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Improving the Program-Targeted Management Methodology and Its Practical Application for the Sustained and Environment Development of Agro-Industrial Complex

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Abstract:

The following paper considers the flaws of the development stage, implementation patterns, changes in the monitoring procedure within State Programs and the National Project for the Development of the Kazakhstan's agro-industrial complex. The risks caused by the poor attention to long-term industry development priorities based on environmental, social, governance principles and the abundance of planned quantitative indicators are identified.

The dynamics of Kazakhstan's agricultural industry development key indicators is compared with the indicators of countries successful in implementing agricultural policies. The effectiveness of the implementation of the goals in the country context was assessed. The impact of global challenges such as global climate warming, water scarcity, significant atmospheric pollution as a result of increased emissions from agriculture, worldwide forest loss, soil depletion on the development of world agricultural markets has been confirmed. An average pace of Kazakhstan's agricultural market development has been confirmed. The expected GDP value in agriculture is predicted in case of an increase in investment in fixed assets.

The paper concludes that Kazakhstan has not reached its full agricultural potential and recommends giving attention to such drivers of the agricultural sector development as the increase in fixed assets, in the volume of concessional lending, and in the efficiency of the state subsidy system including measures for the sustainable and environmental development of the agricultural industry.

Keywords: agricultural policy; sustained development; environment management; agro-industrial complex; program-targeted management; state support.

JEL Classification: Q13; Q18; R11.

Introduction

Effective operation and sustained and environment development of the agro-industrial complex (hereinafter referred to as the AIC) has always been and remains one of the global issues, which addressing is under careful watch across the globe. Despite the dominance of the economic paradigm of globalization, practice shows that successful development of world agricultural markets is predetermined by a well-coordinated state policy.

In this day and age, the world agricultural market cannot withstand a whole number of serious global challenges without proper and timely state support. A global challenge in the long term is to ensure the sustained development of agriculture and rural areas in the context of global climate warming, water scarcity, significant atmospheric pollution as a result of increased emissions from agriculture, worldwide forest loss, soil depletion, etc. In the medium term, implementation of investment projects, including those with innovative, environmental, social components aimed at partially addressing the above global issues and mitigating possible consequences caused by these processes. The state's current and main task is to ensure food security as an essential component of economic and, ultimately, national security. In this regard, states are forced to respond promptly to changes in the volume of production and consumption of food, depending on many factors including changes in global and national supply chains, changes in population's income level, multiplicity of geological conflicts, COVID-19, and other events.

Thuswise, being under the constant influence of global challenges, state agrarian policy is subject to quite justifiable adjustments and transformation. Relatedly, the goals, objectives, tools, and mechanisms for providing state support to the agricultural sector are changing as well. These transformational changes can be tracked by studying a series of successive program documents that determine the directions of state policy and measures of state AIC support.

The above-mentioned program documents bear their own national-country specifics and occupy different places in the hierarchy of documents of the state planning system. Public policy for the development of the agricultural market of the United States of America is enshrined in a public law known as Farm Bill, the history of which begins in 1933. Today, this policy is officially called the Agriculture Improvement Act of 2018 and is valid until 2023 (Smith and Glauber 2019). The key guidelines of state support and directions of financial assistance to agriculture in European countries are reflected in the series of documents titled Common Agricultural Policy (European Commission 2021), the evolution of which dates back to 1962. The New Common Agricultural Policy adopted in advance effective 2023 (Henke *et al.* 2018). In Kazakhstan, Russia, and Ukraine, elements of short and medium-term agrarian policy and directions of agricultural sector support are set out in successive State Programs and the National Project for the Development of Agriculture for 2021—2025 (hereinafter referred to as the National Project), which in turn are developed and implemented within the framework of the program-targeted management (PTM) methodology (Pronko *et al.* 2020, Raizberg 2012).

It stands to mention that Kazakhstan's program-targeted management methodology is still evolving and despite the constancy of management processes, issues of a different nature continue to arise at each of them. In this paper, we review the current practice of applying the PTM methodology to identify key benchmarks for the sustained and environment development of this priority sector of the economy. That being said, we mainly focus on assessing the effectiveness of the implementation of the goals of state program documents by comparing the dynamics of key indicators of the development of Kazakhstan's agricultural industry with the indicators of countries successful in the implementation of agricultural policy.

1. Research Background

Contemporary views on global challenges that have us look for new measures of state support for the agricultural sector and adjust the policy of development of agriculture and rural areas, as mentioned above, can be divided into three groups.

2.1. Long Term Challenges: Ensuring Sustained Development of Agriculture and Rural Areas

Widely discussed is the challenge of “fostering synergies between farm modernization and sustainable rural development,” the solution of which can be found in strengthening the processes of horizontal and vertical integration of various stakeholders; this process is known in the literature as multi-actor governance (Koopmans *et al.* 2017).

Simultaneously, studies are being conducted to assess the effectiveness of state support measures aimed at sustained and environment development of agriculture and rural areas. One of the large-scale studies in environment management covering seven Central Europe countries and 105 rural development programs (RDPs) has attempted to establish the impact of state support measures for the development of Areas of Natural Constraint (ANC) to ensure farm sustenance (Poláková and Soukup 2020). Along with this, scientists and practitioners pay special attention to the development and preliminary testing of new state support measures including various agroecological schemes: for sowing catch crops to reduce nitrogen leaching; improved fertilizer utilization by both manure utilization and precision farming; and set-aside of agricultural land for fallow (Hasler *et al.* 2019, 1292). The importance of this synergy is also proved by Kazakhstani researchers who summarize the following: “The

agriculture development is a priority for sustainable rural development and rural cluster formation” (Nakipova and Lemechshenko 2021, 98) State agricultural policy makers have also recognized the importance of this synergy in the National Project and provided for “a stable increase in the incomes of one million rural residents driven by the formation of seven large ecosystems and implementation of investment projects” (Adilet 2022).

2.2. Medium Term Challenges: Implementation of Priority Investment and Innovation Projects

The researchers discuss a whole range of challenges negatively affecting investment processes in the AIC. One of the new and rather rarely discussed ones is the process of financialization in the agrifood sector, which works to reshape agrifood systems in ways that prioritize the needs of shareholders over other social and environmental goals (Clapp 2019, 624). This challenge also leads to the monopolization of the agrifood market and is aggravated by the fact that large farms receive most of the subsidies. Indeed, within the framework of the Common Agricultural Policy (CAP), “three quarters of the agricultural sector financing go to just one quarter of the largest and richest farms in the country.” (Bateman and Balmford 2018, 294).

Moreover, as a rule, most of these subsidies go to specialized farms, which in conditions of agricultural raw materials and finished products price volatility, are recognized as economically more vulnerable in comparison with diversified farms (de Roest *et al.* 2017). However, in contrast to these trends, the National Project provides for the deepening of specialization and the formation of seven agribusiness ecosystems, which are essentially “clusters.” In turn, the initiative to create clusters was manifested back in 2006 but has not been implemented to this day. In addition, we feel important to note that creation of flour and dairy clusters has been carried out by the Kazakhstan Industry and Export Center “QazIndustry” since 2014 (QazIndustry 2021) and even with that, this center is not in the list of responsible performers for the creation of agribusiness ecosystems (Adilet 2022).

The next pressing challenge reducing the investment attractiveness of the agricultural market is the reorientation of state subsidies to environmental improvements projects (Bateman and Balmford 2018) and adoption of conservation practices and programs (CPPs) (Ranjan *et al.* 2019). The National Project also provides for “investment subsidies for projects in the AIC including that on the basis of sustained development in accordance with the principles of green growth,” however their number and share in the project portfolio are not specified (Adilet 2022).

2.3. Current Challenges: Food Security

One of the significant categories in assessing the Global Food Security Index of countries according to the methodology that was developed by Economist Impact is the food affordability. According to data for 2021, in 84 countries out of 113 participating in the rating, food affordability is rated higher than availability (Economist Impact, 2022), which emphasizes the effectiveness of state policy on price regulation in AIC. Meanwhile, the issue of regulating prices for finished agricultural products persists and is subject of research in a number of works. Emphasized is the following: “Price-cost squeeze is still a principle economic problem in agriculture touching farms in all over the world” (Czyżewski *et al.* 2019, 82): “Volatile prices and income uncertainties are major issues for farmers, leading to a demand for policies that mitigate such risks” (Pieralli *et al.* 2021, 370).

Since the issues of food security and price regulation in the agricultural sector are of priority for all countries worldwide, agricultural policymakers use various tools to address them, which are recognized as the most effective at any given time. During the COVID-19 pandemic, having recorded “falling prices across a broad array of farm commodities,” the United States of America provided “substantial farm support of a wide array of animal and plant products” as part of \$5 trillion (Orden 2021, 243). Within the framework of the Common Agricultural Policy, the European Union has introduced a fairly universal income stabilization tool. This tool “provides compensation to farmers whose income decreases larger than 30% from the expected income” (Severini *et al.* 2019).

The whole range of challenges within the framework of State Programs and National Projects in Kazakhstan, Russia, and Ukraine is slightly underestimated due to the abundance of target indicators presented by planned quantitative indicators, which is PTM methodology’s flaw (Ovchinnikov, 2019, 15). For the same reason, achieving these target indicators is often extremely problematic and there are many disagreements about determining the effectiveness of the implementation of these goals (Stehnei *et al.* 2019, Trenev and Treneva 2018).

Thus, the purpose of this article is to study the practice of applying the program-targeted management methodology of Kazakhstan’s agro-industrial complex and make proposals for its improvement for the sustained and environment development of this priority sector of the economy.

2. Methodology

We used the following methods as the basis on which the main provisions of the paper were built:

- Logical and comparative analysis were used to identify the issue and formulate the purpose of the paper;
- Establishing cause-and-effect relationships was used in the study of the practice of applying the PTM methodology of Kazakhstan's AIC;
- Statistical data processing was used to assess the effectiveness of the implementation of the goals of state program documents by comparing the dynamics of key indicators of Kazakhstan's agricultural industry development with the indicators of countries successful in implementation of agricultural policy.

The effectiveness of the goal implementation has been determined using the following formula:

$$Egoals = \frac{1}{h} \sum_{i=1}^n Eind * 100\%$$

where: $Eind$ is the effectiveness of the implementation of an indicator for which statistics are available for other countries. This indicator is calculated according to the following formula:

$$Eind = \frac{I_K^t - I_K^0}{\frac{\sum_{q=1}^s (I_q^t - I_q^0)}{s}}$$

where: I_K^t is the indicator value at the end of the period for the analyzed country; I_K^0 is the indicator value at the beginning of the period for the analyzed country. I_q^t is the indicator value at the end of the period for the country being compared; I_q^0 is the indicator value at the beginning of the period for the country being compared and S is the number of countries being compared.

There is a limitation to calculating according to these formulae: the countries in which indicator deterioration is recorded are excluded from the calculation: we used correlation and regression analysis to verify the existence of close relationships between the key indicators of the agricultural sector development and their projecting; we used hierarchical agglomerative clustering to identify countries close to the level of AIC development; we used the Euclidean distance formula and the unweighted pair-group method using the centroid average.

3. Application Functionality

3.1. Flaws Found in the Agro-Industrial Complex Development Programs and Projects Design Phase

Since 2010, State Programs and, more recently, the National Project would be developed in compliance with the principles of the PTM methodology. The great question is the fact that the National Project was approved on October 12, 2021, while the updated Methodology for its development, on October 25, 2021. Meanwhile, a comparative analysis of this Methodology with the methodology for the development of State Programs dated February 19, 2018 has shown no fundamental differences (Adilet 2022).

Perhaps the main innovation of the updated Methodology was the linking of target indicators (objectives) and outcome indicators (quantitative indicators) with higher-level documents of the State Planning System and Sustainable Development Goals until 2030. The National Project mentions "investment subsidies for AIC projects, including those based on sustainable development in accordance with the principles of green growth," although fails to specify their number and share in the project portfolio. Digitizing land data shall continue until the end of 2022, and their share will amount to 35%. Then, until 2025, work will be carried out on "developing new forms of introducing agricultural land." Simultaneously, the land area with the use of water-saving technologies is expected to increase (Adilet 2022).

However, a comparative analysis of previous policy documents has shown that target indicators themselves remain unchanged. The volume of gross agricultural output, labor productivity increase, food security, export of agricultural products, investments in fixed assets and food production, formation of either "ecosystems" or "regional agricultural complexes" or "clusters" are invariably recognized as key target indicators.

During the development of the National Project, one of the significant flaws of the planning stage of the previous program document was corrected. This one was tied to the "artificial underestimation of the planned values for all target indicators," which was discovered during the analysis of the State Program for the Development of the Agro-Industrial Complex of the Republic of Kazakhstan for 2017-2021 (Nakipova *et al.* 2021). Meanwhile, a risk of

non-fulfillment of the planned target indicator values still stands due to the National Project being packed full with quantitative indicators considering the multitude of global challenges AIC is facing. The stage of approval of program documents has shown a persisting issue for the public administration system as a whole, still to be addressed. Involving a wide range of independent experts in the process of discussing the draft action plan for the implementation of the National Project failed. Only four interested parties took part in the open discussion of this document (Legalacts 2021).

3.2. Patterns of Agro-Industrial Complex Development Programs and Projects Implementation

In the practice of implementing state programs for Kazakhstan's AIC development, their premature discontinuation and frequent changes have become quite regular. The program for the development of the agro-industrial complex in the Republic of Kazakhstan for 2010-2014 was discontinued after two years and four months. That notwithstanding, the first changes were introduced nine months after its approval; the following ones came eleven months later. Eight more months later the document was rendered null and void. Likewise, the program for the development of the agro-industrial complex in the Republic of Kazakhstan for 2013-2020 "Agribusiness 2020" lasted exactly half of its expected term: four years and one month. During this period, the program has been amended once. Seemingly, the State Program for the Development of the Agro-Industrial Complex of the Republic of Kazakhstan for 2017-2021 (hereinafter referred to as the AIC SP) lasted almost a full period of four years and eight months. However, the program in question was completely updated a year and five months after its approval; then amended threefold in 2020 (Adilet 2022). Meanwhile, we feel important to note that timely adjustment of individual indicators of state body program documents under the influence of global challenges is quite acceptable and even preferred. However, in this case changes in target and outcome indicators are quite significant and frequent, which are often not achieved even after introducing adjustments.

One of the most frequently raised issues in the process of implementing state program documents is the responsibility allocation for the achievement of certain target indicators or the implementation of measures. The main reason for this is the blurring of responsibilities between different state structures within the state programs and projects themselves. The approach to the allocation of responsibilities, at least at the stage of the National Project development, was no exception. However, the recently introduced "Rules for the implementation of project management" in the activities of state bodies assume the coordination of their work in a single project management information system (Adilet 2022). Coordination consists in the fact that at the level of state bodies, managed programs including national projects, in the process of their implementation will be separated into specific projects by creating project teams and organizing their activities. Introduction of such an automated information platform gives hope for the increase in the manageability of programs and projects at the stages of implementation and monitoring of the achievement of target indicators, performance indicators, and individual significant events.

Meanwhile, it should be added that introduction of an automated information system does not address the issue of the quality of planning and separation of program documents for specific projects. As is commonly known, implementation of the pilot project on the decomposition of the AIC SP into regional programs, sectoral investment programs, resource support programs, and related subprograms for the development of AIC and rural areas concluded with its discontinuation without analyzing the effectiveness of individual projects whatsoever.

Moreover, when developing a National Project, the issues of interaction between individual state bodies playing a key role in achieving certain target and development indicators have also been overlooked. According to the developers of the National Project, the Ministry of Industry and Infrastructure Development is responsible for achieving only one indicator, "an increase through the growth of subsidies for the purchase of agricultural machinery by 1.5 times." However, the Kazakhstan Industry and Export Center "QazIndustry" (one of the key operators of the Ministry of Industry and Infrastructural Development) is working to create flour and dairy clusters in the country. Over the period between 2014 and 2020, the Ministry of Industry spent 233.7 million tenge to develop cluster policy and created a pool of key projects for six territorial clusters including flour and dairy ones. Introduction of projects for these clusters began in 2020 and is expected to be completed in 2024 (QazIndustry 2021). Despite this, Ministry does not appear in the National Project implementation plan as the one responsible for creation of agribusiness ecosystems for the production and processing of milk and grain crops. However, these ecosystems are prototypes of clusters and the long-term results of QazIndustry's work in this direction in the text of the National Project are reduced to zero. However, there is a risk of their emergence during the reporting on creating agribusiness ecosystems.

The current subsidy system's performance is subject to much criticism. The Accounts Committee for Control over Execution of the Republican Budget (hereinafter referred to as the Accounts Committee) notes a number of "systemic shortcomings that have been recurring for several years: planning expenditures without confirming the

need for funding; non-compliance with procedures for coordinating draft budget programs with agricultural departments; lack of clearly defined priorities for subsidizing agriculture; non-compliance with the targeting of budget funds; weak monitoring of ongoing projects.” At the same time, number of violations resulting from inefficient planning and use of budget funds allocated for the development of agriculture for the period between 2017 and 2020 amounted to about 50 billion tenge (Accounts Committee 2021, 76). To date, the issue of revising the current subsidy system remains relevant and unfortunately, the relevant department embodied in the Ministry of Agriculture is failing to propose a subsidy system that would address the issues identified by the Accounts Committee.

3.3. Procedural Improvement for Monitoring Implementation of the Agricultural Sector Development Concept

The updated Methodology for monitoring the concept of agricultural development, realization of which is achieved through the implementation of national projects, has addressed several issues of the previously existing system of monitoring state programs for the development of this branch of the economy.

Above all, an issue regarding the procedure, timing, and mandatory nature of the annual posting by the Ministry of Agriculture of reports on the implementation of target indicators, development indicators, and measures for the AIC development on its homepage has been addressed. Based on this report, the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan will prepare a summary report and draft conclusion on implementation of the concept of AIC development. If necessary, the draft conclusion can be finalized by the Government before submission to the Presidential Administration for subsequent reflection in the report on the implementation of the National Development Plan of the Republic of Kazakhstan for the corresponding reporting period (Adilet 2022).

During monitoring of the AIC SP implementation, it transpired that evaluation methods have not been developed for certain target indicators, which significantly hindered the process of assessing the degree of achievement of the planned values. According to the AIC SP, indices of labor productivity, physical volume of gross output, physical volume of investments in fixed assets should have been calculated by the level of 2015.

However, according to the current methods “On approval of the Methodology for calculating labor productivity,” “On approval of the Methodology for calculating gross domestic product by the method of production at current and constant prices,” “On approval of the Methodology for the formation of investment activity indicators,” they would be and continue to be calculated exclusively as a percentage over the previous year (Adilet 2022). The National Project offers these indicators in absolute terms and this shortcoming has been corrected.

Along with this, interestingly, state development program and project builders still have excessive monitoring powers. Paragraph 272 of the Methodology states that “the completeness, quality, reliability, and timeliness of the presentation of the results of monitoring the state planning system documents is provided by the state bodies – the authors” (Adilet 2022). However, Methodology still has no mention of mandatory monitoring condition and the use of calculations and conclusions made by independent experts as sources of information is optional. Consequently, the practice when a relevant agency provides data on implementation of certain activities without proper control over their actual implementation, without on-site monitoring or public assessment of these activities in situ may remain unchanged. In this regard, it is advisable to create an automated monitoring system in government agencies, which would be enabling provision of reports not in the “planned-actual-comments” format, but to supplement them with links on performed activities, investment projects to improve public confidence in the activities of the state apparatus.

3.4. Assessment of the Effectiveness of the Implementation of the Agro-Industrial Complex Development Goals

Our earlier “planned-actual” assessment of the effectiveness of the AIC SP target indicator achievement showed that the planned values for all target indicators were initially underestimated, and subsequently, for the most part, not achieved (Nakipova *et al.* 2021). According to the Accounts Committee data for 2020, five out of eight target indicators have been achieved (Accounts Committee 2021, 188). Along with this, an objective assessment of two target indicators, particularly “The volume of water in industrial water supply systems” and “Water consumption for irrigation” appears challenging. There is a few reasons for this: firstly, there is no open reporting data on them; secondly, responsibility for achieving these indicators has been shifted from the relevant department to the Ministry of Ecology, Geology and Natural Resources.

In general, our analysis of the PTM methodology has indicated the presence of issues at stages of planning, implementation and monitoring of state program documents including those related to global challenges and affecting the global agricultural market as a whole. Based on this, to confirm or rule out the impact of global

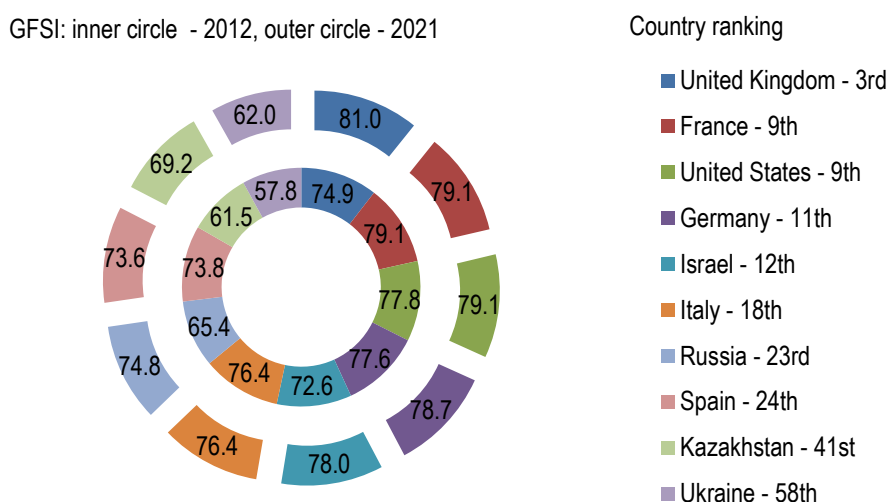
challenges on the effectiveness of implementing the AIC SP goals, we conducted a comparative analysis in the context of several countries. We have compared the dynamics of key indicators of Kazakhstan's agricultural industry development with the indicators of countries successful in implementing agricultural policy (Table 1, see Appendix A). We have also assessed the effectiveness of the implementation of goals according to the formula given in Materials and Methods (Table 2, see Appendix A). Abbreviated indicator names used in the tables are disclosed below when directly describing changes in these indicators by country.

During the calculations, all the data shown in Table 1 (Appendix A) was presented in a comparable form; for the base year, the value was taken as 100%; for the last reporting year, the growth rate to the base year has been calculated. The cells highlighted in red show a deterioration in the country for that indicator over the period under review.

Concurrently, for three out of ten indicators, the reduction of actual values has been recognized as effective. These are a reduction in imports, a reduction in government expenditure on the development of agriculture, and a reduction in the number of people employed in the industry, which has an inverse correlation with an increase in labor productivity. The average value for the country has been calculated as an arithmetic mean for all indicators. A comparison of the effectiveness of the goal achievement in the country context by the ten selected indicators, which largely coincide with target indicators laid down in both the AIC SP and the National Project, allows us to conclude that Kazakhstan belongs to the second group of countries with average rates of agricultural development. Countries with high rates of agricultural sector development included Russia (342%), Great Britain (159%), and Ukraine (112%). Over the selected period, Kazakhstan's agricultural market would develop at an average rate of 88% and the average development rates were also observed in Israel and Spain (59% and 55% respectively). The rest of the countries in the eleven-year period under review have shown growth rates below average.

Countries are placed in the tables from Appendix A, according to the global food security ranking assigned based on the Global Food Security Index (GFSI), see Figure 1. The following countries have made the greatest progress in improving the positions in ensuring food security of the population for the period between 2012 and 2021: Russia (219%), Kazakhstan (168%), and Great Britain (126%).

Figure 1. Progress of countries towards food security

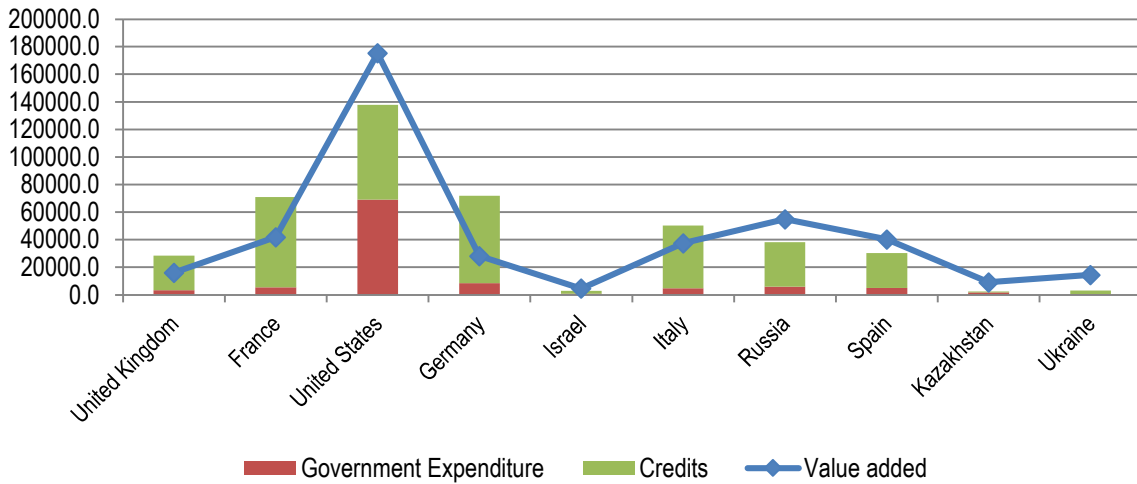


Source: Compiled by the authors based on data from the Economist Impact (2022)

One of the most important indicators characterizing the development of the agricultural sector is the Value Added (VA). Based on this, we have compared the impact of Government Expenditure (GE), industry lending, Gross Fixed Capital Formation (GFCF), and employment on VA in agriculture. According to our calculations, the following countries have shown the highest efficiency in achieving the goal related to VA growth: Ukraine (240%), Kazakhstan (210%), and Israel (155%). These countries have the lowest VA in a group of compared countries, which may explain the high efficiency of the goal achievement (Table 1).

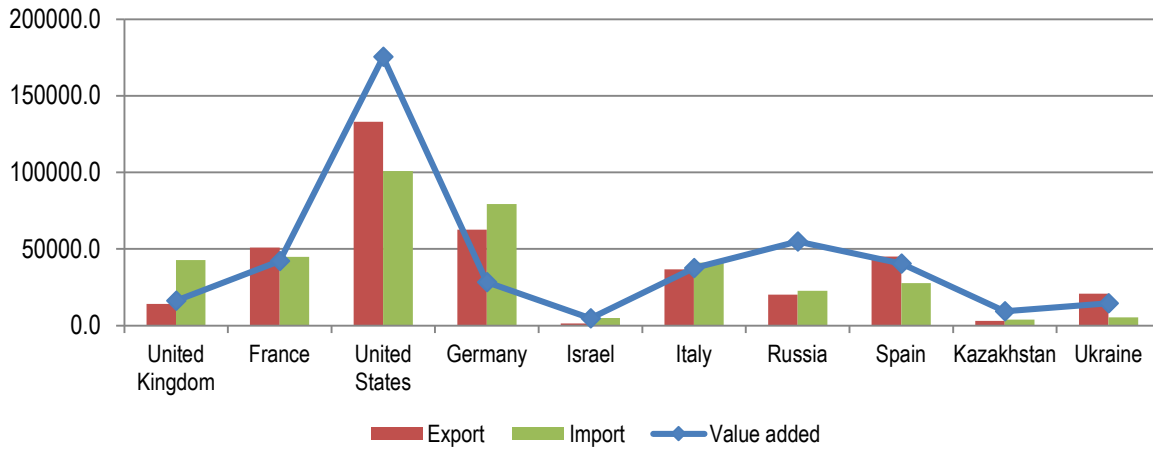
However, given the fact that competing on the world market is way harder for small national economies and the agricultural market is no exception here, this indicator demonstrates the effectiveness of the agrarian policy pursued by these countries.

Figure 2. State financial support impact on gross agricultural output in 2020, millions of US dollars



Source: Compiled by the authors based on data from the FAOSTAT (2022)

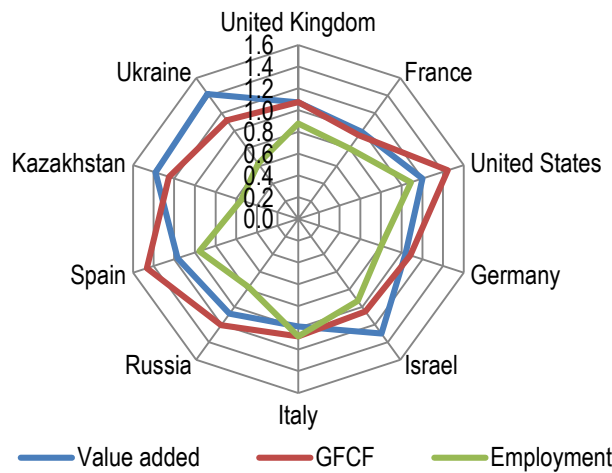
Figure 3. Ratio of agriculture VA, exports and imports in 2020, millions of US dollars



Source: Compiled by the authors based on data from the FAOSTAT (2022)

An interesting fact is that a group of European countries including Germany, France, Italy, and the Great Britain, has agricultural lending volumes exceeding the VA generated by the industry (Figure 2).

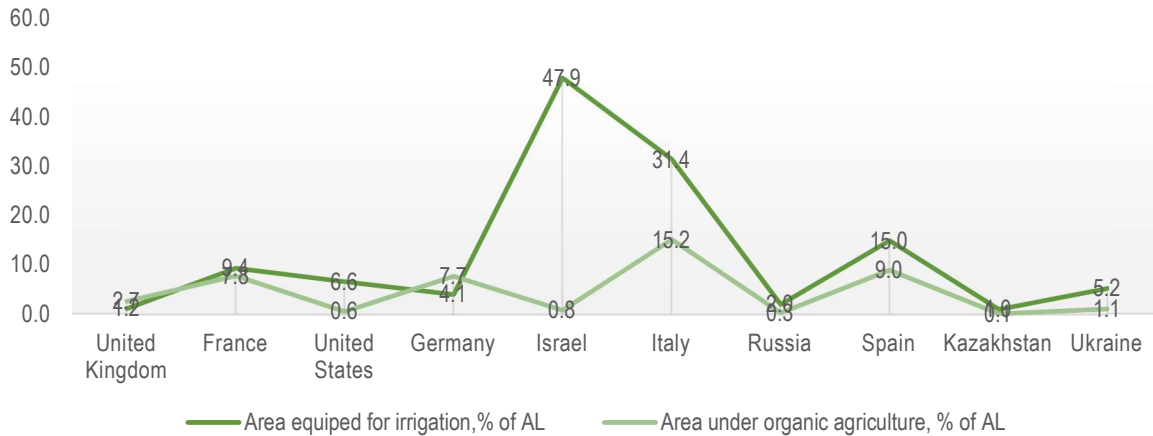
Figure 4. Growth rate of agricultural production and gross output factors for the period of 2010-2020



Source: Calculated by the authors based on data from the FAOSTAT (2022)

This circumstance may be related to the fact that these countries show a predominance of agricultural imports over exports while consumption exceeds production (Figure 3). Generation of circulating funds of agricultural units does not affect high volumes of lending (Figure 4). Italy's high lending volumes can be explained by the high proportion of irrigated agricultural land (31.4%) and land covered by organic agriculture (15.2%) (Figure 5).

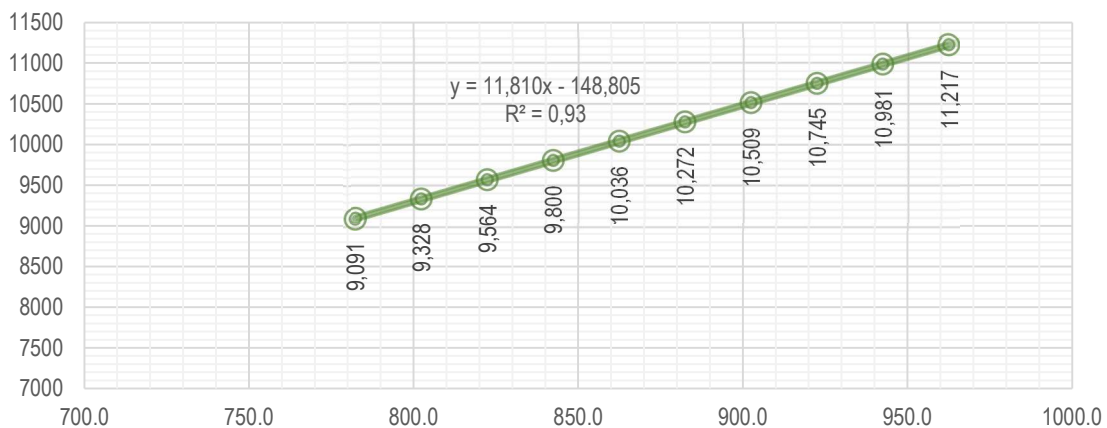
Figure 5. Share of irrigated agricultural land and land under organic agriculture, % of total agricultural land



Source: Calculated by the authors based on data from the FAOSTAT (2022)

The correlation and regression analysis of the selected key agricultural sector development indicators showed a close relationship between agriculture's VA and GFCF. For all countries with the exception of Italy and Israel, a correlation coefficient ranges between 0.57 and 0.96. According to these indicators, Kazakhstan has shown the highest correlation coefficient. Based on this, we have built a linear regression model describing VA's dependence on GFCF in Kazakhstan's agriculture.

Figure 6. The expected Value Added with a GFCF increase in increments of 20 million US dollars by the linear pair regression equation



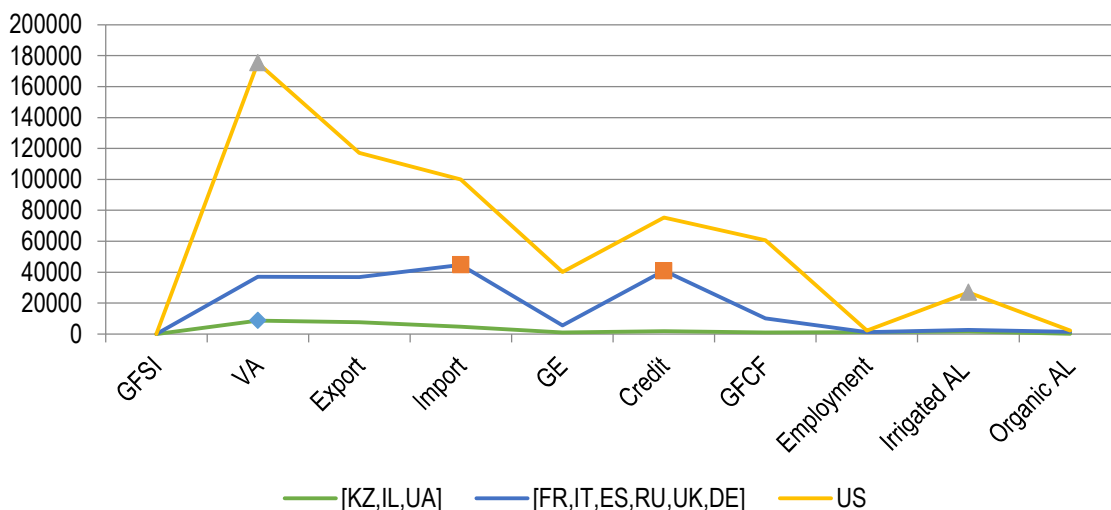
Source: Calculated by the authors based on data from the FAOSTAT (2022)

The R-squared coefficient of determination, which shows the closeness of the relationship between indicators and characterizes the quality of the model, is 0.93. Standard model error probability is 3.1%. It is unlikely that the relationship between the two values can be random; P-value is well lower than zero. Based on the obtained linear pair regression equation, we have projected the expected value of VA with an increase in GFCF in increments of 20 million US dollars (Figure 6).

Assessment of the effectiveness of the implementation of goals in the country context can be useful to government agencies if there is a need to elaborate on one or more development indicators. In this case, it will be necessary to study the experience of countries that have managed to maximize their positions on this indicator. In case where assessment of the competitiveness of a country's AIC is required, it is advisable to conduct hierarchical agglomerative clustering to identify a group of countries close in level of development. By applying the Euclidean distance formula and the method of unweighted pair-group method using the centroid average, we have constructed

a hierarchical agglomerative clustering of selected countries according to the level of AIC development (Figure 7). We have divided the countries into three clusters and indicated country names in the sequence in which they would merge based on the Euclidean distance. We have calculated indicators in the figure for each cluster group using the method of average centroids.

Figure 7. Hierarchical agglomerative clustering of countries according to the level of agro-industrial complex development



Source: Calculated by the authors based on data from the FAOSTAT (2022)

The clustering of countries has illustratively confirmed that the United States occupies a leading position in the global agricultural market. Their high Value-Added volumes are complemented by the proportionality of other indicators. Exports prevail over imports, lending volumes are higher than government expenditures, fixed assets are larger than labor. Figure 7 also clearly shows that the group of European countries, which includes Russia in terms of comparability of indicators of the development of the agricultural sector, demonstrates some of the imbalances noted above and common to Germany, France, Italy, and the Great Britain. In absolute terms, Kazakhstan's AIC development indicators are comparable to those of Israel and Ukraine. Since Kazakhstan has an undeniable advantage of a large area of agricultural land of 214,453 thousand hectares, the agricultural potential of the country can be considered unlocked. The area of these lands is approximately twice as smaller than that of the United States, although comparable to the area of Russia and exceeds the agricultural lands of both Ukraine fivefold and Israel by 336 times (Faostat 2022).

As the analysis has shown, the following can become the drivers of the development of the agricultural sector in Kazakhstan: an increase in fixed GFCF assets; an increase in the volume of concessional lending; an increase in the efficiency of the state subsidy system; an improved PTM methodology at all stages from planning to evaluating the effectiveness and performance of programs and projects relations.

Conclusion

In today's world, a well-coordinated state policy predetermines the successful development of world agricultural markets. Measures of state support for the agricultural sector are aimed at countering a number of serious global challenges, for the purposes of this paper, conditionally divided into three groups:

- Long-term challenges: Ensuring sustained development of agriculture and rural areas,
- Medium-term challenges: Implementation of priority investment and innovation projects, and
- Current challenges: Food security.

Goals, objectives, tools, mechanisms for state support to the agricultural sector are reflected in the program documents that bear their own national-country specifics and occupy different places in the hierarchy of documents of the state planning system. In Kazakhstan, they are set out in successive State Programs and a National Project. In turn, these documents are developed and implemented within the framework of the program-targeted management methodology. After its recent improvement, the relevant department, the Ministry of Agriculture, needs to focus on neutralizing the continuing risks:

- A weakly expressed synergy between the sustained development of agriculture and rural areas may lead to overlooking of a number of important objectives, the addressing of which is of paramount importance for the creation of rural clusters.

- The National Project for the Development of the Agro-Industrial Complex of the Republic of Kazakhstan for 2021-2025 being packed full with quantitative indicators considering the multitude of global challenges AIC is facing, may increase the risk of non-fulfillment of the planned target indicator values.
- Introduction of a unified project management information system may not lead to an increase in the manageability of the National Project at implementation and monitoring stages because it does not address the issue of the quality of planning and decomposing the program document into specific projects.
- A comparison of the dynamics of key indicators of Kazakhstan's agricultural sector development with the indicators of countries successful in implementation of agricultural policy has shown the following:
- Assessment of the effectiveness of the goal implementation in the country context has confirmed the impact of global challenges on the development of world agricultural markets and showed the average pace of Kazakhstan's agricultural market development.
- Correlation and regression analysis has shown a close relationship between Value Added (VA) and Gross Fixed Capital Formation (GFCF) in agriculture and allowed us to project the VA values with an increase in GFCF in increments of 20 million US dollars.
- A hierarchical agglomerative clustering has shown that the agricultural potential of Kazakhstan has not been unlocked yet, and the undeniable advantage in the form of significant areas of agricultural land at this stage of AIC development does not give the country significant competitive advantages.

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APPENDIX A

Table 1. Dynamics of key development indicators of world agricultural markets

Country	GFSI/ 100 scale points		VA		Import/ US\$ millions		Export/ US\$ millions		GE		Credit		GFCF		Employment/ 1000 persons		Irrigated AL/1000 ha		Organic AL	
	2012	2021	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2019	2010	2019
	UK	75	81	15.069	16.126	42.605	42.605	15.950	13.989	4.274	3.303	18.339	25.127	6.479	6.966	363	319	95	208	698
FR	79	79	42.388	42.002	41.106	44.782	53.616	50.930	11.182	5.549	54.577	65.368	14.140	13.446	783	626	2.727	2.691	845	2.241
US	78	79	146.300	175.400	70.431	100.792	114.869	132.998	30.500	69.000	58.997	68.700	43.769	63.202	2.016	2.191	26.415	26.916	1.949	2.327
DE	78	79	27.296	28.283	63.065	79.255	55.105	62.462	7.737	8.581	53.336	63.184	10.687	11.574	636	511	652	676	991	1.291
IL	73	78	3.611	4.697	3.822	4.810	1.364	1.291	353	783	1.541	2.213	764	803	39	36	225	306	9	5
IT	76	76	37.890	37.530	35.058	40.964	32.369	36.646	7.981	4.746	54.690	45.616	11.102	11.976	846	912	3.735	4.124	1.114	1.993
RU	65	75	51.004	54.892	27.219	22.595	5.342	20.101	9.421	6.029	17.156	32.269	9.451	11.431	5.469	4.237	4.300	4.300	44	674
ES	74	74	34.540	40.341	21.138	27.708	31.055	44.962	7.055	5.016	30.633	25.397	5.617	8.236	798	765	3.660	3.923	1.434	2.355
KZ	62	69	6.678	9.224	4.164	3.902	2.196	2.882	1.174	1.820	1.779	568	610	762	2.314	1.284	2.185	2.205	134	294
UA	58	62	10.130	14.409	3.977	5.288	5.742	20.778	923	550	4.333	2.549	1.624	1.819	4.042	2.542	2.178	2.166	270	468

Source: Compiled by the authors based on data from the Economist Impact and FAOSTAT (2022)

Table 2. The effectiveness of the achievement of agricultural market development goals

Indicator/Country	GFSI	VA	Import	Export	GE	Credit	GFCF	Employment	Irrigated AL	Organic AL	Average value
United Kingdom (UK)	126%	31%			58%	99%	35%	54%	1188%		159%
France (FR)					149%	49%		96%		64%	36%
United States (US)	23%	96%		15%		40%	267%		6%	7%	45%
Germany (DE)	23%	16%		12%		45%	39%	94%	13%	11%	25%
Israel (IL)	109%	155%				121%	23%	30%	151%		59%
Italy (IT)				12%	114%		37%		37%	29%	23%
Russia (RU)	219%	34%	270%	436%	98%	326%	107%	109%		1819%	342%
Spain (ES)		79%		44%	76%		285%	17%	25%	23%	55%
Kazakhstan (KZ)	168%	210%	37%	30%			131%	254%	3%	45%	88%
Ukraine (UA)	81%	240%		398%	113%		58%	200%		27%	112%

Source: Calculated by the authors based on data from the Economist Impact and FAOSTAT (2022)

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