Formation of clusters is a priority direction of innovative development of the agricultural sector of Uzbekistan

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Abstract. This article presents the results of the analysis of the functioning of the agro-industrial complex of the Republic of Uzbekistan, the formation of clusters, the integration of enterprises engaged in agricultural production with enterprises of other sectors of the national economy of Uzbekistan. Referring to the analysis results, it can be concluded that clusters are the most optimal production integrated management system in the conditions of the market economy of the Republic. The article presents data on the analysis of the activities of agro-industrial clusters, including cotton and textile clusters, and shows the effectiveness of their activities. The foreign experience of clustering the economy is presented.

1. Introduction
With the growth of competition in the domestic and world markets of goods, labor and capital, the primary task for business entities of the Republic is the growth of competitive advantages of domestic farms.

In recent years, the priority of the development of theoretical concepts that make it possible to justify and implement effective forms of regional organization of the national economy and competitive business strategies for the social and economic development of the country has been increasing. The concept of clustering is a relatively new approach to the effective organization of the economic development system, focusing on the cooperation of production capacities and opportunities. The level of profitability of cluster systems is differentiated due to their different geographical location, mutual influence of business entities, government decisions [10]. Practice has proved that cluster business organization creates the basis for increasing labor productivity and production efficiency, reducing transaction costs, and stimulating innovation [7].

The world experience of recent decades provides many examples of the formation and development of clusters in different sectors of the economy. For example, in the USA there are 380 clusters in the fields of high technology, consumer goods production and service industry. In Germany, key industrial clusters have been formed in the chemical, mechanical engineering and other industries. Finland has largely clustered the country's economy and formed nine leading clusters. The experience of cluster development in foreign countries has shown their high role in stimulating regional development, increasing employment and budget revenues, attracting investment and, ultimately, in the growth of the gross regional product.
2. Materials and methods of research

In the process of preparing a scientific article, such methods as general scientific, formal logical, generalizations, and the method of comparative analysis were used.

The basis for the intensive development of the agricultural sector and related sectors of the domestic economy is the formation of clusters.

According to Harvard University Professor Michael Porter, a cluster system is a systemically organized group of economically interconnected firms, suppliers, enterprises of related industries and organizations that arise in certain areas and countries to gain competitive advantages. Based on the current trends in the development of the world economy, the formation of technological, innovative clusters becomes an urgent task [4].

For the rapid industrial and innovative progress of the economy of Uzbekistan, it is necessary to ensure that the pace of industrial development exceeds the growth rate of gross domestic product, which requires active clustering of the economy of the Republic.

In countries with developed economies, a model of innovative development is being created in today's conditions, based on transformation and transition to a relatively high technological regime, which is ensured by large investments in research and development work [9]. For example, the costs of research and development work in relation to GDP in developed countries are the following: in the United States - over 2.6%, in Germany - 2.3%, in Japan - more than 3%, in France - 2%, in Italy - 1.2%, in the UK - 2.1%.

Considering the experience of advanced countries, Uzbekistan should create its own model of transferring the economy to an innovative path of development, and this model should be based mainly on its own innovative potential.

Activities in this direction are already implemented. Thus, in the Kuyichirchik district of the Tashkent region, it is planned to create livestock and fish farming clusters with the attraction of foreign direct investment.

The project will be implemented through the creation of an enterprise with foreign investments - Tashkent Cotton Textile Cluster. This enterprise will use 35.3 thousand hectares of irrigated land and 3.2 thousand hectares of fish-breeding lakes on a legal basis.

At the same time, it is planned to transfer the assets of the former Joint-Stock company "Balikchi" to the enterprise at a "zero" redemption value to create a modern complex for growing, processing and exporting a wide range of fish products. At the same time, new jobs will be created. Investments in this will amount to over $ 8.2 million.

The total cost of the projects to be implemented in the cluster will exceed $217 million.

Production facilities will be put into operation in stages, from 2021 to 2023.

At a meeting of the Syrdarya region's active core in 2018, the country's President Sh.M. Mirziyoyev noted that selling cotton as raw materials means not understanding the economy. He also noted that cotton should be grown where it is profitable to do so [8].

To date, more than 30 districts, including Asakinsky, Kitabsky, Bulungursky, Jambaysky, Urgutsky, Zangiatinsky, Kibraysky, Parkentsky and Kuvasaysky are exempt from cotton cultivation. The natural and climatic conditions of these areas allow to successfully grow and produce fruit and vegetable crops.

President of Uzbekistan Sh.M. Mirziyoyev, in his next speech at the solemn ceremony dedicated to the Day of Agricultural Workers, which has been celebrated since 2017, emphasized that Uzbekistan sees the future of cotton growing in a cluster economy covering all processes: from cotton cultivation to the production of final products from it.

It should be noted that this completely new system for Uzbekistan in a short time turns into an advanced force — a driver that drives the agricultural production of the country. The future of the agricultural sector is associated exclusively with the cluster method. This innovative method is becoming increasingly popular in work organization and performance. The number of cotton and textile clusters operating in the country has already reached 122.

A significant part of the raw cotton produced in the republic in 2020, that is, more than three million tons, fell on the share of clusters. During the year, the yield increased by an average of 10 percent.
Despite the negative impact of the pandemic, fruit and vegetable products were exported for more than one billion dollars [5].

It should be noted that in clusters organized in Bukhara "BCT Cluster", in Tashkent "TST Cluster" and in Surkhandarya "SCT Cluster", acreage is distributed to local families on the basis of a family contract - from 1 to 10 hectares. Local peasants manufacture products based on bilateral agreements with clusters. Provision of the agrotechnological process with the necessary raw materials and labor tools used in the production of agricultural products is carried out at the expense of clusters. At the same time, a family contract makes it possible to use effectively the allocated plots of acreage [6].

3. Research results

Analysis of data for four years shows that the average yield of cotton in Israel is 54 centners, in Australia - more than 50 centners, in Brazil - within 43 centners, in Uzbekistan this indicator averages only 26 centners per hectare, which is almost 2 times less against the background of the above countries. At the same time, special emphasis is placed on obtaining maximum profit from each hectare [11].

The development of clusters requires the construction of textile enterprises, deploying them at short distances from cotton fields. This arrangement of textile mills contributes to the decrease of raw cotton transportation costs by more than 2 times. This creates the basis for ensuring rapid expanded reproduction in the industry, which is facilitated by the uninterrupted supply of raw cotton to enterprises [1].

In such production units, raw materials are converted into fiber, and subsequently into fabric, from which finished products are sewn at textile enterprises. Mini-factories are being opened as part of clusters, where vegetable oil, soap and other products are produced. Currently, the agricultural sector has entered a phase of development based on innovative projects [2].

According to our calculations, if we sell 1 kg of cotton in the form of raw materials, the price of selling raw materials will be 1.5 - 1.7 dollars. At the same time, the fabric obtained from 1 kg of raw cotton can be sold for 3-3.5 dollars, while spending 0.5 dollars on its processing. It should be noted that from this fabric, obtained from 1 kg of raw cotton, it is possible to make finished products, for example jeans, which can be sold for $ 25-30 as an export product outside the country (Table 1) [13].

Table 1. Export indicators of cotton fiber, yarn and textile products of Uzbekistan in 2005-2019, million soums.

| Processed products                          | 2015 | 2018  | 2019  |
|--------------------------------------------|------|-------|-------|
| Fiber                                      | 736.1| 222.1 | 281.6 |
| Yarn                                       | 545.9| 726.7 | 926.1 |
| Finished textiles and clothing              | 184.0| 585.7 | 354.5 |
| Knitwear                                   | 46.1 | 65.5  | 84.8  |
| Cotton fabric                              | 33.8 | 65.6  | 69.2  |
| Other finished textile products            | 15.4 | 42.9  | 51.9  |
| Carpets                                    | 13.6 | 31.0  | 32.0  |
| Cotton wool, felt and non-woven materials  | 16.4 | 26.8  | 108.1 |
| Total cotton processing products           | 855.2| 1544.2| 1626.6|

From the table data it can be seen that in 2015 only 855.2 thousand tons of processed cotton products were exported. In 2019, this indicator increased by more than 2 times and amounted to 1,626.6 thousand tons, which indicates the effective operation of cluster systems operating in the cotton and textile sector. Considering the activities of cotton and textile clusters, it is also necessary to analyze the agricultural production of Uzbekistan in the regional context (Table 2) [12].
The Syrdarya region, as evidenced by the data given in the table. The regions with the lowest shares of agricultural production are the Republic of Karakalpakstan and

| Regions                  | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Republic of Uzbekistan   | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  |
| Republic of Karakalpakstan | 3.21 | 2.83 | 3.25 | 3.12 | 3.13 | 3.35 | 3.40 | 3.24 | 3.50 | 3.80 | 3.87 |

* Systematized by the authors according to the data of the State Statistics Committee of the Republic of Uzbekistan

| Territories | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------|------|------|------|------|------|------|------|------|------|------|------|
| Andijan     | 9.21 | 9.42 | 9.48 | 9.90 | 9.77 | 9.84 | 10.27| 10.32| 10.46| 10.95| 10.47|
| Bukhara     | 7.86 | 8.28 | 8.05 | 8.51 | 8.38 | 8.32 | 8.49 | 8.75 | 9.10 | 8.87 | 9.43 |
| Jizzakh     | 5.63 | 5.88 | 5.83 | 5.68 | 5.83 | 5.71 | 5.91 | 5.96 | 6.11 | 6.34 | 6.39 |
| Kashkadarya | 8.92 | 9.35 | 9.76 | 9.59 | 9.40 | 9.13 | 9.40 | 9.69 | 9.18 | 9.22 | 9.50 |
| Navoi       | 4.37 | 4.47 | 4.46 | 4.45 | 4.35 | 4.22 | 4.36 | 4.37 | 4.43 | 4.38 | 4.54 |
| Namangan    | 6.19 | 6.43 | 6.37 | 6.55 | 6.69 | 7.00 | 6.90 | 6.89 | 6.74 | 7.17 | 7.11 |
| Samarkand   | 17.40| 14.89| 14.01| 14.27| 14.36| 14.36| 14.78| 14.51| 13.69| 13.12| 12.94|
| Surkhandarya | 7.41 | 9.05 | 8.66 | 8.14 | 8.27 | 8.25 | 7.56 | 7.83 | 8.03 | 8.25 | 7.81 |
| Syrdarya    | 3.48 | 3.62 | 3.73 | 3.71 | 3.51 | 3.60 | 3.54 | 3.42 | 3.02 | 3.42 | 3.21 |
| Tashkent    | 11.72| 11.37| 11.63| 11.25| 11.09| 10.78| 10.41| 10.52| 9.80 | 9.44 | 9.75 |
| Ferghana    | 8.33 | 8.40 | 8.59 | 8.78 | 8.89 | 9.22 | 8.50 | 8.36 | 9.31 | 8.57 | 8.50 |
| Khorezm     | 6.26 | 6.00 | 6.19 | 6.05 | 6.33 | 6.24 | 6.50 | 6.13 | 6.63 | 6.47 | 6.48 |

(* Systematized by the authors according to the data of the State Statistics Committee of the Republic of Uzbekistan)

Analyzing the data in Table 2, it can be concluded that the Samarkand region occupies a leading position in comparison with other regions, exceeding the rest of the regions by an average of 1.5 times. The regions with the lowest shares of agricultural production are the Republic of Karakalpakstan and the Syrdarya region, as evidenced by the data given in the table.

Due to the uneven distribution of the population across the territory of the republic, it is important to analyze the per capita contribution of regions to the manufacture of agricultural products (Table 3) [12].

| Territories | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------|------|------|------|------|------|------|------|------|------|------|------|
| Andijan     | 1.06 | 1.53 | 1.86 | 2.18 | 2.64 | 3.15 | 3.60 | 4.54 | 5.64 | 6.38 | 7.23 |
| Bukhara     | 1.44 | 2.20 | 2.60 | 3.22 | 3.84 | 4.57 | 5.32 | 6.93 | 9.01 | 9.97 | 12.10|
| Jizzakh     | 1.49 | 2.24 | 2.70 | 3.08 | 3.82 | 4.46 | 5.25 | 6.67 | 8.47 | 9.93 | 11.31|
| Kashkadarya | 1.01 | 1.52 | 1.92 | 2.20 | 2.60 | 3.00 | 3.52 | 4.56 | 5.36 | 6.08 | 7.12 |
| Navoi       | 1.55 | 2.30 | 2.80 | 3.28 | 3.89 | 4.53 | 5.34 | 6.75 | 8.47 | 9.50 | 11.19|

Table 2. The share of regions in agricultural production in Uzbekistan, %*

Table 3. Per capita indicators of agricultural sector production in Uzbekistan by region in 2010-2020, million soums/person*
The largest contribution to the manufacture of agricultural products is made by the Bukhara region (more than 12 million soums in 2020) and the Navoi region (about 11 million sum in 2020). The least contribution is made by the Ferghana region (about 5.5 million soums in 2020). In general, in Uzbekistan during the study period, the average per capita contribution to the agricultural sector increased by more than 7 times, in 2020 it exceeded the bar of 7.2 million soums per 1 person.

It should be noted that the primary task of clusters is to minimize the share of manual labor, increase the mechanization of labor through the introduction of advanced technologies. In addition, it is necessary to create more modern jobs, provide workers with fair wage [3].

It should be noted that there is no concept of "seasonal worker" in the cotton-textile cluster. Employment of people is provided for 12 months a year. They, like the workers of factories and factories, receive wages all year round. The upcoming task of clusters is to strengthen the social protection of workers and employees working for them (Table 4) [12].

**Table 4.** Manufacture of agricultural sector products per one person employed in the economy of Uzbekistan in 2010-2020, million soums/person *.

| Regions            | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Republic of Uzbekistan | 2.65  | 3.80  | 4.56  | 5.30  | 6.38  | 7.63  | 8.69  | 10.96 | 14.12 | 15.97 | 18.86 |
| Republic of Karakalpakstan | 1.71  | 2.17  | 3.02  | 3.39  | 4.12  | 5.29  | 6.15  | 7.42  | 9.31  | 11.54 | 13.82 |
| territories:       |       |       |       |       |       |       |       |       |       |       |       |
| Andijan             | 2.55  | 3.73  | 4.49  | 5.43  | 6.42  | 7.70  | 9.15  | 11.59 | 15.48 | 18.44 | 21.14 |
| Bukhara             | 3.16  | 4.78  | 5.58  | 6.91  | 8.33  | 10.06 | 11.89 | 15.69 | 21.06 | 24.06 | 30.06 |
| Jizzakh             | 4.55  | 6.78  | 8.06  | 9.10  | 11.14 | 12.88 | 15.01 | 18.87 | 23.53 | 25.59 | 29.94 |
| Kashkadarya         | 2.83  | 4.22  | 5.25  | 5.94  | 6.94  | 7.95  | 9.20  | 11.79 | 14.08 | 16.34 | 19.99 |
| Navoi               | 3.31  | 4.90  | 5.94  | 7.05  | 8.46  | 9.99  | 11.94 | 15.32 | 20.36 | 22.94 | 28.06 |
| Namangan            | 2.34  | 3.46  | 4.07  | 4.82  | 5.84  | 7.20  | 7.96  | 9.87  | 12.02 | 14.04 | 16.47 |
| Samarkand           | 4.37  | 5.31  | 5.94  | 6.98  | 8.38  | 9.90  | 11.51 | 14.12 | 17.53 | 19.49 | 22.90 |
| Surkhandarya        | 2.92  | 5.01  | 5.72  | 6.21  | 7.50  | 8.33  | 9.09  | 11.71 | 15.29 | 17.42 | 19.86 |
| Syrdarya            | 3.36  | 5.00  | 6.21  | 7.20  | 8.20  | 10.21 | 11.60 | 14.37 | 15.96 | 21.14 | 24.03 |
| Tashkent            | 3.13  | 4.35  | 5.33  | 6.00  | 7.13  | 8.38  | 9.35  | 12.09 | 14.95 | 16.56 | 20.37 |
| Ferghana            | 1.92  | 2.78  | 3.42  | 4.08  | 4.97  | 6.18  | 6.51  | 8.12  | 12.03 | 12.42 | 14.77 |
| Khorezm             | 3.18  | 4.35  | 5.36  | 6.08  | 7.63  | 8.93  | 10.53 | 12.46 | 17.45 | 19.01 | 22.67 |

(* Systematized by the authors according to the data of the State Statistics Committee of the Republic of Uzbekistan)

The data in Table 4 shows that the manufacture of agricultural sector products per person employed in the economy of Uzbekistan in 2010 amounted to 2.65 million soums, increased 7 times and amounted to 18.9 million soums in 2020. Among the advanced regions there are Bukhara, Jizzakh, Navoi, Syrdarya, Samarkand and Khorezm regions. This is facilitated by the high level of clustering of agro-industrial production in these regions.
4. Conclusions
According to the results of the study, it should be noted that the experience of Uzbekistan convincingly proves the high economic and social efficiency of clustering of agro-industrial production, since it contributes not only to increasing the profitability of production, but also to creating jobs, ensuring the employment of workers throughout the year.

The cluster system is formed on cooperative intersectoral principles, it includes various production units, as well as enterprises of the agro-industrial complex and other industries that have their own interests in the development of this system. According to the results of the study, it can be concluded that the main purpose of the cluster system is not only the production, processing, and sale of the final products of the textile and agricultural industries, but also the development of its new product samples.

An example of the implementation of intersectoral relations is the entry of business entities into the currently functioning agro-industrial and cotton-textile clusters of Uzbekistan.

References
[1] Araslanova A 2017 Cluster approach (M.: LAP Lambert Academic Publishing) pp 208
[2] Akulich M 2017 Cluster approach. Economic growth and innovative clusters (M.: Publishing Solutions) pp 886
[3] Djurabaev O 2020 Formation of model beekeeping facilities and modernized interindustrial communications in human bearing management Archive of scientific research 11
[4] https://finance.uz/index.php/ru/fuz-menu-economy-ru/55-perspektivy-formirovaniya-innovatsionnykh-klasterov-v-uzbekistan
[5] http://ukros.ru/wp-content/uploads/2020/
[6] https://xs.uz/ru/5920711
[7] Nabokov V I, Nekrasov K V, Ziablitckaia N V, Skvortsov E A, Iovlev G A and Sharapova V M 2018 Innovation Activity of the Industry Organizations International Journal of Advanced Biotechnology and Research (IJBR) ISSN 0976-2612, Online ISSN 2278–599X 9(3) 174-177
[8] Yuldashev N K, Nabokov V I and Nekrasov K V 2018 Agriculture innovative development prospects of The Uzbekistan Republic Moscow economic journal 4 31
[9] Nabokov V I, Semin A N, Pryadilina N K, Gusev A S and Nekrasov K V 2020 The density of robotization of agriculture in Russia and its regions WSEAS Transactions on Systems and Control 15 549–555
[10] Nabokov V I, Semin A N, Pryadilina N K, Gusev A S and Nekrasov K V 2020 The density of Robotization of Agriculture in Russia and its Regions WSEAS Transactions on Systems and Control 15 549-554 DOI: 10.37394/23203.2020.15.53
[11] Yuldashev N K, Nabokov V I, Nekrasov K V and Tursunov B O 2020 Modernization and intensification of agriculture in the republic of Uzbekistan E3S Web of Conf. International Scientific and Practical Conference “Development of the Agro-Industrial Complex in the Context of Robotization and Digitalization of Production in Russia and Abroad” (DAIC 2020) 222
[12] State Committee of the Republic of Uzbekistan on Statistics: https://stat.uz/
[13] Creation of jobs in the agro-food sector of the Republic of Uzbekistan World Bank 2020 «Uzbekistan: Agri-Food Job Diagnostic» World Bank, Washington, D.C. https://documents1.worldbank.org/ p 74