

ANALYSIS OF THE COMPETITIVENESS OF GLOBAL AGRICULTURAL MARKETS: ANALYTICAL HIERARCHY PROCESS

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ABSTRACT	KEYWORDS
With the increase in agricultural production and food consumption simultaneously, global markets are increasingly targeting the highest quality and healthiest agricultural products. Therefore, it is essential to understand nature of the global markets and to produce better by being competitive so that companies can manage high risk and increase profitability effectively. This study aims to analyze the competitiveness of global agricultural markets based on the analytical hierarchy process and the factors on which the competitiveness depends. To identify the most relevant factors that contribute to the competitiveness of global agricultural markets in relation to several global agricultural markets, stakeholder interviews and literature review are implemented. To attain the study objective, based on the data retrieved from stakeholder interview and literature review, we calculated the highest weights of relative importance of the factors to show ranking of success criteria and determined the export priority and competitiveness methodology of agricultural companies in global markets. The methodological tools proposed in the study can be used as a guideline of monitoring the development of market strategies and programs for the improvement of export-oriented agricultural sectors in the countries like Uzbekistan where agricultural production contributes to higher economic development. Also, the results of applying the proposed approach in the performance case of real firms showed that agricultural production is profitable from both a financial and economic perspectives since they have an optimal competitiveness strategy. Finally, the paper ends with theoretical and practical implications as well as future research agenda.	Analytical Hierarchy Process, Global Agricultural Markets, Decision Criteria, Stakeholder Interview

1. Introduction

Competitiveness plays the important role in maintaining long-term prosperity of a nation or company. Long-term survival and prosperity of a farm or company requires creating and sustaining competitive advantage that enables firms to always step forward from competition [1,2]. Agricultural firms of a

country must have a competitive advantage since the increased competitiveness of agricultural products plays crucial role in the export development process.

In today's highly-changing international markets, there is a number of factors to consider in developing competitive business, such as the foreign demand [3] and saturating the domestic market [4], the efficient usage of the export potential of the agricultural industry and increasing the competitiveness of agricultural products [5].

When analyzing the foreign agricultural policy, [6,7,8] evaluated indicators of the openness in the methodological tools for assessing the effectiveness of the rational import substitution policy in different levels such as industry, ministry, and country to develop indicators of improving agricultural competitiveness of local firms in global markets. When improving the methodology, there are some indicators of export orientation that were developed such as priority, elasticity, load, opportunities.

The universality of the export situations in global agricultural markets and their great importance for economy have contributed to the development of multi-criteria methods to support decision-making in managing competitive strategies of agricultural firms in global markets. Many different methods [9,10] can be applied to solve problems in such kind of decision-making. One relevant problem for complex decision-making in global agricultural business is the selection of an appropriate competitive strategy, especially in the context of global agricultural markets.

The available literature on agricultural business & competitiveness has tended to cover the local sector related to agricultural businesses, while decision-making in this area for developing competitive strategy of agricultural firms – especially at the global level – is rather poorly discussed. This research area is thus still open and requires a new point of view, discussion and research attention. Fitting in this context, this paper demonstrates analysis of global agricultural markets and development of decision - making model in improving competitiveness of agricultural firms based on a bottom-up strategy. The descriptive model of decision-making is constructed using the analytic hierarchy process (AHP) method that includes performing pairwise comparisons in the hierarchical manner. These pairwise comparisons are considered with regard to each individual set of criteria, ensuring the same degree of importance for all criteria in the decision model.

The pairwise comparisons are also performed based on the following questions: which criterion is more important for analyzing competitive strategy of agricultural firms in global market? To what extent are these criteria important?

The following set of statements that reflect saaty's scale of relative importance (1980) was applied to answer these questions: 1 – same meaning; 3 – weak advantage; 5 – strong advantage; 7 – very strong advantage; and 9 – extreme advantage.

In general, the research was carried out using a review of the relevant literature and stakeholder interview, together with the generation of a decision-making model to analyze the competitive strategies of agricultural firms in global markets.

1.1 Literature Review

Global Agricultural Competitiveness Definitions and Factors

The constant development of global agricultural markets promoted the formation of numerous criteria of success that closely influences the effective international specialization of the countries. The authors of the global economic analysis [1], correlation structure analysis of the global agricultural futures market [2], and the multiregional economic modeling [3], the role of cultivated land expansion and

global agricultural markets [4] and others [5-10] contributed to the creation of the theoretical and methodological principles of global agricultural competitiveness.

The theory of the global competitiveness of individual regions was developed by [12,13,14]. Competitiveness of Malaysia's fruits in the global agricultural and selected export markets was investigated by [12], contributing the conceptualization of Revealed Comparative Advantage (RCA) and Comparative Export Performance (CEP). However, researchers maintain a growing argument about the need and methods for assessing the competitiveness at continental levels such as Asian and European countries [13,14].

[15,16] justifies the need to develop and implement the global agri-food export competitiveness, which plays a crucial role at gaining leading positions in the global market. This is possible on the basis of governmental and organizational support for competitive agricultural industries. Creating favorable conditions for local agricultural enterprises to increase their global competitiveness to the level that produce agricultural products consistent with global trends and standards.

In the conditions of strategic development, the estimate agricultural market is based on export profits and financial & legal services [17]. The theoretical and methodological principles substantiating the principles of global agricultural markets explain the profitability of international agricultural trade and provide the grounds for identifying the geographically relevant international trade operations. Information technologies, as an instrument for the development of specialization, motivates countries to increase the global competitiveness of products through environmentally savvy strategies of using limited resources [18]. This leads to the increased global competitiveness of agricultural goods (services) and, as a result, to the economic prosperity of the population.

The remainder of this paper is structured in the following ways. Section 2 presents the AHP based decision model development and the decision criteria, along with the application of the proposed model in the performance case of real firms. Section 3 discusses the AHP hierarchical model and the results of the calculations such as the pairwise comparisons and prioritization of criteria. The last section provides the conclusions and future research directions.

2. Methodology

A scientific study of global competitiveness of agricultural markets, which can be investigated at the different levels such as country, government, and industry, determines the need to consider global and local perspectives in developing decision model for monitoring the development of market strategies and programs for the improvement of export-oriented agricultural sectors. The decision criteria to assess global competitiveness are retrieved from literature review that was conducted in section one and stakeholder interview described later.

When improving the methodology and creating decision model, those indicators of global competitiveness of agricultural markets (investment in formal education for farm managers; public and private investment in infrastructure, particularly market infrastructure, technical innovations, and information transfer; and facilitating access to agricultural advice) were taken into account, which enabled evaluation of the global competitiveness of agricultural products in local farm, detailed in Table 1.

Table 1. Indicators of global competitiveness of the agricultural markets

Criteria	Definitions/explanations
investment in formal education for farm managers	Increasing the awareness and knowledge of agricultural managers so that they can develop strong global competitiveness strategies and advantages
public and private investment in market infrastructure	Improving market infrastructure via foreign or local investments
technical innovations	Creating new technologies that can modify or develop global competitiveness of a agricultural farm to some extent
information transfer	Providing first hand information exchange between different members in an agricultural farm
facilitating access to agricultural advice	Creating adequate Conditions for agricultural consultations

The Analytical Hierarchy Process (AHP) method was specifically chosen to solve the organization and prioritization problems in decision making of developing or analyzing the global competitiveness of agricultural farms because of its versatility. Creating one of the best possible multi-criteria decision models for those problems will be the main subject of this paper. Fitting in this context, the AHP method is one of the most popular multi-criteria decision support methods that looks like a four-level structure consisting of a decision goal, placed at the top of the hierarchy; decision criteria; sub-criteria containing the details of the criteria; and decision variants at the bottom of the hierarchy.

The most important stage of applying the AHP method is to build a decision model that is known as a hierarchical structure or a hierarchy of decision. This is considered the most creative stage of the AHP because of a significant amount of time and knowledge invested, as well as the involvement of relevant experts. In the most crucial stage of applying AHP, a pairwise comparison of the individual criteria is implemented based on a 9-point comparison scale to obtain weighting factors. On the basis of the results, comparison matrices are calculated to identify priorities and to make decisions based on these priorities

Mathematical calculations of analytical hierarchy process are also based on the results of the stakeholder interview. Expert evaluation allows the researchers of this article to clarify levels of importance of each criteria of global competitiveness that are used for pairwise comparisons and comparison matrices. Experts also provide competitive performance scores of real agricultural firms (CNH Industrial, The Archer-Daniels-Midland Company (ADM)) that have international trades in global agricultural markets based on the previously established decision model within the range of 1..5. This enables us to validate the decision model for analyzing and assessing the global competitiveness of agricultural firms.

3. Results

To construct a hierarchy of competitiveness decision model in the context of global agricultural business, the decision criteria are identified through an extensive literature review as mentioned in section 1 and stakeholder interview in section 2. The calculation steps of Analytic Hierarchy Process (AHP) are mentioned in the following paragraphs.

After collecting data from experts, pairwise comparisons and weights of each criteria are calculated in Table 2.

Table 2. Pairwise comparisons and weights of decision criteria for analyzing / assessing competitiveness of global agricultural markets

CRITERIA FOR COMPETITIVE ADVANTAGE	Investment in formal education for farm managers	public and private investment in market infrastructure	technical innovations	information transfer	facilitating access to agricultural advice	TOTALS	WEIGHTS
Investment in formal education for farm managers	1	1.33	1.17	1.40	1.14	6.042857	0.234057
public and private investment in market infrastructure	0.75	1	1.17	1.33	0.88	5.125	0.198506
technical innovations	0.86	0.86	1	1.60	1.40	5.714286	0.221331
information transfer	0.71	0.75	0.63	1	0.71	3.803571	0.147323
facilitating access to agricultural advice	0.88	1.14	0.71	1.40	1	5.132143	0.198783
						25.81786	1

In the analysis, "investment in formal education for farm managers" is the most important criteria with weight 23,4% followed by "technical innovations" with 22,1%. Criteria, "information transfer" (14,7%) is the least prioritized criteria followed by "public and private investments in market infrastructure" and "facilitating access to agricultural advice" (approximately the same, 19,8%). This criteria analysis shows that managerial education and technology are more concerned than others like information transfer and facilitating access to agricultural advice when analyzing the global competitiveness of an agricultural farm.

Table 3. Score and ranking of alternative firms according to analysis of their global competitive performance based on the decision model

competitive performance analysis of a real firm	Investment in formal education for farm managers	weight for "Investment in formal education for farm managers" criteria	score for "Investment in formal education for farm managers" criteria	public and private investment in market infrastructure	weight for "public and private investment in market infrastructure"	score for "public and private investment in market infrastructure"	technical innovations	weight for "technical innovations"	score for "technical innovations"	information transfer	weight for "information transfer"	score for "information transfer"	facilitating access to agricultural advice	weight for "facilitating access to agricultural advice"	score for "facilitating access to agricultural advice"	Totals
The Archer-Daniels-Midland Company (ADM)	4.5	0.23406	1.05327	4.1	0.19851	0.81389	4.3	0.22133	0.95172	4	0.14732	0.58928	4.5	0.19878	0.89451	4.30267
CNH Industrial	4.4	0.23406	1.029864	4.8	0.19851	0.95285	4.6	0.22133	1.01812	3.9	0.14732	0.57455	3.8	0.19878	0.75536	4.33074

Table 3 shows the overall ranking of the real agricultural firms in applying the decision model, showing integrated priority (global priority) and integrated ranking (global ranking) for local agricultural firms 'global competitiveness. The result shows that The Archer-Daniels-Midland Company (ADM) is the more globally competitive firm that CNH Industrial. Both of the firms show better score in this decision model when analyzing the performance (more than 4).

4. Conclusions

The indicators of the development of global agricultural trade and improvement of competitiveness of global agricultural products include investment in formal education for farm managers, public and private investment in infrastructure, particularly market infrastructure, technical innovations, and information transfer, and facilitating access to agricultural advice. According to criteria analysis, it should be noted that "investment in formal education for farm managers" is the most important criteria with weight 23,4% followed by "technical innovations" with 22,1%. This means managerial agriculture education and technical innovations are top priorities of global agricultural markets to develop competitiveness.

This study examined the different criteria to understand competitiveness of global agricultural markets through Analytical Hierarchy Process (AHP). The five identified criteria are analyzed on the basis of experts' judgement and experience and ranking of criteria is found out. On the basis of priority, a hierarchy of competitiveness decision model is constructed. Investment in formal education for farm managers is always highly expected to build knowledge and competencies among managers. Applying the proposed approach in the performance case of real firms (CNH Industrial, The Archer-Daniels-Midland Company (ADM)) showed highest results of competitiveness performance.

The study also suggests that analysis of global agricultural markets needs to pay great attention towards information technologies dimension; internet of things and automation & robots to deliver more value to the companies. The hierarchy structure decision model tells only the priority of criteria but not of interrelationship within criteria. To identify the interrelationship within criteria, a good opportunity for conducting the future research exists for researchers.

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