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Vilena Seitova¹, Roland Giese²¹University of Turan, Almaty, Kazakhstan;²University of Applied Sciences Hochschule Zittau/Görlitz)Vilena_11@mail.ru r.giese@hszg.de**FORMATION AND DEVELOPMENT OF INNOVATIVE
COTTON-TEXTILE CLUSTER IN KAZAKHSTAN**

Abstract. The article is devoted to the formation and development of innovative services in the cotton industry. Innovation is an objective stimulus and a prerequisite for the dynamic development of the economy. A comparative analysis of the new innovative cotton variety “Turkistan” was carried out, the possibilities of their introduction in production were investigated. The introduction of innovation results, first of all, will contribute to the sustainable economic growth of the cotton industry and, secondly, increase the competitiveness of cotton-textile cluster production in the country.

Innovative cluster approach allows to mobilize all economic factors in the certain direction. Cluster development today is a widely recognized instrument that provides economic development and competitiveness. Rapid growth of cluster initiatives in developed and developing countries has shown their effectiveness and viability. The usage of the cluster model in the development of cotton-textile industry in Kazakhstan is a key factor in the competitiveness of the private companies and the economy associated with the production.

Keywords: innovation, cotton industry, strategy, development, cluster technology, cotton-textile cluster, efficiency, competitiveness.

Kazakhstan's economy is reflected in the system of product complexes of the existing agrarian sector. The living conditions of the country's population depends primarily on the level of agricultural production, the volume of agrarian production, directly related to the formation and development of the economy.

The head of the state N.A.Nazarbayev in his Message to the People set out the question of Kazakhstan's joining to the group of 30 developed countries «...development of agroindustrial complex on the basis of industrial-innovation clusters, deep processing of raw materials and products, export orientation»[1].

One of the export-oriented sectors of the agrarian sector of Kazakhstan, the results of scientific research in cotton growing and the formation of competitive structure on the basis of introducing innovative [2,3], development of the sectoral economy determine the relevance of this theme and its content.

The decline in the production of raw cotton after years of independence led to the country's textile sectors supply of raw materials and reduced demand for export products. Low productivity of raw cotton, high labor and production costs, as well as low purchasing prices compared with fuel and energy costs, inflation led to decrease efficiency in production and the growth of raw cotton output.

These conditions include the loss of the previous logistics system, the inequality of prices for agricultural and industrial products, technologies for outdated production facilities and resources due to financial deficits, etc. the inability to update, in turn, had a negative impact on the development of the cotton industry.

Analysis of long-term data on cotton production in the Republic of Kazakhstan shows an increase in raw cotton output from year to year. According to the data of 2017 y., 95,0% of the total production of raw cotton is in the share of peasant (farmer) farms, and 5,0% - by agricultural enterprises. For the last five years, the volume of raw cotton production in peasant (farmer) farms increased to 33,6% or to 77,0 thousand tons. There were special requirements to establish competitive cotton structures at the production sites taking into account specialization of production on the territories.

Table 1 – Main indexes of cotton industry of Kazakhstan [4]

years	Total crop of cotton industry		Total product of raw cotton		Productivity of raw cotton	Volume of cotton fibre
	thousand ha.	previous year in %	thousand tons	previous year in %	centners/ha.	thousand tons
1991-1995 yy. average	112,3	100,0	234,9	100,0	20,9	85,0
1996-2000 yy. average	124,0	110,4	215,7	91,8	17,4	74,2
2001-2005 yy. average	196,2	158,2	422,6	195,9	21,8	135,9
2005	204,0	103,9	465,0	110,0	23,1	156,3
2006	200,0	98,0	435,4	93,6	22,2	145,0
2007	206,1	103,1	441,7	101,4	22,1	110,5
2008	178,7	86,7	317,5	71,9	18,2	133,3
2009	140,0	78,3	270,0	85,0	19,6	97,1
2010	137,2	98,0	239,8	88,8	17,9	91,4
2011	160,6	117,1	336,0	140,1	21,8	75,5
2012	147,7	91,9	379,7	113,0	26,2	105,8
2013	140,5	95,1	396,7	104,4	28,7	105,7
2014	127,6	90,8	320,7	80,8	25,1	73,8
2015	99,3	77,8	273,9	85,4	27,8	110,7
2016	109,6	110,4	286,7	104,6	26,2	94,2
2017	135,5	123,6	330,5	115,3	24,4	93,1
2017 y. 2010 y., (+,-)	-1,7	97,8	+90,7	137,8	+6,5	136,3

According to the data given in Table 1, the largest amount of raw cotton production in 2005 y. was 465,0 thousand tons. The average annual increase in the production of raw cotton in 2010-2017 yy. was 8,6 thousand tons [5].

Based on the mathematical models using long-term cotton data, trend patterns of the industry's core indicators were identified, analyzed and predicted for the future.

Computing and analysis of determinable values of mathematical models and equations, determined on the basis of special software on the computer, the need to apply the equation $y = +517,22 - 40,302x + 1,9225x^2$ for the future calculation of raw cotton production of the Republic of Kazakhstan, where the coefficient of determination is equal to 0,5331 (Figure 1).

It is calculated on the computer that the model of a trend model $y = 241,95 - 16,488x + 0,5458x^2$ of the general crop area of a cotton crop is a mathematical equation, and its determinant coefficient $R^2 = 0,8594$ was calculated. This is a very high level.

Meanwhile, the cotton yields per hectare, in hectare / ha. The application of the equation for calculating the predicted values $y = +21,764 - 0,3199x + 0,0531x^2$, where the determination coefficient is equal to $R^2 = 0,4074$.

As a result of the factual analysis of the problem on the computer with the multiple regression equation should be used the following equation [6]:

$$y = -307,32 + 2,0015x_1 + 13,1035x_2 + 0,3141x_3 + 0,2833x_4,$$

where the productive index y - total product of raw cotton, thousand tons, and the influencing factors: x_1 - total crop of cotton, thousand hectares; x_2 - productivity of raw cotton, centners/ha; x_3 - consumption of mineral fertilizers, kg.; x_4 - 1 ton of raw cotton, thousand tenge.

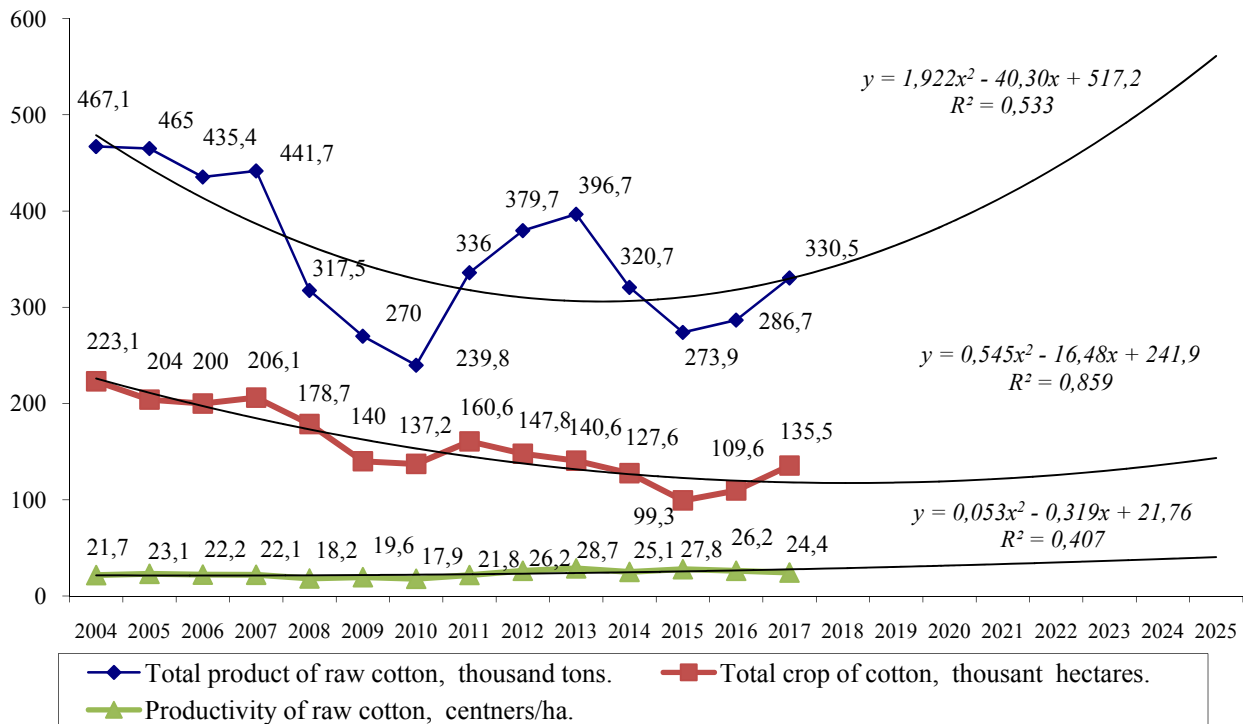


Figure 1 - Description of the output of raw cotton in terms of cotton yields [4]

The value of the coefficient of multiplicity $R^2 = 0,9947$ determines the change in the result, depending on the factors presented in the equation in the overall change of result. Here, this share is 99.47%, and the high level of result changes indicates that the deviation factor, in other words, the effectiveness of the indicator is closely related to the factors in the equation.

Despite the growth of cotton production and financial sustainability, many cotton-breeding farms face a lack of quality seeds, a low level of fertilizers and their base and high cost, and many unresolved problem [7.8].

Currently cotton growing is one of the fastest growing industries in the country, and cotton fiber is the most necessary raw material for the processing industry in the cotton-textile cluster.

Innovative cluster approach allows to mobilize all economic factors in the certain direction. Cluster development today is a widely recognized instrument that provides economic development and competitiveness. Rapid growth of cluster initiatives in developed and developing countries has shown their effectiveness and viability. The usage of the cluster model in the development of cotton-textile industry in Kazakhstan is a key factor in the competitiveness of the private companies and the economy associated with the production. Although textile industry in the Republic of Kazakhstan isn't well known in the world, it has all the capabilities to create textile industry at the regional level. In this regard, innovative strategic project for the development of cotton-textile cluster in Kazakhstan has been set up in Kazakhstan to enhance the competitiveness of the cotton industry and its rational management [9.10].

Free economic zone «Ontustik» was created to develop the innovative cotton-textile cluster in the Turkestan oblast, subsidies and other benefits were provided by the state. About 15 textile enterprises in the territory of special economic zone (SEZ) «Ontustik» produce 100 thousand tons of cotton fibers a year and the main types of production are new innovative products made in Kazakhstan, such as jeans, textiles, garments and hard fabrics, home textile products. LLP «Cottonprom-Cellulose» - «Organization of production of hygroscopic cotton, cotton cellulose and technical carboxymethylcellulose from cotton raw materials», LLP «KazDemirTextile»- «Organization of production of cotton and fiber products assortment» and LLP «Oxy Textile»- «Spinning is a complex automated factory» were created and operate today [11].

Cotton Textile Cluster is a regenerator of intermediate links in the value chain of the cotton-textile industry for the rapid development of yarn and fabric production today with the largest competitive potential.

The raw cotton in Kazakhstan is the average fiber type. More than 80% of the cotton fiber produced on the cotton-cluster is export-oriented. The rest is used in textile enterprises such as LLP «Alliance Kazakh Russian Textile», JSC «Melange», JSC «Yutex», LLP «Nimex Textile» located in the Turkestan Region. The whole volume of cotton produced in the country was directed to Russia.

In western European countries such as Germany, France and the United States, the share of textile and light industry in industrial production is 4%, in Italy - 12%. This allows them to form 20% of the budget, and 75-85% of the domestic market supplies their products [12.13]. Textile share in Turkey and China will reach 30% in GDP. Textile and clothing industry of Kazakhstan covers only 10% of domestic demand. At the same time, the volume of domestic production should meet at least 30% of the domestic demand for the economic security of the country. Kazakhstan has a great potential for the successful development of the textile industry. This is proved with the low cost of raw cotton, the proximity to cotton raw material and the potential sales market for the products, the attractive investment climate and the developed transport infrastructure.

Cotton products are competitive because elite cotton seeds are used as early ripening crops that are resistant to diseases and pests with high quality fibers that meet international standards.

Implementation of new types of innovative cotton is realized through the introduction of all the necessary agro-technical measures and all necessary factors for plant life. This allows obtaining cotton product through using, optimizing and managing correctly all the influencing factors.

Table 2 – Comparative indicators of varieties of raw and cotton cultures in the Republic of Kazakhstan [14]

№	Grade	Raw cotton productivity, c/ha			Average productivity, cen/ha	Deviation from standard, price	Vegetation period	Mass of the first box, gr.	Fiber output, %	Wilt disease, %
		Experience years								
		1 year	2 year	3 year						
1	2	3	4	5	6	7	8	9	10	12
1	C-4727	22,1	22,6	26,8	23,8	standard	113	5,4	37,6	6,1
2	Machtaral 4005	22,8	22,4	25,9	23,7	-0,1	112	5,7	36,2	2,0
3	Machtaral 4007	23,8	21,3	24,5	23,2	-0,6	114	5,7	36,4	2,7
4	Machtaral 4011	24,4	21,6	23,7	23,2	-0,6	118	5,5	37,1	0,2
5	Myrzashol-80	24,7	22,6	26,8	24,7	0,9	118	5,8	37,3	0
6	Bereke-07	21,2	28,3	30,9	26,8	+3,0	117	5,7	38,4	0
7	Machsats	23,6	21,6	30,1	25,1	+1,3	116	5,2	36,3	2,1
8	MA-3047	-	-	29,8	29,8	+6,0	117	5,7	37,4	0,3
9	Turkestan	24,2	29,1	31,3	28,2	+4,4	110	6,0	38,5	0
10	Turkestan-1	24,3	28,7	30,7	27,9	+4,1	109	5,7	36,6	0,3

At present, the basic principles of the introduction of cottonseed crops are identified based on the introduction of innovative technological optimal production programs, identifying key factors and calculation and optimization models that allow for relatively accurate programming of the crop.

Innovative new technology «Turkestan» raw cotton was studied and developed in the research Institute of ecology and practical biology (innovative research enterprise) in Saryagash district of Turkestan oblast. The earliest maturity period is 108-131 days, with the early maturing, innovative crop of cotton seeds and climatic conditions up to maturity, up to 50% from 50% of seedlings. Opening of cotton boxes is at a high level. Until October 1, the cotton-production is 36 - 46 centners per hectare. The fiber productivity is 36 - 37%, the fiber length is 35 - 36 mm. The sparkling white color, the load cut 4,5 – 4,6 g. The relative breaking load is 27,5 - 28,5 g.wt. /fiber. On the international certification fiber is 4,3 - 4,6 micronair, the code is 36 - 37. The size of the seeds is 19-20% [15.16].

The results of this variety quality test were selected to compare with other existing cotton varieties in Kazakhstan (Table 2). Different variety tests were carried out at the «Saryagash» state innovative research complex, where cotton varieties were compared with different indicators.

According to Table 2, Turkestan crude cotton varieties exceed all indicators by their innovative achievements compared to other proven varieties.

The innovative advantage of "Turkestan" raw cotton is that its vegetation period is 110 days from seeding to ripening. This cotton is shorter for 3 days compared to the base grade of the plant. Thus, the weight of the first box of "Turkestan" raw cotton grade is 6,0 grams, 0,4 g higher than the base grade, and fiber fertility is 38,5%, which is not affected by vild disease [17].

«Turkestan» grade cotton seeds is higher than C-4727 raw cotton. «Turkestan» raw cotton is dried rapidly, so the dry weight of this variety is about 2 times more than the dry weight of C-4727. The studies have shown that the opening of the first boxes of «Turkestan» is much more intense than the C-4727. Boxes are opened in 12-13 days. Also, according to the size and weight of the box, the grade «Turkestan» exceeds the C-4727 level.

These specifications affect the cotton productivity. For example, raw cotton yield from 1 hectare of «Turkestan» was 10,1 centner higher than C-4727. In the reporting year, the productivity of the «Turkestan» varieties was 36,3 centners per hectare, while the C-4727 productivity was only 26,2 centner / hectare [18].

Table 3 – Comparative analysis and evaluation of the new innovative «Turkestan» to cotton of base technology

№	Indicators	Measu-ring unit	Indicators		deviation +,-
			Base technology	project	
1	Main volume of the produced raw cotton product in the natural form	centner	262	363	+101
2	Main volume of the produced raw cotton product in the essential level	thousand tenge	2046,3	2835,3	+801,7
3	Production cost of raw cotton per 1 cen.	tenge	6762	7811	-1049
4	Growth of net weight	thousand tenge	-	789	+789
5	Efficiency level	%	15,3	39,2	+23,8
6	Vegetation period	days	113	110	-3
7	Mass of a box	gram	5,4	6,0	+0,6
8	Fiber output	%	37,6	38,5	+0,9
9	Wilt disease	%	6,1	0	-6,1
10	Average productivity	cen./ha	26,2	36,3	+10,1

The analysis shows that in the northern part of the Turkestan region, the introduction of raw cotton of «Turkestan» allows producing 10,1 centners of raw cotton from the hectare of crops and further development of raw cotton in the agricultural production of the Republic of Kazakhstan.

Using the data in the tables above, we can calculate the project's key indicators. The value of production volumes was determined based on the contractual price level. In the analysis of the above table data, the overall growth of the raw cotton crop was reduced to 3 days, the weight of a box increased to

11%, the cotton fiber yield was 2,4% higher, and we see that the wilt disease disappeared. The produced cotton productivity was 36,3 cen./ha on the developed innovative technology project, which is 38,5% higher than the productivity of the main technology. According to the project, the efficiency level of 1 centner of cotton was 39,2%, which is higher than the efficiency of raw cotton productivity using the basic technology [19.20].

Based on the results of the analysis, the following conclusions were made:

In the Turkestan region, it is technically and economically feasible to implement an innovative technological project «Turkestan Early ripening cotton grade».

It is necessary to identify the methods of innovative services management, mechanisms and sources of funding for innovative services based on innovative development programs and create conditions for their implementation in Kazakhstan:

– to attract investments for the purpose of introduction of scientific and technical projects into production in perspective directions of cotton-textile cluster development;

– to implement the cotton-textile cluster on the market, with the release of competitive scientific and technical products;

– it is necessary to create effective mechanisms for reinvesting instruments and means fixed in innovative research projects.

The use of new innovative technologies in the production directly affects business development. The use of new varieties of seeds, machinery and equipment, new irrigation techniques for the introduction of new elite cotton crops will increase the productivity of raw cotton crops and increase the volume of gross product, as well as increase product quality.

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ҚАЗАҚСТАНДА ИННОВАЦИЯЛЫҚ МАҚТА-ТОҚЫМА КЛАСТЕРІН ҚАЛЫПТАСТЫРУ ЖӘНЕ ДАМУ

Аннотация. Мақалада мақта саласында инновациялық қызметтерді қалыптастыру және дамыту қарастырылған. Инновация - экономиканың қарқынды дамуын қалыптастыратын объективті күшті ынталандыру және оның қажетті шарты. Инновациялық жетістіктер негізінде «Түркістан» ерте пісетін мақта сорты» инновациялық технологиялық жобасын жүзеге асыруға, техникалық жағынан мүмкін және экономикалық тиімді екендігі зерттелген. Қолданыстағы инновациялық жаңалықтар, біріншіден, мақта саласының орнықты экономикалық өсуін, екіншіден, мақта-тоқыма кластері өндірісінің бәсекеге қабілеттілігін арттыруға мүмкіндік жаратады.

Инновациялық кластерлік көзқарас барлық экономикалық факторларды нақты бағытта қолдануға мүмкіндік береді. Кластерлерді дамыту бүгінгі күні экономикалық даму мен бәсекеге қабілеттілікті қамтамасыз ететін кеңінен танылған құрал болып табылады. Дамып келе жатқан және дамушы елдердегі кластерлік бастамалардың жылдам өсуі олардың тиімділігі мен өміршеңдігін көрсетті. Қазақстандағы мақта және тоқыма өнеркәсібін дамытуда кластерлік модельді қолдану жеке компаниялардың және өндірістің экономикасының бәсекеге қабілеттілігінің негізгі факторы болып табылады.

Түйін сөздер: инновация, мақта саласы, стратегия, даму, инновациялық қызмет, кластерлік технология, мақта-тоқыма кластері, тиімділік, бәсекеге қабілеттілік.

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ФОРМИРОВАНИЕ И РАЗВИТИЕ ИННОВАЦИОННОГО ХЛОПКО-ТЕКСТИЛЬНОГО КЛАСТЕРА В КАЗАХСТАНЕ

Аннотация. Статья посвящена формированию и развитию инновационных услуг в хлопковой отрасли. Инновация является объективным стимулом и предпосылкой для динамичного развития экономики. Проведен сравнительный анализ нового инновационного сорта хлопка «Туркестан», были изучены возможности их внедрения в производство. Внедрение инновационного сорта хлопка, в первую очередь, будет способствовать

устойчивому экономическому росту хлопковой отрасли и, во-вторых, повышению конкурентоспособности хлопко-текстильного кластерного производства в стране.

Инновационный кластерный подход позволяет мобилизовать все экономические факторы в определенном направлении. Развитие кластеров сегодня является широко признанным инструментом, который обеспечивает экономическое развитие и конкурентоспособность. Быстрый рост кластерных инициатив в развитых и развивающихся странах показал их эффективность и жизнеспособность. Использование кластерной модели в развитии хлопко-текстильной промышленности в Казахстане является ключевым фактором в конкурентоспособности частных компаний и экономики, связанной с производством.

Ключевые слова: инновации, хлопковая отрасль, стратегия, развитие, кластерная технология, хлопко-текстильный кластер, эффективность, конкурентоспособность.

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