity and business competitiveness, clusters are firmly on the political agenda of the European Union [19]. A cluster's success is assessed based on three factors: objective attainment, cluster size, and innovation and global competitiveness [18]. The cluster idea has been warmly welcomed by the European Commission, particularly in relation to the creation of the Lisbon agenda and the execution of regional policy [21]. Innovation clusters facilitate the use of contemporary technology, cost reduction, and innovation implementation, all of which have an impact on regional growth [10, 11]. The agroindustrial logistic cluster is traditionally seen as a means to enhance the competitiveness of a region [5]. Clusters have become a crucial element in promoting the development of value chains in the agricultural and agri-food industry in Romania [16].

Choosing a competitive economic model to maximize available potential is challenging,

especially given the need to improve the economic efficiency of regional agroindustrial complexes. The principles of which clusters. have proven effective globally, may offer the best solution to this issue. The placement of agro-industrial clusters is determined by factors such as a high degree of strategic planning and above-average performance management, indicators, participation in technical. innovative, international, logistical, and workforce activities, and a large number of Establishing employees. a management structure and identifying critical elements from the agro-industrial cluster's internal and external environments are crucial steps in implementing cluster policy.

Based on existing scientific literature and the exploration of successful case studies in the global sector [6], the identified factors influencing territorial agro-industrial development are: short supply chains, protection of agri-food products with territorial identity, family farming, local food systems, and agribusiness [9].

The agro-food industry's clusters of excellence offer favorable conditions for cooperation between farmers, processors, distributors, universities, research centers, and other players [3, 8]. Agro-food industry participants may get access to new markets and economic prospects [7], both domestically and globally [15], through the excellence cluster [20].

Despite their lack of a formal status and differences in population and size, Romania's eight development areas are united by one thing: agriculture, which is one of the primary industries contributing to the country's overall output [4]. 12 clusters are registers in Romania, in the agro-industrial sector as follows: AgroTransilvania Cluster in the North-West region, Cluster AGRO-FOOD in the Central region, Bio Oltenia Cluster in the South-West region, IND AGRO VEST Cluster in the West region, Inomar Cluster, Bio Danubius Cluster, Innovative Agro-Industrial Cluster "Dunarea de Jos" in the South-East region, Bio Concept Valea Prahovei Cluster in the South Muntenia region, IND-AGRO Competitiveness Pole in the Bucharest Ilfov region, BioNest, bioRone Cluster, and the Innovative Regional Bioeconomy Cluster Suceava-Botosani in the North-East region (Fig. 1). Romania has to create clusters in every region to boost competitiveness and create a single value chain for exports in order to promote the expansion of the agri-food industry [17].

The Romanian clusters operating in the agrifood sector have merged to form a cooperative structure within the National Network of Clusters in the Agri-Food Sector. This structure aims to facilitate discussions on shared topics of interest and find workable solutions to the problems faced by the agrifood industry. AgroTransilvania Cluster is the only agro-industrial cluster in Romania to receive gold accreditation for management excellence.

The cluster that performs best among all clusters in a nation is designated as an "excellent cluster."



Fig. 1. Romania's agro-industrial clusters' current state Source: Own determination.

The objective is to create independent, voluntary evidence of cluster management excellence that is accepted across Europe and beyond, according to ECEI [14].

By benchmarking against the best and learning from their techniques, cluster managers may improve their performance by participating in "mutual evaluation" and "mutual learning" at the same time [12].

Innovation clusters facilitate the use of state of the art technology, increase the efficiency of production and innovation implementation, all of which have an impact on regional growth [10].

This research aims to analyse and classify the ESCA indicators based on their relevance to the specific needs identified in the Northwest Region of Romania as being relevant for the agro-industrial sector. Additionally, it seeks to adapt these indicators to be more suitable for the agro-food sector, utilizing feedback from cluster managers and sector analysis

## MATERIALS AND METHODS

Referencing the ESCA standard approach on the indicators for measuring management excellence [13], the primary goal of the research is to determine the least relevant indicators for the agro-industrial sector for gold clusters in the North West area. Gold audit report for AgroTransilvania Cluster, Romanian clusters, analysis of EU cluster policies, and a study of methods supporting cluster development were among the resources utilized in the research. Utilizing data from relevant sources including, at European level: the European Secretariat for Cluster Analysis (ESCA) and, respectively, the European Cluster Collaboration Platform (ECCP), and, in Romania, the North West Region's Smart Specialization Strategy in 2021–2027 were used as research techniques.

A high-quality pre-audit was conducted for AgroTransilvania Cluster through the use of the ESCA methodology [13].

In the view of the authors, the set of the indicators can be been updated to be more relevant for the specificity of the agriindustrial sector, especially for Romanian realities.

The subsequent proposed methodological actions were:

1. The ESCA evaluation methodology has been revised. The exact indicators utilized for performance evaluation were identified by analyzing and selecting the original ESCA methodology.

2. Modification of the indicators. We have changed or replaced the indicators that did not apply to the agro-industrial sector. This required coming up with new metrics that more accurately capture the industry's particular difficulties and success.

3. Data collection. Relevant data was obtained from AgroTransilvania Cluster via member satisfaction questionnaires and analysis of internal documents

4. Data analysis: The collected data was analyzed using statistical and analytical techniques to identify the strengths and weaknesses of ATC in the agro-industrial setting.

5. Systematizing the results. The results of the analysis were presented in a clear and concise way, organized in tables.

## **RESULTS AND DISCUSSIONS**

The only agro-industrial cluster in Romania to get the gold accreditation for management excellence is AgroTransilvania Cluster [2]. At the moment, the management team plans, oversees, and evaluates all of the cluster's operations in a methodical manner. To ensure effective coordination, these tasks entail scheduling meetings of the Board of Directors, the General Assembly, and the management team.

Certain ESCA indicators pertaining to the certification of management excellence may not be as applicable to Romania's agroindustrial sector, or they may need to be modified to more accurately reflect the demands and reality of this industry.

This research aims to analyze and classify the ESCA indicators according to their relevance for the specific needs of the agro-industrial sector in the Northwest Region of Romania, based on the feedback received from the cluster managers and the sector analysis. Indicators are classified into two categories:

"Blue" indicators denote the relevant metrics for the North-West Region of Romania.

These indices are crucial for evaluating management excellence in agro-industrial clusters from various perspectives, including local cooperation and partnerships, the adoption of sustainable technologies, education and professional training, and the availability of financing.

They are considered pertinent to the North-West Region of Romania.

The less significant metrics for Romania's agro-industrial sector are represented by "orange" indicators.

The degree of advanced digitization, membership in international research networks, internationalization, and the density of innovation clusters are some of these indicators that may need to be adjusted to better represent local circumstances.

For these metrics, Romania's agro-industrial sector is thought to be less significant.

## 1.Findings about how well the AgroTransilvania Cluster represents a broader population.

Representativeness in a cluster refers to how well its members reflect the range and significance of interests and skills within the cluster's specific industry or subject. Ensuring sufficient representativeness is crucial for promoting fair and effective involvement of all stakeholders and maximizing the opportunities for innovation and cooperation.

Table	1. Evaluation of the AgroTransilvania Cluster's management effectiveness in 2024		-				
Crt. no.	Suggestion for the agro-industrial sector indicator Suggestion for the agro-industrial sector indicator	Superior standard of excellence	Moderate standard of excellence with potential for improvement				
I. Clus	I. Cluster Representativity						
1	The involvement of farmers and agro-industrial companies in the cluster, with emphasis on active participation and cooperation in joint projects.	х					
2	Diversity of participants in the cluster, including farmers, agricultural equipment manufacturers, researchers and agricultural educational institutions.	х					
3	Total number of farmers, agro-industrial companies and partner institutions involved in the cluster.	х					
4	The geographical distribution of participants in rural and agrarian areas, assessing the proximity of farms and processing facilities.		x				
II. Ty	II. Typology, governance, cooperation						
5	The level of experience and expertise of the management team in the agro-industrial field.	Х					
6	The quantity and background of personnel managing the cluster, with a focus on experience in the food and agricultural industries		x				
7	The management team's degree of expertise in biotechnology, agriculture, and agricultural management.	х					
8	Initiatives to provide the management staff with professional development opportunities and ongoing training in new agriculture technology and techniques.		x				
9	The staff retention rate in the management team and succession plans to maintain continuity.	Х					
10	The clarity of the roles and responsibilities of the participants and the active involvement of farmers and companies in decision-making processes.	х					
11	The regularity and worth of face-to-face communication between the management group and agricultural companies.	х					
12	Direct communication between members in the cluster and the cluster management team	х					
13	The level of cooperation between farmers, companies and institutions in the projects and initiatives of the cluster.	х					
14	The degree of integration of the cluster into the agricultural innovation system and partnerships with research and development institutions.	х					
III. Fi	nancing						
15	The financial projections of the cluster, including funds available for agricultural and technological projects.		x				
16	The proportion of private funding, such as investment by agro-industrial companies and farmers' contributions.	x					
IV Ch							
17	The process of developing the cluster strategy, focusing on the needs and challenges of the agro- industrial agetor	x					
18	Comprehensive record of the cluster plan, with particular goals for the food and agriculture	x					
19	The cluster strategy's implementation plan outlines the steps required to achieve the goals in the	x					
20	The cluster's financial control system, designed specifically for managing investments in	x	x				
21	The procedure of routinely reviewing the strategy and implementation plan and making modifications in light of the area inductrial sector's growth	x					
22	Keeping track of how well the management group is doing in reaching the sector-specific goals for the agree inductrial sector	x					
23	Driegiting aluster expresses in achieve tion with a long term food and agriculture plan	v					
24	The cluster offers a range of services and activities, including training, technical support, and agricultural consulting	x					
25	Assessment of the cluster management's effectiveness in coordinating agricultural projects and activities	x					
26	Formation and work of specialized working groups in various areas of agriculture and food	x					
27	The effectiveness of internal and external communication of the cluster, including with farmers,	x					
28	Group information on the agro-industrial industry on your website and social media accounts, as	x					
V. Achievements and recognition							
29	Recognition and visibility of the cluster in specialist media and agricultural publications.	х					
30	Success stories of farmers and companies in the cluster, highlighting good practices and innovations.	x					
31	Assessment of satisfaction of participants and clients of the cluster	х					

Source: Own determination.

The AgroTransilvania Cluster now has 90 members and operates on the quadruple helix

paradigm. In order to guarantee and sustain the inclusion and fairness of the cluster, it is

crucial to consistently prioritize the variety of and stakeholders, members foster equal opportunities, and actively engage and encourage the participation of all relevant individuals. The cluster members are actively involved in the projects due to the projects' specialization, financing level, and the members' enthusiasm in participating. As a result. indication 1.1.4 - Geographical concentration of cluster participants is given an orange grade due to the fact that over 65% of members are situated within a 150 km radius.

## 2. Discoveries concerning the classification, management, and collaboration within the AgroTransilvania Cluster

The cluster's maturity is evidenced by its extensive track record of over a decade after its establishment. Indicator 2.2.3 emphasizes the need of lifelong learning in cluster management. This is because staff turnover is impacted by the participation and financial support of certain initiatives for a set period of time. The level of expertise of the workforce varies depending on the specific characteristics of each project.

The AgroTransilvania Cluster is confronted with the issue of worker turnover, which can have a substantial influence on operational efficiency and stability. Key factors of staff turnover within the cluster are team instability, depletion of experience and knowledge, disruption to project continuity, increased expenses and resources allocated to recruiting and training, and potential adverse consequences on employee morale and engagement.

In order to address staff turnover within the cluster, it is crucial to implement efficient employee recruiting and retention methods, enhance team communication and engagement, offer chances for professional growth and progression, and foster a good and stimulating work environment. Furthermore, implementing explicit rules and procedures for performance management and awards may effectively mitigate employee attrition and enhance the overall stability of the firm.

3. Discoveries pertaining to the funding aspect inside the AgroTransilvania Cluster

At present, the cluster's financial resources consist of membership fees, acquired grants, generated research revenue from and development laboratory operations, and sponsorships from partners. Nevertheless, the financial insurance for the future only provides coverage for a maximum duration of 1.5 years, as the funding from the funded initiatives guarantee this timeframe. This condition results in acquiring the vellow indication. To mitigate financial risks and provide more budget stability, it is advisable to get money for a minimum of two years in advance.

The financial assistance gained through grants within the AgroTransilvania Cluster plays a crucial role in providing a substantial portion of the resources required for the conducted activities. Project grant reliance refers to the scenario in which a cluster or organization largely relies on external money in the form of grants to sustain its ongoing activities and operations. This interdependence can have both advantageous and disadvantageous characteristics and can greatly impact the financial stability and long-term sustainability of the cluster.

# 4. Discoveries about the strategy, aims, and services inside the AgroTransilvania Cluster.

The the most current update to AgroTransilvania Cluster strategic plan was made in 2022. It offers a clear path for development and advancement through suggested activities and is in line with the potential and demands in the agro-industrial sector. The goals are quantifiable, reachable, and aligned with the mission and vision of the cluster, which is to provide national economic players in the agro-industrial sector with an engaged and sustainable partner and to serve a model of successful international as collaboration.

The services provided to members should be evaluated to determine if they bring additional value both within the cluster and to a broader audience.

Quarterly assessments should be conducted to evaluate the utilization of human, financial, and technology resources, as well as identify any potential gaps or needs that may require

attention in order to enhance the organization's capability.

We can ensure that the AgroTransilvania Cluster remains relevant and effective in fostering the creative and sustainable expansion of the agro-industrial sector in the Transylvania area by consistently evaluating and improving the cluster's objectives, strategy, and services.

These observations can provide important improving the cluster's guidance for effectiveness and impact on the surrounding area.

#### 5. Discoveries on accomplishments and acknowledgment inside the AgroTransilvania Cluster

The primary means of evaluating the impact of the AgroTransilvania Cluster on the agrosector industrial and its surrounding community is through national and international evaluations and recognition, which are deemed essential.

These findings might emphasize the noteworthy contributions, innovations, and recognition attained by the cluster, both at the local and national or worldwide levels.

The cluster's most significant accomplishments in this area are the identification and documenting of successful projects and initiatives that have been executed.

Examples include research, development, and innovation projects, corporate growth efforts, training programs, and promotion and communication campaigns.

AgroTransilvania has achieved significant recognition over the course of its 10 years of operation. Its most notable achievement is the Gold label certification, along with ISO certifications. Additionally, it has received numerous awards and forms of appreciation contributions that validate its and performance.

assessing and emphasizing By accomplishments and accolades inside the AgroTransilvania Cluster, the cluster's reputation and beneficial influence on the agro-industrial sector and its community may be enhanced.

These insights can also offer important direction for recognizing and taking advantage of future growth and partnership prospects.

No	Change	ESCA standard methodology	$\label{eq:methodology} \mbox{ Methodology recommendations for the agro-industrial sector}$			
1.	Relevant Indicators	It makes use of generic indicators that work across a range of service and industrial industries.	It covers metrics unique to the food business and agriculture, such crop production, the degree of ecological sustainability, the degree of technological advancement in agricultural operations, and the efficiency with which natural resources are used.			
2.	Measuring Economic Performance	It focuses on broad economic metrics such operational expenses, revenue growth, and profitability.	Modify economic statistics to take into account certain factors like the price volatility of agricultural products, the effect of subsidies, and the expenses related to climate change.			
3.	Sustainability and Environmental Impact	It takes a broad approach to sustainability, avoiding intricacies unique to any one industry.	It contains certain sustainability metrics including greenhouse gas emissions, fertilizer and pesticide use, and biodiversity damage.			
4.	Technology and Innovation	The demands of the agro-industrial sector are not taken into consideration in the general evaluation of technology and innovation.	It focuses on the use of cutting-edge agricultural technologies, including biotechnology, automated agricultural processes, and precision farming.			
5.	Infrastructure and Logistics	It assesses logistics and infrastructure without considering industry-specific factors.	It contains metrics for certain infrastructure, such the ability to store agricultural products, the effectiveness of the supply chain, and market accessibility.			
6.	Climate Change Adaptation Capacity	It doesn't give climate change adaptation any special attention.	Examine how well agriculture and industrial facilities can adjust to the changing environment, taking precautions against harsh weather included.			
7.	Community Relations and Social Responsibility	In general, it emphasizes social responsibility.	It looks at interactions with rural communities, the effects of agriculture on society, and community development programs.			
5	Source: Own determination.					

Table 2. Differences between the agro-industrial sector's recommended procedure and ESCA's actual methodology

The pre-audit offered a comprehensive and precise assessment of ATC's performance, enabling the establishment of specific initiatives for ongoing enhancement and growth. The approach that was suggested for

the agro-industrial after the sector AgroTransilvania Cluster study differs significantly from the present one (the standard ESCA methodology) in that it takes into account the unique requirements and characteristics of this industry. As per the

stance of the Clustero Association, agroindustrial clusters will be able to make meaningful comparisons with other clusters across Europe if they conform with the ESCA metrics.

Similar to this, the suggested indicators' applicability must encompass important domains including innovation and research, economic development, networking and cooperation, the quantity of international relationships and the degree of cooperation among cluster members, education, and sustainability. The main differences identified can be found in Table 2.

By making the recommended adjustments, the evaluation is more accurate and pertinent for evaluating the production and quality in the agro-industrial sector, which aids in problem identification and the creation of workable solutions.

## CONCLUSIONS

A cluster of excellence in the agri-food industry has the potential to be a potent instrument for fostering innovation. competitiveness, and sustainability in this crucial domain for the economy and society. By consolidating resources and knowledge inside specialized groups, we can foster fruitful interactions and enhance the development potential of the overall agri-food business.

The AgroTransilvania Cluster, the sole agroindustrial cluster in Romania to have received gold management excellence accreditation, embodies the quadruple helix model. significant guaranteeing variety among stakeholders [1]. The cluster's longevity of over 10 years is apparent, but, the issue of personnel turnover continues to pose a significant difficulty, impacting the continuity and efficiency of projects. The AgroTransilvania Cluster plan's 2022 version closely corresponds with the demands of the agro-industrial sector. Although the goals are clear and measurable and the services offered are relevant, it is still important to regularly evaluate the extra advantages they deliver.

The agro-industrial sector's performance and quality may now be more accurately and

suitably assessed thanks to the changes made to the ESCA indicators. This makes it possible to identify and put into action effective strategies that will support and maintain this sector's growth. This is a positive outlook, and the Clustero Association fully supports an effort to standardize the indicators unique to clusters in the agroindustrial sector.

With its wide range of projects and excellence certification, the AgroTransilvania Cluster is a very successful role model in Romania's agroindustrial sector. However, the challenges presented by employee turnover, dependence on subsidies, and the need to diversify funding sources.

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