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Analysis of the agro-industrial sector of the Kyrgyz Republic

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▸ **Abstract.** In the light of global and regional crises, which have become increasingly frequent since the early 2020s, the issues of food security of individual states are particularly acute. For the Kyrgyz Republic, the task of ensuring its own independence from external food suppliers is also highly relevant. The purpose of this study was to conduct a comprehensive analysis of the agro-industrial sector in Kyrgyzstan. In the process of work, statistical analysis of data for 1990-2023 was carried out, as well as empirical research by remote written questionnaire survey of the target audience. As a result, the data on the growing dynamics of the gross product of the Kyrgyz Republic, the role of agrocomplex in the economy of the country were obtained, and the information on the increase in yields of key crops – raw cotton and melons – was confirmed. Separately, the foreign economic balance of the country was considered, which revealed a marked excess of imports to Kyrgyzstan over exports, which is an alarming signal. In the course of the survey conducted among the owners of small and medium-sized farms, information was obtained confirming the need to increase targeted support programmes and provide soft loans for the purchase of agricultural machinery and seeds. Also, as a result of the questionnaire survey, a management problem was identified, where the majority of owners prefer to manage their farms on their own, not trusting professional management. At the same time, almost all respondents confirmed their willingness to introduce additional processing lines in their farms, which would enable them to offer the market a higher-value product. The results of this study are important for the relevant ministries and agencies to ensure technological growth and efficiency of the agro-industrial complex of the Kyrgyz Republic

▸ **Keywords:** agriculture; farm management; yield; farming efficiency; concessional financing; state support

▸ Introduction

All over the world, agriculture is an important component of the economy and a guarantor of food sovereignty. A special role in it is played by the agro-industrial complex (AIC), which includes, in addition to the process of growing agricultural products, also the industries of processing raw materials, supplying means of production, and logistics infrastructure facilities. Agriculture also occupies a key position in the economy of the Kyrgyz Republic (KR), despite the significant part of mountainous and hilly territories that are not suitable for traditional farming. Kyrgyz scientists have repeatedly addressed in their studies the issue of increasing the efficiency of the national agro-industrial complex and analysing its actual indicators. In particular, A.A. Baimuratov *et al.* (2023) used a comprehensive methodology to assess the investment attractiveness of the agrarian sector of the Kyrgyz Republic, which proved the importance of state regulation. Among the priority areas of support from the state, the authors identified the financing of scientific and innovative developments, the development of public-private partnership mechanisms, as well as ensuring transparent tender procurement.

Sustainable development of the AIC of the KR in an integrated environment was the subject of the work by V. Kozhogulova *et al.* (2023). The analysis of trends in the development of agriculture in the conditions of Eurasian integration allowed identifying such structural features

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as the development of import substitution, factors of instability in logistics chains, and the formation of regional agro-clusters. The resource potential of sustainable agricultural development in the KR was also the subject of research by N. Parpieva *et al.* (2023). Having analysed the totality of land, material, technical and labour resources, the authors concluded that the volume and speed of resource reproduction in agriculture critically depend on the initial capitalization of the subject, its development strategy, as well as the general market conditions. The weak development of market infrastructure for agrarians and the lack of targeted government programmes were named among the challenges to the realization of this potential. When analysing the agriculture of Kyrgyzstan, researchers pay a special role to such a promising area as cotton growing. Natural and geographical features of the country allow developing this branch of the AIC to a strategic level. M.Zh. Abdiev *et al.* (2023), in their work, economically justified the importance of growing raw cotton in Kyrgyzstan and formed recommendations on the creation of appropriate infrastructure, as well as the creation of innovative inter-sectoral co-operatives that unite producers and processors.

K.D. Dzhumabayev *et al.* (2023) also wrote about the efficiency of agricultural cooperatives' investments, emphasizing the importance of involving the rural population of Kyrgyzstan in the regional economy of Central Asia. According to the new market approach proposed by the authors, the efficiency of agrarian cooperatives should be facilitated by the involvement of the State Fund of Agricultural Land, whose resource will be the basis for a phase jump in production. Such a step, according to the authors, will strengthen the competitive advantages of the KR in the conditions of regional integration. According to S.T. Umarov *et al.* (2022), another commodity group of agricultural products that deserves attention is plums. Using the example of cultivation and industrial processing of fruits of this crop, scientists managed to develop theoretical and methodological foundations of the economic growth platform, including the export of finished products from Kyrgyzstan to Germany. Despite the fact that the involvement of a high-margin foreign market implies a number of additional costs such as marketing activities, precise logistics and adaptation of the final product to local consumer characteristics, in the end, the authors' calculations proved that the implementation of such a project will be profitable.

As can be seen, the studies available at the moment cover certain aspects of the AIC of Kyrgyzstan. At the same time, a comprehensive analysis of the problems of management of the national agro-industrial production and development of ways to solve them is required. The purpose of this paper was to conduct an objective analysis of the agro-industrial sector of the Kyrgyz Republic and its management potential.

▸Materials and methods

In the course of this study, various aspects of the AIC in the KR were studied, both in historical perspective and in the context of further development of the sector. In particular, the impact of the COVID-19 pandemic and related quarantine restrictions on the activities of agricultural enterprises was assessed. The method of statistical economic analysis was applied to understand the dynamics of these processes. In the process of the study, the data in the period from 2018 to 2023 were also compared. At the same time, the key indicators of the development of the Kyrgyz AIC were gross production volumes of certain crops by regions and yield per hectare for wheat, melons, and raw cotton. The statistics on gross domestic product (GDP), available up to 2022 inclusive, provided by the GDP (current US$) – Kyrgyz Republic (n.d.), as well as the share of Kyrgyzstan's agriculture in GDP according to the open data of the Share of agriculture in GDP (n.d.), which are also available up to 2022 inclusive, were examined separately. For greater clarity of the dynamics of values, a number of indicators were displayed in the form of graphs in the context of years in a single coordinate system.

Based on the theoretical basis of a number of specialised publications, expert farmer opinions and other open sources, a holistic picture of the market of borrowed funds in agrarian business was formed, including participation in the financing of agribusiness by government programmes, as well as the peculiarities of Islamic lending, which is gaining popularity in the 2020s. Among the materials used in this study, in addition to those already mentioned, data from the Summary of the progress of harvesting crops by regions and districts of the KR as of 23 November 2023 (2023), Export-import operations of the KR in January-February 2024 (2024), Production of main types of livestock products in the KR as of 1 April 2024 (2024). Additionally, data from the Preferential loans to farmers are given in accordance with Islamic principles (2024), A horticulture development programme for 2024-2028 has been developed (2024), Brief express information on the main indicators of socio-economic development of the KR for January-August 2023 (based on preliminary data of the NSC) (2023) was utilised. Lastly, data from About Kyrgyz Republic. Key Industries. Agriculture (n.d.) were considered. In the process of work, structural analysis methods were also used to identify barriers and challenges faced by the agro-industrial sector of the KR – relatively small average land area, land reclamation problems, personnel issues with qualified management of agro-enterprises, weak cooperation between market participants, which complicates the creation of profile clusters.

As part of the empirical research, 250 Kyrgyz farmers who are owners of small and medium-sized businesses were questioned in writing by e-mail using the Computer Assisted Web Interviewing (CAWI) method. According to the Tax Code of the Kyrgyz Republic, these included organizations, and entrepreneurs whose total revenue for the previous year did not exceed 30 million soms. The questionnaire included 4 questions to which respondents were asked to answer using a ten-point system, where 1 is the lowest score and 10 is the highest. The questions had the following form.

1. How do you assess the current situation in the AIC of the Kyrgyz Republic?

2. Assess your farm's need for borrowed financial assistance.

3. To what extent is the management staffing problem solved at your company?

4. How ready are you to incorporate higher-value-added capacity into your production cycle?

In the process of processing the survey results, the method of calculating the average value was used – the scores for each of the questions were summed up and divided by the total number of responses received. In addition to feedback on the questions of interest, brief statistical information was also collected to understand the demographic profile of the respondent. Thus, based on the obtained data, using the extrapolation method, the conditions for further development of agro-industrial complex in Kyrgyzstan were forecasted and recommendations for relevant agencies were formed. All survey participants were informed about how their anonymity is ensured, the purpose of the survey, how their provided data will be used, and the associated risks. The study was conducted in accordance with the principles of The Declaration of Helsinki (1975).

Results

Challenges and opportunities for the development of agro-industrial complex of Kyrgyzstan. Since independence, the KR has been striving to improve its economic performance and the welfare of its population. In this context, the dynamics of the country's GDP growth, as well as the volume of agricultural products produced, both in absolute terms and in relative terms, are very indicative. Consequently, the first block of results analysed the state of the AIC on the basis of statistical data. The change in the size of gross domestic product over the previous decades can be observed in Figure 1.

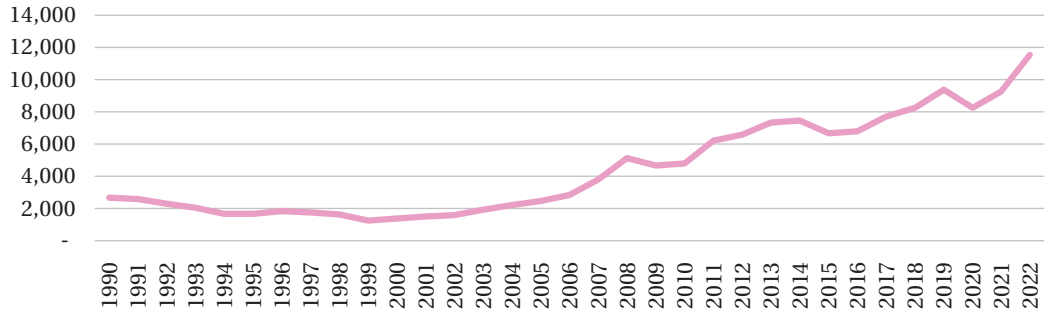

Figure 1. GDP volume of the Kyrgyz Republic by years, million USD
Source: compiled by the authors based on GDP (current US$) – Kyrgyz Republic (n.d.)

According to the chart above, despite a number of economic setbacks, Kyrgyzstan has managed to demonstrate a steady upward trend over the 30 years of independence. Among the stages of temporary decline, it is worth noting 1991-1999, when the economy of the young state was in the stage of formation and was directly dependent on external revenues; a small "setback" in 2008-2010, caused by the World Crisis, as well as a drop in the indicators of 2015-2016. The decline in Kyrgyzstan's GDP in 2020 due to the onset of the COVID-19 pandemic and the resulting quarantine restrictions deserves special attention. Globally, the regime of isolation of citizens and the transition to remote communications had a significant negative impact on the economy, but for the KR this effect was minimal and in the next year, 2021, the country managed to reach "pre-pandemic" financial indicators, and in 2022 to demonstrate growth of almost 25% more. Relative volumes of agricultural production in Kyrgyzstan in previous years are shown in Figure 2.

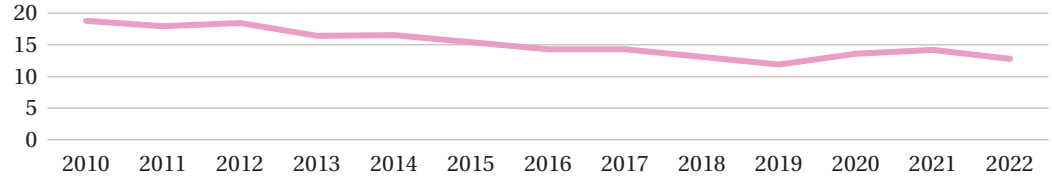

Figure 2. Share of agriculture in GDP of the Kyrgyz Republic, %
Source: compiled by the authors based on Share of agriculture in GDP (n.d.)

Despite the apparent decline in the indicators on the graph, it should be borne in mind that the above figures are relative indicators, i.e. per cent of the gross domestic product of the country. As can be seen from Figure 1, GDP indicators, especially in recent years, have a clearly pronounced positive trend, which means that the volume of AIC products is also growing. In Figure 2, it can be seen that since 2018, the share of agricultural products is in the region of 12%, which, provided that the economy as a whole is growing steadily, is a balanced indicator. For comparison, we can cite the figures of such recognised agrarian leaders as Ukraine (10-12%), Australia (12%), Greece (7%). In addition to general figures, for a detailed analysis of the AIC of Kyrgyzstan, it is necessary to study the indicators of development of individual crops that are important for agriculture in the country, and in the context of different regions. Wheat production volumes are shown in Figure 3.

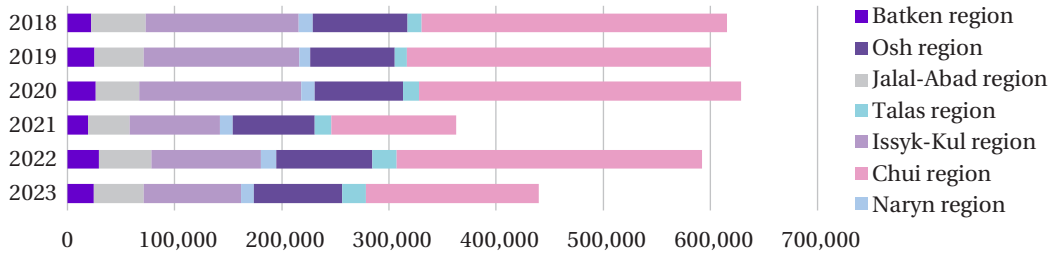

Figure 3. Volume of wheat production by regions of the Kyrgyz Republic by years, tonnes
Source: compiled by the authors based on the Summary of the progress of harvesting crops by regions and districts of the Kyrgyz Republic as of 23 November 2023 (2023)

According to official statistics, starting from 2018, there was a marked decrease in 2021 and 2023. This sample is not sufficient to form conclusions, but the situation is worrying and requires further monitoring. If such negative dynamics continue, government intervention will be required to restore the balance and maintain wheat production in the KR at the same level. At the same time, the dynamics of wheat production in Talas region should be separately noted – despite the general trend, the indicators of this region are growing from year to year. The specifics of raw cotton production are such that due to geographical and climatic reasons, only two regions of Kyrgyzstan can claim to be the leaders in production. Their volumes in the context of previous years are shown in Figure 4.

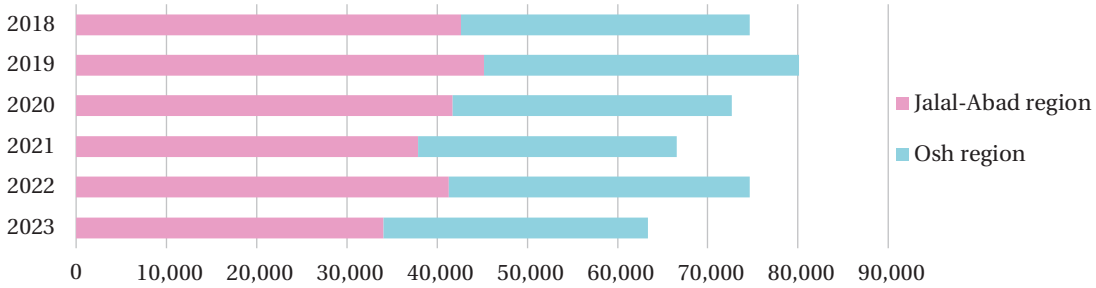

Figure 4. Raw cotton production by key regions of the Kyrgyz Republic by year, tonnes
Source: compiled by the authors based on the Summary of the progress of harvesting crops by regions and districts of the Kyrgyz Republic as of 23 November 2023 (2023)

As can be seen from the graph, Jalal-Abad and Osh regions maintain approximate parity in cotton production, but the overall non-systematic nature of production requires attention – the total amount changes dynamics almost every year, tending to a downward trend. The production volumes of the AIC of Kyrgyzstan in another strategic area, melon crops, are shown in Figure 5.

Melon crop production in Kyrgyzstan is a strategic area with characteristics of a unique trade offer in the macro-region. The existing statistics of the previous six years show a relatively stable trend without sharp spikes from jocks. At the same time, it is melons, due to the above reasons, that can become a kind of "locomotive" for promotion of Kyrgyz products to foreign markets. For a more detailed analysis of the reasons for the observed stagnation, it is necessary to separately examine the yields of key and strategically important for the KR agrarian crops. The dynamics of yields of wheat (in weight after processing), raw cotton (in net weight) and melon crops are shown in Figure 6.

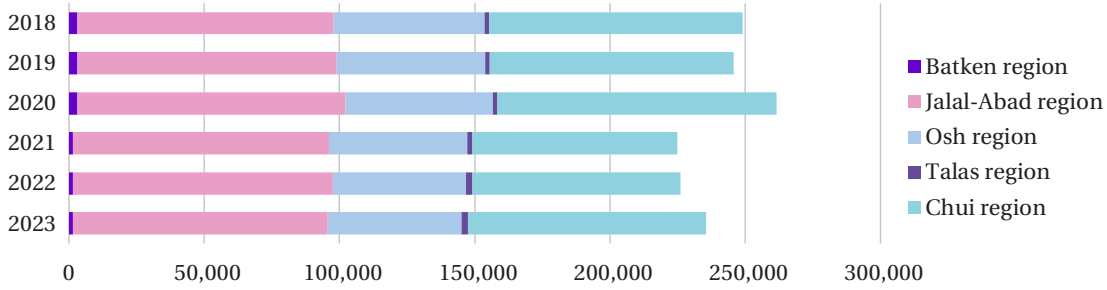

Figure 5. Volume of melon crop production by key regions of the Kyrgyz Republic by years, tonnes
Source: compiled by the authors based on the Summary of the progress of harvesting crops by regions and districts of the Kyrgyz Republic as of 23 November 2023 (2023)

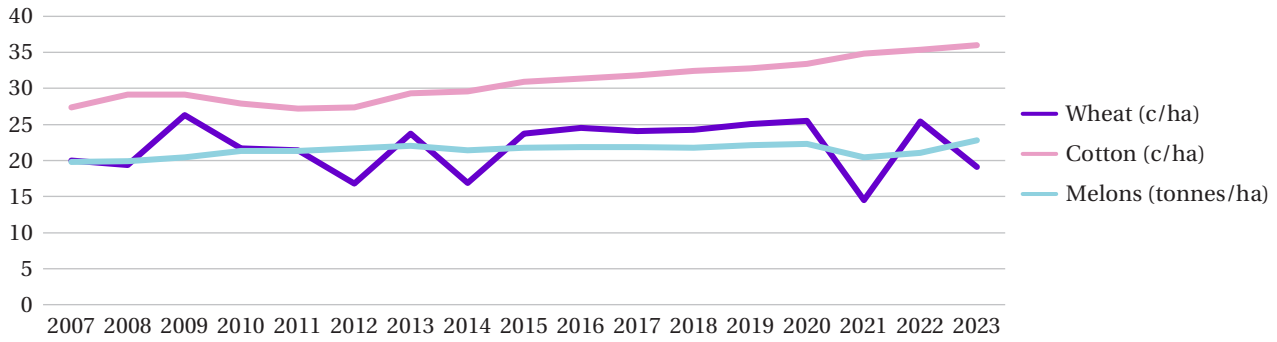

Figure 6. Dynamics of yields of key crops in the agro-industrial complex of the Kyrgyz Republic by years
Source: compiled by the authors based on Summary of the progress of harvesting crops by regions and districts of the Kyrgyz Republic as of 23 November 2023 (2023)

A clear positive trend in cotton and melon yields should be noted – this indicates that the decline in production of some items discussed above is not related to the intensity of farming. On the contrary, based on the results of the analysis, the solution to the problem of productivity of AIC lies in the plane of extensive growth, and it is necessary to take control of the issue of actual reduction of sown areas. Another crucial aspect of the agricultural economy is export-import operations. No country in the world can provide itself with a full range of agricultural products, and it is normal practice to purchase some assortment abroad. At the same time, it is important to maintain parity in sales of own products to foreign markets and purchase of necessary products abroad in order not to fall into food dependence on imports (Kryvenko, 2024). The dynamics of the total amount of purchases of agricultural products from external suppliers, as well as the volume of exports of own products, are shown in Figure 7.

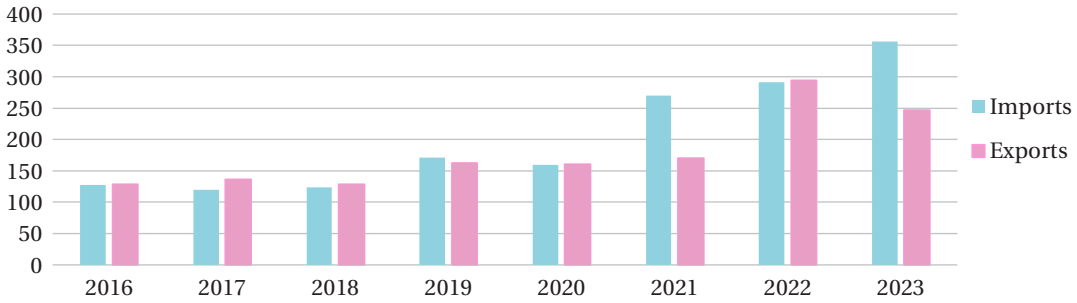

Figure 7. Dynamics of agro-imports and agro-exports to/from KR by years, million USD
Source: compiled by the authors based on the Export-import operations of the Kyrgyz Republic in January-February 2024 (2024)

Based on actual data, the current situation in the foreign economic direction of the Kyrgyz AIC is far from balanced. In 2023, exports did not even reach 70% of agricultural products purchased abroad, which puts the Republic in a certain dependence. Additional efforts should be made to increase exports and bring the ratio between imports and exports of agricultural products closer to the parity point. Access to "long money" – loans or other material assistance that does not need to be repaid in the short term – is of great importance for agricultural business. Unlike trading or brokerage services, which involve a quick turnover of money, working on the land requires planning and financing for many years ahead. This is why the government and international programmes currently operating in Kyrgyzstan are so important – some of them will be listed and analysed below.

The "Horticulture Development Programme" initiated by the A horticulture development programme for 2024-2028 has been developed (2024) encourages planting of fruit and berry trees from 2024 to 2028 and envisages the provision of preferential targeted loans to the population for almost 2 billion KGS, the establishment of 14 nurseries, 25 specialised cooperatives and 14 horticultural clusters. The authors of the project, among the goals and objectives of the programme, separately emphasise the importance of creating opportunities for export and increasing the competitiveness of Kyrgyz fruit in foreign markets. The traditional seasonal programme of preferential government loans for Kyrgyz farmers has started in 2024 (In the new season…, 2024). Under this project, state banks can provide up to 500 thousand soms at a reduced annual rate of 6 per cent to entrepreneur-agrarians with only one condition – that the funds are used in a specialised way.

"Agrofinance for value chains" is another €37 million programme funded by several EU structures (Supporting farmers in Kyrgyzstan…, 2023). An important difference from previous projects is the strict linkage of the programme to the financing of agrarian innovations, scientific developments, as well as the introduction of modern technologies in agriculture. These steps will make it possible to

switch the AIC of the KR from raw material specialization to the production of higher value-added agro-products more quickly. International programmes to support farming in the KR have different forms. For example, the Kyrgyz Republic: Remote household food security surveys (2023) helps Kyrgyz farmers grow wheat and then buys back their crops. A project called "Empowering Local Smallholder Farmers" selects small family businesses based on income level and number of children in the family, finances them, and then uses the purchased flour to provide food aid to those in need in the region.

Another project, but already initiated by the Farmer-to-Farmer (2023), is called "Farmer-to-Farmer" and is designed to improve the skills and technical equipment of Kyrgyz agrarians. Since the atomization of the educational base of the AIC in the KR often creates significant obstacles to obtaining quality crops, 118 experts from all over the world came to the country to transfer their experience and skills free of charge. In general, given the national and religious traditions of the Kyrgyz people, especially those living in rural areas, Islamic banking, which is gaining popularity, may be a solution to the issue of attracting external loans. According to official information from the Preferential loans to farmers are given in accordance with Islamic principles (2024), Aiyl Bank OJSC and RSK Bank provide preferential financing to private enterprises of crop production, livestock breeding and land reclamation in accordance with Islamic principles under the Murabaha deal. Farmers can take such a preferential loan for a period of two years and up to 500 thousand soms.

In addition to purely financial constraints, farms in the KR face a number of challenges. These include, firstly, the small size of land plots, problems with land irrigation and business management, as well as the lack of full-fledged communication between farms, which precludes the creation of not only technological agricultural clusters, but even simple co-operatives.

Analysis of the results of the survey of farmers in Kyrgyzstan. In the next, more practical part of the study, in order to thoroughly analyse the genesis of the current situation and to obtain an "inside" assessment, an electronic questionnaire was conducted among owners of small and medium-sized agribusinesses whose contacts were found in the public domain. A questionnaire containing four questions and an invitation to respond within 10 working days was sent to the e-mail accounts of 250 farmers. Each of the questions assumed a response format from 1 (lowest) to 10 (highest) points and publication of the answers on condition of anonymity. In terms of the generalised profile of respondents, with a total sample of 182, the gender ratio was 97% male (177) versus 3% female (5); average age was 48 years (range 28 to 65).

After the stipulated period, 193 completed questionnaires were returned, eleven of which were invalidated due to the presence of text formatting in some responses. The total qualitative response rate was 72.8%, which is quite low for a specialised f CAWI survey. The question "How do you assess the current situation in the AIC of Kyrgyzstan?" received a total number of 904 points. The average arithmetic assessment of this question by specialists was, thus, 904/182 = 4.97 points out of 10 possible. This is a low score, indicating serious problems in the industry from the point of view of ordinary market participants. For the task "Assess the need of your farm for borrowed financial assistance" the total number of points 1550 was obtained. This means that the arithmetic mean score is 1550/182 = 8.52 points out of 10 possible, which means that the demand of Kyrgyz farmers for external financial assistance for the development of agribusiness is still high. In response to the next question – "To what extent is the human resource management problem solved at your enterprise?" – respondents gave a total score of 1,314 points. The arithmetic mean score in this case was 1,314/182 = 7.2 points. This indicator turned out to be much higher than predicted and, as it was learnt as a result of clarifying analysis, was explained by the fact that the majority of small farmers prefer to manage their enterprise on their own, losing in quality, but gaining in wages for hired labour and efficiency of decision-making. Finally, the final question – "How ready are you to include higher-value-added facilities in your production cycle?" – a sum of 1,645 was obtained, i.e. an average of 9.04 points – the highest average score in the questionnaire. Such a high score indicates that farmers themselves understand the need to modernise production and switch from the supply of unprocessed agro-products and raw materials to goods of a higher level of processing, which implies higher earnings.

Thus, a comprehensive analysis of the current situation in the agricultural industry of Kyrgyzstan – both statistical and empirical – indicates such key trends: COVID-19 pandemic and the resulting quarantine restrictions in 2020-2021 did not have a significant impact on the industry; GDP of the KR is growing dynamically, the economic situation of the country as a whole is improving, the specific weight of the AIC in GDP is decreasing, but it is stable at the level of the leading agrarian powers; gross volume of actual production of key crops – wheat, cotton, melons – in previous years was in an unpredictable trend, but yields per hectare are steadily improving year by year; project support of agriculture in the form of targeted programmes, both by the KR authorities and international institutions, is at a high level, it is only necessary to control timely awareness of farmers about such initiatives. In addition, it should be noted that in the community of small and medium-sized farm owners there is a consensus on the need to increase the level of product processing to maximise profits, but smallest farm owners prefer to manage the business themselves, which is often less efficient and costlier in the long run than hiring a specialist. This stereotype needs to be corrected through a holistic communication strategy.

▸ Discussion

The agro-industrial sector in almost any state is not only a vast area for employment of the population, but also a guarantor of food security. That is why many scientific works all over the world are devoted to the study and analysis of this strategic industry, prospects, and programmes for its qualitative development. Some issues raised in this study are purely national in nature and imply the peculiarities of agricultural development in the Kyrgyz Republic, but most of the topics have significant parallels with international practice.

For example, the impact of the COVID-19 pandemic on AIC KR activities analysed above was found to be negligible, while in the work of G. Gruère & J. Brooks (2021), the authors identified the coronavirus as the cause of significant volatility in the industry. Among the key negative impacts of COVID-19 on agribusiness, labour shortages due to quarantine restrictions, changes in consumer demand for a number of technology crops such as biofuels, and disruptions in supply logistics, which affected demand for perishable agricultural products, were identified as key negative factors. Another group of authors, led by S. Arita *et al.* (2022), conducted an econometric assessment of the impact of the pandemic on the agribusiness sector and found that although trade in agro-products remained mostly stable during 2020-2021, the sector as a whole experienced notable fluctuation. For example, there was a redistribution of demand on the HoReCa side – whereas previously most restaurants and cafés prioritised a wide range of agricultural products, often exotic, COVID-19 restrictions forced them to narrow the list of services provided by the catering industry to courier delivery of ready meals, which significantly affected the range of fruits and vegetables ordered (Buka *et al.*, 2023).

Another important issue raised in this study concerns the financing of farmers through government programmes and private initiatives. Z. Yi *et al.* (2021) believed that concessional credit for agricultural production and supply from smallholder farmers with limited capital is particularly important in developing countries. In conformity with their research work, in addition to traditional bank financing, direct financing from creditworthy intermediary platforms also plays a major role. Moreover, it is with guarantee and direct financing that the production performance of small farm enterprises becomes higher. T. Havemann *et al.* (2022) also wrote about the importance of state support, examples of which were given in this paper in relation to the Kyrgyz situation. In their opinion, to achieve the global goals of sustainable development in agriculture, appropriate incentive programmes are also necessary. In general, it was proved that in order to achieve a significant level of investment in agriculture, it is necessary to attract all legal forms of support for farmers, including innovative ones (Shahini *et al.*, 2023).

C. Brown *et al.* (2021) wrote about subsidies to farming programmes from the European Union structures – the work of some of them in Kyrgyzstan was also discussed in the present article. The authors of the study of European motivational policy, after conducting several interviews, found that the determining factors for modern farmers are economic and structural factors, while environmental issues are of secondary importance to them. Thus, a number of support programmes need to be rapidly revised to take into account new motivational models. Farm management is also a rather complex and multidimensional issue (Yahelyuk *et al.*, 2023). According to the results of the survey conducted in the course of this work, the majority of small farm owners in Kyrgyzstan prefer to manage their farms themselves, but international experience casts doubt on this approach. For example, W. Sroka *et al.* (2023), studying various business models on the example of Poland, proved that the percentage of successful and profitable farms is significantly higher among those enterprises where hired professional managers are engaged in routine management, and owners participate only in solving strategic issues. As the authors proved, hired managers often have higher motivation and ability to establish personal relationships with customers.

It should be noted that there are also existing global trends that are not yet widely represented in the AIC of the Kyrgyz Republic. Such innovations include the "Internet of Food" described by N. Sundmaeker *et al.* (2016) and the integrated high-tech precision farming system studied by A. Monteiro *et al.* (2021). At the same time, while the term "Internet of Food", created by analogy with the Internet of Things (IoT) is promising to realise new levels of control and is able to form intelligent networks of connected agricultural objects, precision farming aims to conserve resources and manage the spatial and temporal variability of soils. Both high-tech initiatives need to be implemented in Kyrgyzstan – at least at the level of pilot projects. A lot of attention in the analysis was devoted to the export of agricultural products and the need to maintain a balance between imports and exports. V. Matkovski *et al.* (2022), who studied the export competitiveness of the agri-food sector, also focused on minimizing dependence on external suppliers. Using the example of the Western Balkan countries, where in previous years there was a marked intensification of trade in agro-industrial products, the authors promoted the idea of specialization of the national economy in a particular market segment. In the case of the Kyrgyz agricultural complex, as mentioned above, such a unique offer could be raw cotton and melons (Totubaeva *et al.*, 2023).

In addition to assortment decisions, it is important to consider possible logistical peculiarities when planning a long-term export policy. J.C. Beghin & H. Schweizer (2020) identified the most significant trade costs of agricultural products as the formation of transport consignments, renting regional warehouses in the country of discharge and maintaining the necessary storage regime. In turn, D.D.D. Fiankor *et al.* (2020) drew attention to another challenge to foreign trade in agricultural products – the inconsistency of different national standards, which include phytosanitary control requirements. As it was proved in the process of this study, one of the most important functions of the AIC is to ensure national food security. For Kyrgyzstan, with its arid climate, this thesis is especially relevant and farmers in the southern regions of the country literally fight for the harvest every year (Zheleuova *et al.*, 2020). As R. Mohtar (2021) noted in his work, that the neighbourhood of deserts forces national governments around the world to regularly make a difficult decision – whether to sell harvested agricultural products abroad or to use them as a buffer of food sovereignty.

A sound national food policy is also important for countries with more temperate climates – W.J. Deaton & A. Scholz (2022), using Canada as an example, examined the features of security programmes, wholesale price and duty statistics for key agro-industrial export categories, and developed an algorithm for calculating strategic reserves to maintain the country's food independence even in force majeure conditions. Similar calculations were observed in the study of M.F. Rabbi *et al.* (2021) who examined the relationship between food security and the transition

to the Sustainable Development Goals. After reviewing 25 indicators of food independence, the authors proposed a set of measures to facilitate their implementation in the national AIC and gave examples of practical implementation of such programmes in Central European countries.

Thus, most of the problems and challenges facing the AIC highlighted in the course of the analysis are not purely national or regional peculiarities. Globalization helps the responsible services of the KR to identify similar cases in the agriculture of other countries and adopt their positive experience. It is important, however, that such import of ideas and technologies takes place in a timely manner, legally and according to pre-planned algorithms.

Conclusions

In the process of detailed analysis of the AIC of the KR, the dynamics of its development were assessed, current trends in yields of strategically important crops were identified, and recommendations on future priorities of the industry were formed. In particular, such indicators as the country's GDP and the share of agriculture in the gross domestic product are on a positive trend, and the increasing yields of cotton and melon crops per hectare allow talking about the formation of these crops as a unique trade advantage for the national economy of the KR. At the same time, the study also revealed a number of challenges that require government intervention, such as problems with the financing of small farms and the unstable situation with the volume of harvested crops from year to year with a downward trend. Despite the presence in the country of a significant number of various state and cross-national programmes to support small farms, more activity is still needed in this area.

Speaking about specific indicators, it should be noted the growth of GDP of the KR in 2022 by almost 25%, the share of agrarian production in the region of 12% of GDP, the growth of cotton yields from 2013 to 2023 by 23%, as well as the imbalance of agrarian foreign economic activity of Kyrgyzstan in the amount of 30% in 2023. The results of the survey showed the following average score of answers to the questions: "How do you assess the current situation in the AIC of the Kyrgyz Republic?" – 4.97; "Assess the need of your farm for borrowed financial assistance" – 8.52; "To what extent is the human resource management problem solved at your enterprise?" – 7.2; "How ready are you to include in your production cycle the capacities of higher conversion?" – 9.04.

Thus, it can be stated that although the AIC of the KR is developing mainly in the right direction, the pace of this development lags behind the global level, which is especially noticeable in the example of innovation implementation. The use of international experience in the development of precision farming system deserves special attention and may become the subject of the next study.

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Conflict of interest

None.

References

[1] A horticulture development programme for 2024-2028 has been developed. (2024). Retrieved from https://agro.gov.kg/ru/12023/.

[2] Abdiev, M.Zh., Toktorov, K.K., Imaraliev, O.R., Ismailov, A.K., & Bekboeva, A.Zh. (2023). State and development of cotton production in Kyrgyzstan. In E.G. Popkova, B.S. Sergi, A.V. Bogoviz & E. Semenova (Eds.), *Digital agriculture for food security and sustainable development of the agro-industrial complex* (pp. 11-16). Cham: Springer. doi: 10.1007/978-3-031-27911-9_2.

[3] About Kyrgyz Republic. Key Industries. Agriculture. (n.d.). Retrieved from https://invest.gov.kg/about-kyrgyz-republic/key-industries/#Agriculture.

[4] Arita, S., Grant, J., Sydow, S., & Beckman, J. (2022). Has global agricultural trade been resilient under coronavirus (COVID-19)? Findings from an econometric assessment of 2020. *Food Policy*, 107, article number 102204. doi: 10.1016/j.foodpol.2021.102204.

[5] Baimuratov, A.A., Zikiraev, M.T., Kayipkulova, A.S., Kerimbaeva, T.E., & Parpieva, F.S. (2023). Problems of increasing investment attractiveness of the agro-industrial complex of the Kyrgyz Republic and ways to solve them. In E.G. Popkova (Ed.), *Sustainable development risks and risk management: A systemic view from the positions of economics and law* (pp. 407-411). Cham: Springer. doi: 10.1007/978-3-031-34256-1_71.

[6] Beghin, J.C., & Schweizer, H. (2020). Agricultural trade costs. *Applied Economic Perspectives and Policy*, 43(2), 500-530. doi: 10.1002/aepp.13124.

[7] Brief express information on the main indicators of socio-economic development of the Kyrgyz Republic for January-August 2023 (based on preliminary data of the NSC). (2023). Retrieved from https://mineconom.gov.kg/ru/post/9594.

[8] Brown, C., Kovács, E., Herzon, I., Villamayor-Tomas, S., Albizua, A., Galanaki, A., Grammatikopoulou, I., MsSgaskep, D., Olsson, J.A., & Zinngrebe, Y. (2021). Simplistic understandings of farmer motivations could undermine the environmental potential of the common agricultural policy. *Land Use Policy*, 101, article number 105136. doi: 10.1016/j.landusepol.2020.105136.

[9] Buka, S., Tkachuk, V., Kondratiuk, V., Tonkha, O., & Slobodyanyuk, N. (2023). Prospects for agribusiness in Ukraine over the next 5 years. *International Journal of Environmental Studies*, 80(2), 291-298. doi: 10.1080/00207233.2022.2157630.

[10] Deaton, B.J., & Scholz, A. (2022). Food security, food insecurity, and Canada's national food policy: Meaning, measures, and assessment. *Outlook on Agriculture*, 51(3), 303-312. doi: 10.1177/00307270221113601.

[11] Dzhumabayev, K.D., Dzhumabayev, A.K., Jamalov, Sh.A., Kydykbaeva, E.K., & Azamat kyzy, T. (2023). Prospects for using investment by agricultural cooperatives of Kyrgyzstan in the regional economy of Central Asia. In E.G. Popkova & B.S. Sergi (Eds.), *Food security in the economy of the future: Transition from digital agriculture to Agriculture 4.0 based on deep learning* (pp. 101-111). Cham: Palgrave Macmillan. doi: 10.1007/978-3-031-23511-5_11.
[12] Export-import operations of the Kyrgyz Republic in January-February 2024. (2024). Retrieved from https://www.stat.kg/ru/statistics/download/operational/1780/.
[13] Farmer-to-Farmer. (2023). Retrieved from https://www.usaid.gov/kyrgyz-republic/fact-sheet/farmer-farmer.
[14] Fiankor, D.D.D., Haase, O.K., & Brümmer, B. (2020). The heterogeneous effects of standards on agricultural trade flows. *Journal of Agricultural Economics*, 72(1), 25-46. doi: 10.1111/1477-9552.12405.
[15] GDP (current US$) – Kyrgyz Republic. (n.d.). Retrieved from https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=KG.
[16] Gruère, G., & Brooks, J. (2021). Viewpoint: Characterising early agricultural and food policy responses to the outbreak of COVID-19. *Food Policy*, 100, article number 102017. doi: 10.1016/j.foodpol.2020.102017.
[17] Havemann, T., Negra, C., & Werneck, F. (2022). Blended finance for agriculture: Exploring the constraints and possibilities of combining financial instruments for sustainable transitions. In G. Desa & X. Jia (Eds.), *Social innovation and sustainability transition* (pp. 347-358). Cham: Springer. doi: 10.1007/978-3-031-18560-1_23.
[18] In the new season of preferential lending to farmers in Kyrgyzstan, the amount of support has become smaller, but more farmers will be able to receive it. (2024). Retrieved from https://dairynews.today/kz/news/v-novom-sezone-lgotnogo-kreditovaniya-fermerov-v-kyrgyzstane-summa-podderzhki-stala-menshe-no-poluch.html.
[19] Kozhogulova, V., Mardalieva, L., Kozhomkulova, A., & Sheralieva, Zh. (2023). Sustainable development of the agricultural sector of Kyrgyzstan in an integrated environment. *AIP Conference Proceedings*, 2612, article number 030021. doi: 10.1063/5.0113043.
[20] Kryvenko, N. (2024). Agrarian integration: Theoretical foundations. *Ukrainian Black Sea Region Agrarian Science*, 28(1), 40-51. doi: 10.56407/bs.agrarian/1.2024.40.
[21] Kyrgyz Republic: Remote household food security surveys. (2023). Retrieved from https://docs.wfp.org/api/documents/WFP-0000151608/download/?_ga=2.160340669.1276056.1715586344-1289844497.1715586343.
[22] Matkovski, B., Zekić, S., Đokić, D., Jurjević, Ž., & Đurić, I. (2022). Export competitiveness of agri-food sector during the EU integration process: Evidence from the Western Balkans. *Foods*, 11(1), article number 10. doi: 10.3390/foods11010010.
[23] Mohtar, R. (2021). *Food for trade or food for national food security: A dilemma for drylands*. Retrieved from https://wefnexus.tamu.edu/files/2021/12/PB-52-21-Rabi-Mohtar.pdf.
[24] Monteiro, A., Santos, S., & Gonçalves, P. (2021). Precision agriculture for crop and livestock farming – brief review. *Animals*, 11(8), article number 2345. doi: 10.3390/ani11082345.
[25] Parpieva, N., Matikeyeva, N., Sheralieva, Zh., Adylbekova, N., & Amatova, U. (2023). Resource potential for the sustainable development of agriculture in the Kyrgyz Republic. *E3S Web of Conferences*, 380, article number 01022. doi: 10.1051/e3sconf/202338001022.
[26] Preferential loans to farmers are given in accordance with Islamic principles. (2024). Retrieved from https://agro.gov.kg/ru/12783/.
[27] Production of main types of livestock products in the Kyrgyz Republic as of 1 April 2024. (2024). Retrieved from https://www.stat.kg/en/statistics/download/operational/1775/.
[28] Rabbi, M.F., Hasan, M., & Kovács, S. (2021). Food security and transition towards sustainability. *Sustainability*, 13(22), article number 12433. doi: 10.3390/su13221212433.
[29] Shahini, S., Shahini, E., Koni, B., Shahini, Z., Shahini, E., & Bërxolli, A. (2023). Enhanced tomato yield via bumblebee pollination: A case study in Durres, Albania. *International Journal of Design and Nature and Ecodynamics*, 18(4), 905-914. doi: 10.18280/ijdne.180417.
[30] Share of agriculture in GDP. (n.d.). Retrieved from https://w3.unece.org/PXWeb/en/Table?IndicatorCode=6.
[31] Sroka, W., Sulewski, P., Mikolajczyk, J., & Król, K. (2023). Farming under urban pressure: Business models and success factors of peri-urban farms. *Agriculture*, 13(6), article number 1216. doi: 10.3390/agriculture13061216.
[32] Summary of the progress of harvesting crops by regions and districts of the Kyrgyz Republic as of 23 November 2023. (2023). Retrieved from https://www.stat.kg/en/statistics/download/operational/1736/.
[33] Sundmaeker, N., Verdouw, S., Wolfert, S., & Freire, L.P. (2016). Internet of food and farm 2020. In O. Vermesan & P. Friess (Eds.), *Digitising the industry internet of things connecting the physical, digital and virtual worlds* (pp. 129-151). New York: River Publishers. doi: 10.1201/9781003337966.
[34] Supporting farmers in Kyrgyzstan: "Agrofinance for value chains". (2023). Retrieved from https://kaktus.media/doc/480905_podderjka_fermerov_v_kyrgyzstane:_agrofinansirovanie_cepochek_dobavlennoy_stoimosti.html.
[35] The Declaration of Helsinki. (1975). Retrieved from https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/.
[36] Totubaeva, N., Batykova, A., Karches, T., Osmonaliev, A., & Sultanalieva, V. (2023). Ecological aspects in the use of soil enzymes as indicators of anthropogenic soil pollution. *Scientific Horizons*, 26(12), 88-98. doi: 10.48077/scihor12.2023.88.

[37] Umarov, S.T., Toktorov, K.K., & Maatov, K.M. (2022). Ensuring the competitive advantage of the agricultural sector of Kyrgyzstan (case study of cultivation, processing, and marketing of plum). In E.G. Popkova & B.S. Sergi (Eds.), *Sustainable agriculture: Circular to reconstructive* (pp. 113-121). Singapore: Springer. doi: 10.1007/978-981-16-8731-0_12.
[38] Yahelyuk, S., Didukh, V.D., & Fomych, M. (2023). The characteristics of agricultural crops stem biomass. *Commodity Bulletin*, 1(16), 235-243. doi: 10.36910/6775-2310-5283-2023-17-19.
[39] Yi, Z., Wang, Y., & Chen, Y. (2021). Financing an agricultural supply chain with a capital-constrained smallholder farmer in developing economies. *Production and Operations Management*, 30(7), 2102-2121. doi.org/10.1111/poms.13357.
[40] Zheleuova, Z.S., Uzakov, Y.M., Shingisov, A.U., Alibekov, R.S., & Khamitova, B.M. (2020). Development of halal cooked smoked beef and turkey sausage using a combined plant extracts. *Journal of Food Processing and Preservation*, 45(1), article number e15028. doi: 10.1111/jfpp.15028.

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▸ **Анотація.** У світлі глобальних і регіональних криз, що проявляються з початку 2020-х років дедалі частіше, питання продуктової безпеки окремих держав постають особливо гостро. Для Киргизької Республіки завдання забезпечення власної незалежності від зовнішніх постачальників продовольства також є вкрай актуальним. Метою цього дослідження було провести всебічний аналіз агропромислової галузі Киргизстану. У процесі роботи було проведено статистичний аналіз даних за 1990-2023 роки, а також емпіричне дослідження методом дистанційного письмового анкетування цільової аудиторії. У результаті було отримано дані щодо зростаючої динаміки валового продукту Киргизької Республіки, ролі агрокомплексу в економіці країни, а також підтверджено інформацію про збільшення врожайності ключових сільськогосподарських культур – сирої бавовни та баштанних. Окремо було розглянуто зовнішньоекономічний баланс країни, в результаті якого виявлено помітну перевагу імпорту в Киргизстан над експортом, що є тривожним сигналом. У процесі проведеного серед власників малих і середніх фермерських господарств опитування, було отримано інформацію, що підтверджує необхідність збільшення адресних програм підтримки та надання пільгових кредитів для закупівлі сільгосптехніки та насіннєвого матеріалу. Також у результаті анкетування було визначено проблему управління, коли більшість власників надають перевагу самостійному управлінню господарством, не довіряючи професійному менеджменту. Водночас, майже всі респонденти підтвердили готовність упровадження у своїх господарствах додаткових технологічних ліній з переробки сировини, завдяки чому фермерства зможуть запропонувати ринку продукт більш високого переділу. Результати цього дослідження є важливими для профільних міністерств і відомств, покликаних забезпечити технологічне зростання та ефективність агропромислового комплексу Киргизької Республіки

▸ **Ключові слова:** сільське господарство; управління фермою; урожайність; ефективність землеробства; пільгове фінансування; державна підтримка