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Ways to Increase The Economic Efficiency of Production Processes in Cotton and Textile Clusters

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Abstract: This study examines strategies to enhance the economic efficiency of cotton and textile clusters in Uzbekistan, a crucial sector within the country's agricultural industry. Despite ongoing reforms, challenges such as inefficient resource utilization, limited technological integration, and unequal contractual relationships persist. Using a qualitative methodology, the research analyzes statistical data and policy impacts on cluster performance. Findings indicate that modernizing production techniques, improving land use efficiency, and implementing innovative agricultural practices significantly increase productivity and export potential. The results suggest that policy-driven cluster development fosters economic sustainability, employment growth, and sectoral resilience. These insights have broad implications for optimizing agro-industrial cluster models in emerging economies.

Keywords: Cluster, Infrastructure, Free Economic Zones, Agriculture, Innovation, Venture Production, Investment, Processing

1. Introduction

Deepening processes of globalisation and integration into the world economy require a comprehensive, in-depth study of internal strengths and weaknesses of agricultural business, external opportunities and risks in the market. One of such opportunities is the creation of an agro-industrial group based on the cluster model [1].

The cluster model (from English Cluster – "to grow together") is widely used in the world practice as a means of increasing the competitiveness of an economic group, region and country as a whole. The main characteristics of the cluster model [2]:

1. the group's ability to increase its share in the foreign market;
2. availability of favourable local conditions (raw materials, qualified personnel, infrastructure, training centres, scientific institutions, etc.) [3]
3. ample opportunities for effective participation of participants in the group's work in exchange for strong government support for the group, etc.

In economics, the word "cluster" means an association of several independent companies voluntarily set up to produce a product [4].

The purpose of the study. In this regard, an important issue is the need to improve the quality and competitiveness of products in specialized regions of the republic through the effective use of land, export orientation, creation of new jobs and increase foreign

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exchange earnings to the country by increasing the income of the population [5]. At the same time, make proposals for the development of industrial clusters for cotton processing in the territories of free economic zones and cotton specialization of our republic [6].

The rapid expansion of the global economy and the increasing integration of markets have placed significant pressure on agricultural industries to enhance their efficiency and competitiveness. Cotton and textile production are of great importance in economic development of Uzbekistan and bring with their significant share to employment and export [7]. It has been promoted as a strategic solution for the modernization of agricultural practices, efficient utilization of resources and stimulation of innovation. Nevertheless, these efforts continue to be insufficient both due to inefficient land use, lack of technological integration, and inequitable contractual relationships between farmers and cluster operators. The solution to these problems calls for a holistic approach also, where policy interventions are made to proceed in hand with practical innovations in agricultural management [8], [9].

Although such agro-industrial clustering potential has been previously studied, the ways of improving this model of Uzbekistan's cluster to increase efficiency and sustainability have not been analyzed [10]. Previous studies characterized the overall effects of the economic impact while neglecting the specific mechanisms of boosting productivity, increasing profitability, and making the distribution of benefits fair across stakeholders. By using the results of this analysis to fill the knowledge gaps of how cotton and textile clusters perform, this study seeks to bridge this gap through the qualitative analysis of statistical data, policy evaluations and stakeholder insights. The research provides a data driven perspective on whether the current model is viable in the long term through identifying the strengths and shortcomings of the current model [11], [12].

This study finds that integration of modern production techniques, land use strategies optimization and strengthening of institutional support measures are all found to increase performance of clusters [13]. The results also indicate that policy reforms targeted to stimulate the adoption of technology coupled with an increased adoption of net technology can enhance agricultural output, increase profitability, and improve labor conditions. The findings of these insights are more broadly relevant to policy makers and industry leaders in the process of developing competitive and resilient agro industrial systems in emerging economies. Drafting of an agricultural strategy based on clusters enables Uzbekistan and other economies relying on agriculture to exploit new opportunities for the sustainable development of economy, resource efficiency and integration with the world markets [14], [15].

2. Materials and Methods

The research methodology of this study is a qualitative analysis based on primary and secondary data sources in Uzbekistan's cotton and textile cluster system. To achieve this goal an examination of the cluster model effectiveness in enhancing productivity, economic efficiency and a comprehensive review of policy documents, statistical reports and economic performance indicators was made. The historical trends on agricultural production, investment pattern, and technology improvements had been studied to determine the key drivers of cluster success and areas for more improvements. Insights into land use efficiency, yields of cotton, generation of employment and financial performance were provided by governmental and industry reports on data.

To validate our findings further, case studies of some cotton and textile clusters were examined to determine how the cluster model can be practically implemented. Through this approach, the operational challenge faced by farmers and producers, and in particular the resource allocation, market accessibility and contractual challenges were understood in depth. Comparative analysis was also performed between Uzbekistan's cluster

development and both international best practices and indicators of acceptable standards of cluster development.

The methodology of the study also guarantees the totality of assessment of cluster system at both macroeconomic trends and micro level of the enterprises performance. Using multiple data sources and triangulation, this research provides comprehensive understanding of the effects of cluster based reforms on the Uzbekistan's agricultural sector. Actionable recommendations for policy makers, industry leaders and agricultural stakeholders are provided to further optimize production and export cotton and textile production processes, and increase the competitiveness of the cotton and textiles export.

3. Results and Discussion

Uzbekistan also pays great attention to using the cluster approach to create an ideal innovative image of the country and society. Efforts in the agricultural sector are a prime example of this.

An agricultural cluster is an enterprise with a multi-stage holistic system from ploughing to sowing, tending and production of finished products. Therefore, it can be recognised that today clusters are becoming the engines of the agricultural industry.

The development of agricultural clusters in Uzbekistan is the most correct way. Because even in years unfavorable for agriculture, common jobs and wages are supported by other organizations in the cluster. In other words, the impact of the vagaries of nature on the incomes of enterprises and manufacturing companies is decreasing. Crops can be replaced, and soil fertility will be restored.

Many years ago, there were also those among the peasants who dealt with issues such as the sale of land, the allocation of a place for a manor for money from arable land. However, insufficient attention was paid to crop yields and product quality.

By exporting only cotton, we received ten times less money in return. As long as we had fertile land and running water, yields and profitability continued to decline.

Today, special attention is being paid to the efficient use of every inch of land. Factories for the production of lightweight structures are being built next to the cotton square. The harvest is also processed into fiber, from which ready-made clothes are made. Or mini-creameries within the cluster produce oils, soaps and other products. In short, the agricultural sector has now entered the stage of development based on new innovative projects.

In total, 96 cotton and textile production clusters operated in the republic in 2020.

In 2020, cotton and textile production clusters produced cotton raw materials on an area of 912,403 hectares. This is 87.7% of the total area of the Republic's lands on which cotton raw materials are grown.

Cotton and textile production clusters increase cotton yields by an additional 10 quintals with the use of advanced modern innovative technologies during the growing of cotton raw materials.

In order to obtain a high-yielding cotton crop in cotton and textile clusters, the following works are carried out, in particular:

Phosphorous fertilizers for fertilizing cultivated areas from abroad (Russia, Kazakhstan), as well as chemicals for pest control during agrotechnical treatments are purchased in China, Turkey, Russia, the USA, Australia, Sweden and other countries. It is carried out in 6, 8, 10, 12 rows of purchased pneumatic seed drills;

Modern drip irrigation technologies are being introduced in areas of land sown with cotton that are difficult to access for irrigation, and cotton yields range from 50-60 quintals per hectare.

Cotton and textile production clusters use modern cotton harvesting methods, including cotton harvesters manufactured in the USA (John Deere), Germany (Case), China and other countries.

As of the beginning of 2021, there are 345 agro-industrial clusters in the republic, which are assigned a total of 1 million 201 thousand hectares of land. Including:

1. cotton and textile clusters - 97, with an adjacent land area of 927068 hectares
2. grain clusters - 77, with an adjacent land area of 142800 ha
3. fruit and vegetable clusters - 147, with an adjacent land area of 122394 hectares
4. cereal clusters - 16, with an adjacent land area of 8060 hectares
5. the remaining clusters are 8, with an adjacent land area of 1,150 hectares.

The above data show that cotton fiber accounts for almost half of gross agricultural production. But further analysis proved that there is great potential in cotton farming that has not been realized.

Of course, instead of selling raw materials cheaply, initiating new reforms and taking measures to increase cotton yields, its goal could be achieved through its processing and production of finished products. At the moment, the planned result has been achieved.

If we analyse the situation four years ago, we can say that the average yield of cotton in Israel did not exceed 53.5 quintals, in Australia - 50.3 quintals, in Turkey - 40 quintals, in Brazil - 42.2 quintals, in Mexico - 37.6 quintals, in Uzbekistan - 25 quintals. For Uzbekistan, which ranks fifth in the world in cotton production, this is certainly a low figure.

Today's life shows that the only way to change the situation is through a cluster. Currently, cotton-textile clusters harvest up to 70 quintals per hectare of cultivated area.

Specifically, from the 2020 harvest, raw cotton was grown on an area of 1 million 34 thousand hectares, of which 927.0 thousand hectares were grown in 97 cotton and textile clusters. Last year, 2 million tonnes of cotton was grown in cotton-textile clusters. Each hectare produced 794 thousand tonnes of raw cotton and yielded an average of 30.1 quintals.

To date, water-saving technologies have been introduced in cotton cultivation on an area of 32.5 thousand hectares, of which 3.9 thousand hectares (35 per cent) by farms and 21 thousand hectares (65 per cent) by clusters. This, in turn, testifies to the advantages of the cluster system under conditions of growing demand for water resources.

As for the social aspects of the system, today the clusters have production facilities for the production of 550000 tons of yarn, 204500000 m² of fabric, 54500 tons of weaving, 69000 tons of fabric dyeing and 218600000 units of finished products.

As a result of implementation of projects by clusters to organise production and processing of raw cotton, 145.7 thousand new jobs will be created in 2018-2020, of which 87.2 thousand will be created in 2020.

In particular, in 2020, 18 clusters launched 29 investment projects for cotton processing worth 774 billion soums, and 6.3 thousand new jobs were created. That's how many people got permanent jobs. They have been given a work record, the main thing is to have a permanent source of income.

To date, 14 cotton-growing clusters with a total area of 4 thousand hectares have been commissioned, of which 3.6 thousand hectares have remained unused, and 734 hectares have been reclaimed.

As a result of the introduction of the cluster system in cotton production, the material interest of producers has increased by 1.5 times. Thus, if in 2018 the average monthly salary of one worker in raw cotton production was 850-900 thousand soums, in 2020 this indicator reached 2.2 million soums. This is a gradual process in which the indicator continues to grow.

It is inappropriate and without long-term plans to travel at night, not knowing where to go'. In 2020-2023, 245 investment projects worth 134.2 trillion soums will be implemented in cotton and textile clusters and 49.3 thousand new jobs will be created.

In particular, it is planned to implement 30 projects for the acquisition, reconstruction and construction of a cotton gin worth 2.0 trillion soums, 43 for the creation of a spinning mill worth 9.4 trillion soums, 21 for the organization of weaving in the amount of 112.3 trillion soums and 8 for dyeing fabrics and yarn in the amount of 648.8 billion soums.

During these 2 years, 48 projects have been implemented to create a dairy plant, 33 to create a livestock complex, 13 to introduce drip irrigation, 22 to manufacture clothing and finished products, and 13 to purchase agricultural machinery.

In addition, it was planned to implement 14 projects worth 3.2 trillion soums, including the creation of additional networks such as agro-logistics centers, a biolab, a flour mill, the purchase of a building, and others. And although it seems like just numbers, it's based on the hard work of moving forward, striving for innovation. The most important thing is that everyone is equally interested in this.

The head of our state noted that "cluster and interests are the future of agriculture in Uzbekistan. Without the introduction of science and innovation, it is impossible to make the industry competitive. Consequently, in the future, the importance of the cluster in increasing incomes of the population, creating jobs, modernising and diversifying the economy, including agricultural and food products, will not diminish, but on the contrary, will increase".

At the present stage of society's development, when the relationship between nature and society is becoming more acute, there is a need for the rational use of land resources. Therefore, during the transition to a market economy, special attention is paid to the protection of land resources and the creation of economic mechanisms for their effective use. Because the sustainable development of agriculture is closely linked to the state of land use. On the other hand, agriculture is the main economic sector providing food and clothing to the population.

The implementation of a comprehensive, well-thought-out policy in the field of optimizing acreage and zoning of crops has made it possible to increase the production of other agricultural products several times while maintaining relatively stable production volumes of cotton, which is the most important raw materials and export products.

One of the main problems today remains the improvement of the condition of land before land reclamation. Today, about 8% of irrigated lands are in poor reclamation condition, which is primarily due to high soil salinity and elevated groundwater levels.

Almost 330,000 hectares of land remain unsuitable for agriculture due to the poor state of land reclamation.

The land bonus, a common indicator for assessing the quality of irrigated land, has decreased by 55 points in recent years. The situation remains particularly difficult in the Republic of Karakalpakstan and Khorezm, Bukhara and Syrdarya, Ferghana and Tashkent, as well as in a number of other regions.

4. Conclusion

The findings of this study highlight the crucial role of the cluster model in enhancing the economic efficiency of cotton and textile production in Uzbekistan. By integrating modern agricultural techniques, optimizing land use, and implementing innovative processing strategies, clusters have demonstrated a significant increase in productivity, job creation, and export potential. However, challenges such as unequal contractual relationships, limited technological accessibility, and the need for stronger institutional support remain barriers to full optimization. The study's implications suggest that policy-

driven enhancements in infrastructure, investment incentives, and regulatory frameworks can further strengthen the cluster model's sustainability and competitiveness. Additionally, the adoption of global best practices and advancements in digital agriculture could drive more substantial improvements in efficiency and profitability. Future research should explore the long-term economic and social impacts of cluster-driven agricultural reforms, with particular attention to the role of automation, artificial intelligence, and sustainable farming practices in advancing Uzbekistan's agro-industrial development.

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