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Formation of innovative integrated structures in the agricultural sector of Kazakhstan

Abstract. *Over the years of independence, Kazakhstan has developed as a country in transition to the market, achieved significant results. Although innovations are actively conquering some industries, the country lags behind in terms of technological development. Using the example of the agricultural sector, it is shown how to increase the technical, technological, organizational and economic level of production by integrating personal subsidiary farms. The purpose of the study is to study the exciting technological structures in the economy of Kazakhstan and, using example of the agro-industrial complex, to develop proposals for the creation of innovative integrated structures with more advanced forms of management and a combination of industries that form a chain of a new value creation. Methods of analytical-comparative, general scientific and system analysis were used to solve the main problem. The projected structure is a collective property, where the owners are shareholders, and the income is distributed according to the contribution made. Shareholders and their family members can work at this enterprise and receive wages for their work. In market conditions, such associations make it possible to ensure a high speed of capital movement between organizations of different industries in order to quickly saturate the market with food.*
Key words: *agricultural sector, innovations, integrated structures, production chain.*

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Introduction

Acceleration of globalization of the world economy, internationalization of many spheres of human life, epidemics, wars, etc. negative phenomena create a feeling of uncertainty. The development of communication systems, the emergence of new scientific discoveries and technologies make traditional economies part of the global system, the prospects for the development of which depend on the speed of innovation. At the same time, the speed of innovation is rapidly decreasing. In this situation, new opportunities are being created for the development of some countries, and on the other hand, new problems arise for competitive development, especially for the countries of the "catching up world".

The purpose of the study is to study the technological structures existing in the economy of Kazakhstan and, using the example of the agro-industrial complex, to develop proposals for the creation of innovative integrated structures that contribute to improving the level of management. In order to realize this goal, the following tasks are being solved: the structure of the technological structure in the economy of Kazakhstan is considered; the analysis of the development of agriculture in recent years is carried out; the option of integration of agricultural enterprises is considered, contributing to the growth of the organizational, technological and economic level of production in the industry.

The object of the study is the agricultural sector with the current management mechanism. The essence of the research is the application of analytical, statistical, systematic and integrated approaches to the study of the integration of economic entities, the expansion and concretization of scientific ideas about integration processes in the context of the specifics of the agro-industrial complex. This implies the disclosure of the genesis, features, socio-economic results of the integration of individual industries on an innovative basis. The study of foreign experience was carried out through familiarization with articles by Western experts, studying materials on the Internet.

The chosen topic is relevant due to the fact that today there are many small farms in the agro-industrial complex of the country that are not covered by the association into cooperatives, they produce artisanal agricultural products, the existing cattle are not breeding, outdated tools are used, the creation of agricultural cooperatives has not significantly affected the innovative rise of the industry. For many food products, imports are not decreasing, the Kazakh content of the domestic market is not enough. Therefore, the authors propose to create an integrated structure that includes a production chain capable of generating high added value.

Research methods

In the conduct of scientific research, we used the main methods for research, such as analysis and synthesis, creative thinking and scaling of the desired result in the rural sector of the economy.

The article reviews and reviews the scientific works of foreign authors, as well as statistical data on issues within the gross output of the country. For 30 years of independence, Kazakhstan has developed as a country of transition to the market, there have been periods: denationalization; privatization; bankruptcy of enterprises, etc.

Negative phenomena that led to a decrease in the production of basic goods, the closure of some vital enterprises, an increase in consumer prices, unemployment. All this combined led to a decrease in the technical and technological level of production, the absence of innovations for a sufficiently long time, and a decrease in the investment attractiveness of enterprises. There has been a significant rollback in science and technology, a lag in production in terms of technological development. Let us trace this using the chronology of technological patterns given by scientists S.Y.Glazyev, Andreeva M.E., Glushak O.V., Glushak N.V. [1, 2, 3].

The first technological structure covers the period 1770-1830, the core is the textile industry, and the key factor is textile machines. Kazakhstan has this industry, but there is no production of machines for it, all equipment is bought.

The second technological order covers the period 1830-1880, its core is transport, mechanical engineering, steam navigation, other traditional industries, the key factor in this case is the steam engine, machine tools. In Kazakhstan, in Soviet times, all branches of the IIth way were formed.

The third technological order covers the period 1880-1940, the core is electricity, and the key factor is the electric motor, steel. In our country, this way of life is widely represented by the electric power industry, ferrous and non-ferrous metallurgy.

The fourth technological structure covers the period 1940-1970, the core is the production and processing of oil and gas, nuclear power, automotive, synthetic materials, the key factor is petrochemistry and internal combustion engines. The branches of this way of life are widely represented in the economy of Kazakhstan.

The fifth technological structure covers the period 1980-2010, the core is the electronic industry, computer technology, telecommunications, fiber-optic communication, software, space technology, genetic engineering. The key factor is microelectronic components. The basis of the sixth technological order, which began in 2010, are robotics, artificial intelligence, biotechnologies, global information networks and transport systems, laser technology, renewable energy sources, new medicine. The key factor is nanotechnology, cellular technologies, genetic engineering, alternative energy. It should be noted that not all branches of a particular way of life are listed above, they are mainly indicated in relation to Kazakhstan. The fact is that some industries begin and continue to develop, expand within long periods, new areas of application appear, so it is difficult to distinguish within a specific period.

It should be noted that the authors did not say anything about agriculture, agriculture, which are important in the economy of Kazakhstan. In the publications of Western scientists, these industries are assigned to the III technological order [4, 5]. After gaining independence, as a result of large-scale reforms of

the transition to the market in our country, the backlog that was outlined in Soviet times worsened. Basically, we are at the stage of the IIIth way, there are separate elements of the IV and V ways, but the use of innovations created within these ways is the use of other people's ideas, equipment and technologies. According to our calculations, our economy lags behind the world by about 51 years, we are frozen at the level of 1970.

In Kazakhstan, the share of the III technological way (we have attributed the mining and metallurgical complex, the agricultural sector) is 41%, the IV way is 24.5% (production of oil, gas, non-ferrous metals, construction), the V way is less than 1%. Other industries, mainly the service sector, occupy about 34% [6, 7].

In Russia, the Vrd way occupies 3%, the IVth - 48% (civil engineering, raw materials industries), the III - 49% (agriculture, services, and households) [8-10]. In the USA, the IVth way accounts for 25%, the Vth - 60%, the VIth occupies 15% [11-13].

It is difficult to identify and compare these industries with the statistics of Kazakhstan, because the grouping of industries in the GDP structure is somewhat different, besides, the boundaries of the structures are somewhat blurred due to the use of progressive innovations by some traditional industries, as a result of which they can be considered more high-tech. To confirm what has been said in some approximation, we propose to consider the structure of the country's GDP over the past 20 years, which is highlighted in table 1.

Table 1. The structure of the GDP of the Republic of Kazakhstan for 2000-2021

Indicators	2000	2005	2010	2015	2020	2021	% of the total volume, 2021.
GDP in general, billion tenge, including:	2 599,9	7 590,6	21 815,5	40 884,1	70 649,0	83 951,6	100
mining and quarrying	799,9	3 120,9	7 419,5	11 060,2	11 785,6	17 976,9	21,41
food production	204,3	370,2	695,2	1 095,0	1 957,2	2 287,7	2,73
light industry	21,9	37,2	34,2	71,6	142,7	153,6	0,18
woodworking industry, furniture production	5,4	19,0	31,2	51,6	79,8	94,0	0,11
chemical industry	26,7	53,3	104,1	241,6	476,3	573,6	0,68
metallurgical industry	366,1	693,3	1 595,1	2 140,1	5 662,8	7 676,6	9,14

production of computers, electronic and optical products	10,3	12,5	16,6	33,3	40,9	38,5	0,06
production of machinery and equipment	9,0	34,8	56,9	85,2	234,1	338,7	0,40
oil and gas production and processing	611,3	1 647,0	3 641,2	4 597,1	11 317,3	11 713,4	13.95
production of motor vehicles, trailers and semi-trailers	2,2	10,3	43,2	162,9	830,6	1 070,6	1,28
gross agricultural output	404,1	749,1	1 822,1	3 307,0	6 334,7	7 515,4	8,95
the volume of construction works (services) performed	151,4	1069,5	1944,0	2 896,9	4 934,1	5 530,7	6,59
The sum of the above industries, billion tenge	2 623,0	6 307,2	17 498,3	25 919,2	46 788,8	54 969,7	65,48
as a percentage, %	80,7	83,1	83,3	75,7	66,23	65,48	-
Other industries, billion tenge	627,6	1 283,4	4 317,2	14 964,9	23 860,2	28 981,9	34,52
as a percentage, %	19,3	16,9	16,7	24,3	33,77	34,52	-
Note-Compiled by the authors based on data from the literature [21].							

Today, developed countries have begun to master the V technological order, which is characterized by the creation of new industries, technologies, goods and services in the field of microelectronics, computer science, robotics, biotechnology, genetic engineering, satellite and cellular communications, the Internet, global communications, space exploration. The beginning of the development of industries of the VI - technological structure has been laid. In the first decade of our XXI century, design developments on the VII - technological order began to be carried out. At the same time, it is predicted that the V-th technological mode will end by 2030, then the intensive development of the VI-th technological mode will begin [10, 12].

If Kazakhstan has a full production cycle in the traditional spheres, where the I, II, III and IV technological structures are used, then in the intellectual spheres at the level of V, VI and VII technological structures, Kazakhstan's participation so far appears only as a supplier of raw materials or semi-finished products.

It should be noted that Kazakhstan still had a significant gap in the quality of development at the starting positions, so it is necessary to carry out a grandiose modernization of production, introduce innovations everywhere in order to create a base for its industrial and innovative development on the basis of advanced technologies of other countries. Against this background, the future of Kazakhstan's society is

seen in the growth of intellectual labor mobility, the creation of new industries based on traditional ones. We have such opportunities - developments in the field of biotechnology, pharmaceuticals, IT technologies (mining is actively developing), the creation of useful GMOs, molecular food.

Discussion

In the IMD - 2021 world Competitiveness ranking (International Institute for Management Development), the country took 35th place, improving its position by 7 points (64 countries of the world were evaluated in the study) [14]. The IMD rating is the result of a comprehensive study that evaluates the following factors: "economic activity", "government efficiency", "business efficiency" and "infrastructure". These indicators are closer to us on the topic of the study and are presented in figure 1.

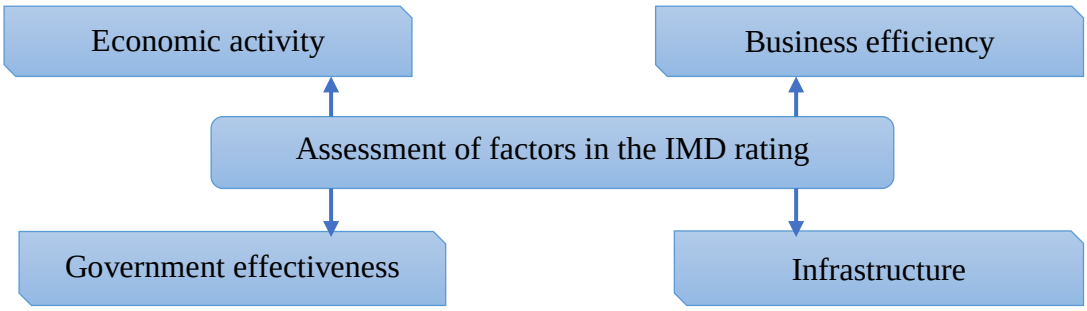

Figure 1. The main evaluation factors in the IMD rating

Note - Compiled by the authors based on data from the literature [14].

According to the "Economic activity" factor, Kazakhstan took the 45th place, rising by 3 positions. According to the "Government efficiency" factor, Kazakhstan improved its position by 8 points and took 21st place. According to the "Business efficiency" factor, Kazakhstan's position has improved by 6 points to 28th place. According to the "Infrastructure" factor, Kazakhstan took 47th place, rising by 4 positions. Figure 2 examines the attractive factors of Kazakhstan's economy.

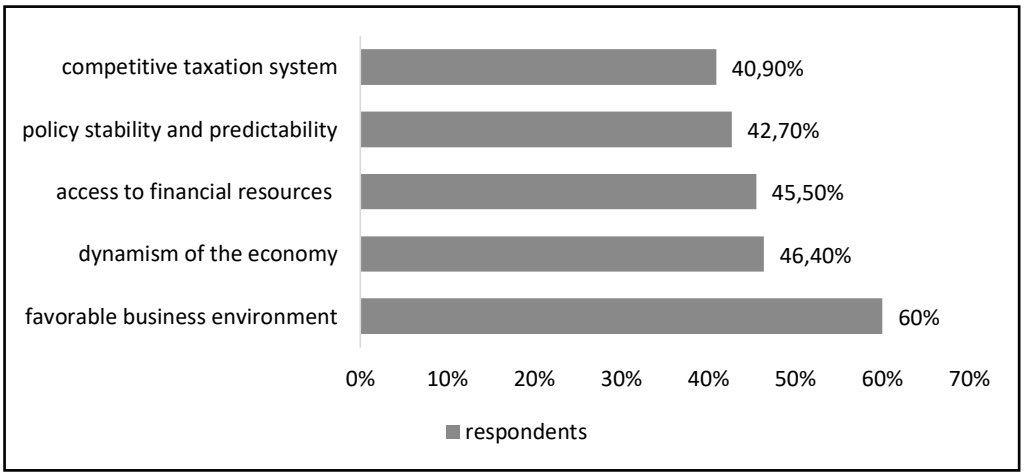

Figure 2. Attractive factors of Kazakhstan's economy

Note - Compiled by the authors based on data from the literature [15].

According to respondents, the five most attractive factors of Kazakhstan's economy include: a favorable business environment (60% of respondents), the dynamism of the economy (46.4%), access to financial resources (45.5%), stability and predictability of policy (42.7%) and a competitive taxation system (40.9%) [15].

The progress of our country's competitiveness lies in its development. The WEF identifies five stages of development - three main ones ("driven by factors", "driven by efficiency" and "driven by innovation") and two transitional ones – the first and second types of economies. In various sectors of the economy, Kazakhstan is now at the stages of "driven by efficiency" and "driven by innovation") and two transitional – the first and second type of economies.

Speech by the President of Kazakhstan K.K. Tokayev at the meeting of the Majilis of the Parliament of the Republic of Kazakhstan "Lessons of tragic January: the unity of society – a guarantee of independence" on January 11, 2022.

In different sectors of the economy, Kazakhstan is now at the stages of "driven by efficiency" and "driven by innovation". In this regard, the task of increasing the competitiveness of the Kazakh economy does not lose its relevance. On the contrary, this urgency takes on a new meaning – progress in a new reality and high-quality economic growth based not on the raw materials sector, but on new drivers, including in those areas that have large reserves of progress in the WEF rating. The development of these areas – innovation, financial market, human capital - should be aimed not only at solving the problem of progress in the competitiveness rating, but also at the real modernization of the socio-economic development of Kazakhstan in the new reality, which President K.Tokayev in his speech on January 11, 2022 in parliament, where he set a number of specific tasks in the political and socio-economic spheres for the new Government [16].

It should be noted that there are opportunities for competitive development of the country: as the innovative economy grows in the world, our country can find its niche as a supplier of raw materials and semi-finished products, and as it participates in the implementation of global high-tech processing, it can improve its technical level and business culture. On the basis of the development of new high-tech goods and services in the future, opportunities for the independent development of completely new goods and services, their promotion to the world market are opening up. In this regard, the problem of using innovations in traditional sectors of the economy, such as agriculture, is relevant by creating new integrated structures that form a chain of added values.

Results

In his speech at an expanded meeting of the Government, President Kassym-Jomart Tokayev on January 24, 2020 noted that the situation in the agro-industrial complex causes reasonable complaints, it was not possible to unlock the export potential and solve the issues of full-fledged food security of the country. It was pointed out the need for a new, verified approach in the agricultural sector, creating conditions for processing raw materials within the country, attracting investment and the latest agricultural technologies, ensuring the stability of state support measures, increasing their effectiveness.

Using the example of the agricultural sector below, we will show what can be done to improve the technical level of production, while some problems lie in the plane of economic and legal relations. Gross agricultural output in Kazakhstan is approximately 9% of GDP (for reference: in 1991, the share of agriculture in the GDP structure was 29.5%). 42% of the country's inhabitants live in rural areas, which is almost 7.7 million people, while the agro-industrial complex provides work for 14% of the total number of employed people [17, 18].

According to the Food Security Index in 2019. (The Global Food Security Index) Kazakhstan ranked 48th among 113 countries [19]. However, with the availability and sufficiency of food, a significant share of the domestic market is occupied by imports, labor productivity and the technical level of production are low.

The growth of production in the domestic agricultural sector is achieved mainly due to an increase in livestock, acreage, attracting a large number of workers, and not due to effective technologies, increasing yields and productivity, modern equipment and the use of achievements in the field of science and technology [20].

The current subsidy system does not provide for the achievement of specific, predetermined results, the mandatory introduction of effective technologies, etc. In addition, there is an instability of the types and

conditions of subsidies. Business representatives in agriculture have developed the habit of focusing only on budget subsidies. The main reason for the backwardness of the industry is that, unfortunately, our country is not the creator of innovative technologies, there is no system infrastructure for generating, promoting and implementing innovations. Outsourcing and technology transfer methods may be the first step in creating an innovative economy, but this is a phenomenon of catch-up development, full of risks of dependence on a supplier. Simply borrowing someone else's technology is the way to a new technological dependence. In this regard, we believe that it is possible to achieve a high level of production organization by combining effective technical solutions and the introduction of economic management mechanisms. Let's take this as an example of personal subsidiary farms (LPH) as structures of the agro-industrial complex.

Currently, there are 1,636,2 thousand LPH, which by the end of 2020 produced products worth 2.6 trillion tenge. These farms employ more than 3.5 million rural residents, who belong to the category of people with low income [21].

Today, private farms do not have access to modern production methods, their potential has not been disclosed. There is no access to state support measures, they are forced to compete unequally with organized farms in the domestic market. The lack of pasture lands around settlements is the reason for the growth of the protest electorate in rural areas. The lack of clear regulation of the economic activities of private households has led to an unfavorable environmental situation and an unsatisfactory epizootic and sanitary situation around villages. Experts have repeatedly proposed to amend the Land Code of the Republic of Kazakhstan in terms of determining the status of private farms, a separate law on private farms was developed, but it was not adopted. Proposals were made to the law "On State Regulation of the agro-industrial complex and rural territories" on subsidizing agricultural enterprises in order to turn them into a category of agricultural producers, to the law "On Local Public Administration and Self-government in the Republic of Kazakhstan" regarding the approval of programs and plans for the development of agricultural enterprises.

At the same time, subsidizing measures are not feasible for most private households, since they do not have experience of independent farming as a peasant farm or a legal entity, which will not have an effect in the form of an increase in income and such a measure will be costly for the budget, it is difficult to finance and control the use of funds of 3-4 million. farms.

In modern agriculture of Kazakhstan, there is such a chain, can be studied in more detail thought the proposed figure 3:

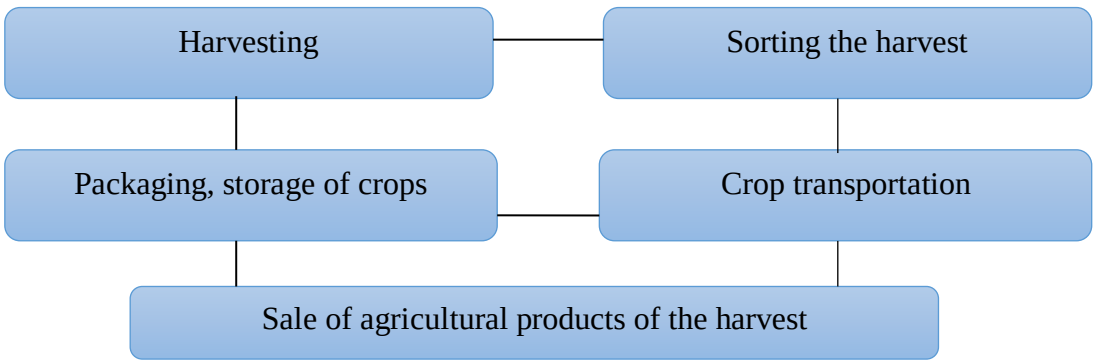

Figure 3. Harvest chain in agriculture of Kazakhstan

Note - Compiled by the authors based on data from the literature [21].

A firm that controls all or several links of this chain is considered vertically integrated. Vertical integration is aimed at covering several stages of production of goods by one company, for example, starting from the production of raw materials, the manufacture of goods or services, then transportation to the place of sale, marketing and retail sales [22, 23].

We offer consolidation of private farms, agricultural enterprises producing the same goods or services. In the recommended structure, there is no desire to monopolize the market, strengthen control over private farms, peasant/farm enterprises (PFE), because the financial basis of this is shares, collective ownership, the company is engaged in the efficiency of multi–profile production, reducing costs and increasing profits, and not tracking competitors.

Our point of view is to create soft structures in the agro-industrial complex, for example, associations, enterprises based on working joint-stock ownership, since they allow joint activities on a corporate basis while maintaining the isolation of its members, rural workers. The core of such associations should be the introduction of more advanced technologies for processing agricultural products, growing environmentally friendly products based on the latest agricultural technologies, genetic modifications.

The strategy of innovative agro-economic integration should take into account the following principles [24, 25]:

- analysis of alternatives and choice of organizational form of integration based on the requirements of the legislation of the Republic of Kazakhstan;

- building a cost-effective integration model taking into account a multidisciplinary combination of horizontal and vertical levels;

- determination of the organizational participation of regional/local authorities in the implementation of the idea of creating an integrated structure.

Participants in these structural formations may be geographically disparate agricultural producers (agricultural producers) who, for various reasons, failed to effectively manage the economy, as well as processing, servicing, trade organizations. Among them can be both economically strong, interested in further growth, and hence in stable supplies of raw materials and strengthening their position in the relevant markets, and economically dependent, who have fallen into the sphere of interests of the former, who act as an integrator. All private households are included in the integrated structure (IP) with their share /shares in the form of money, land, equipment (securities, foreign currency are not accepted).

We propose to form innovative structures with more advanced forms of management and combinations of industries that form a chain of new value creation in order to optimize costs, it will be possible to consider more deeply in Figure 5.

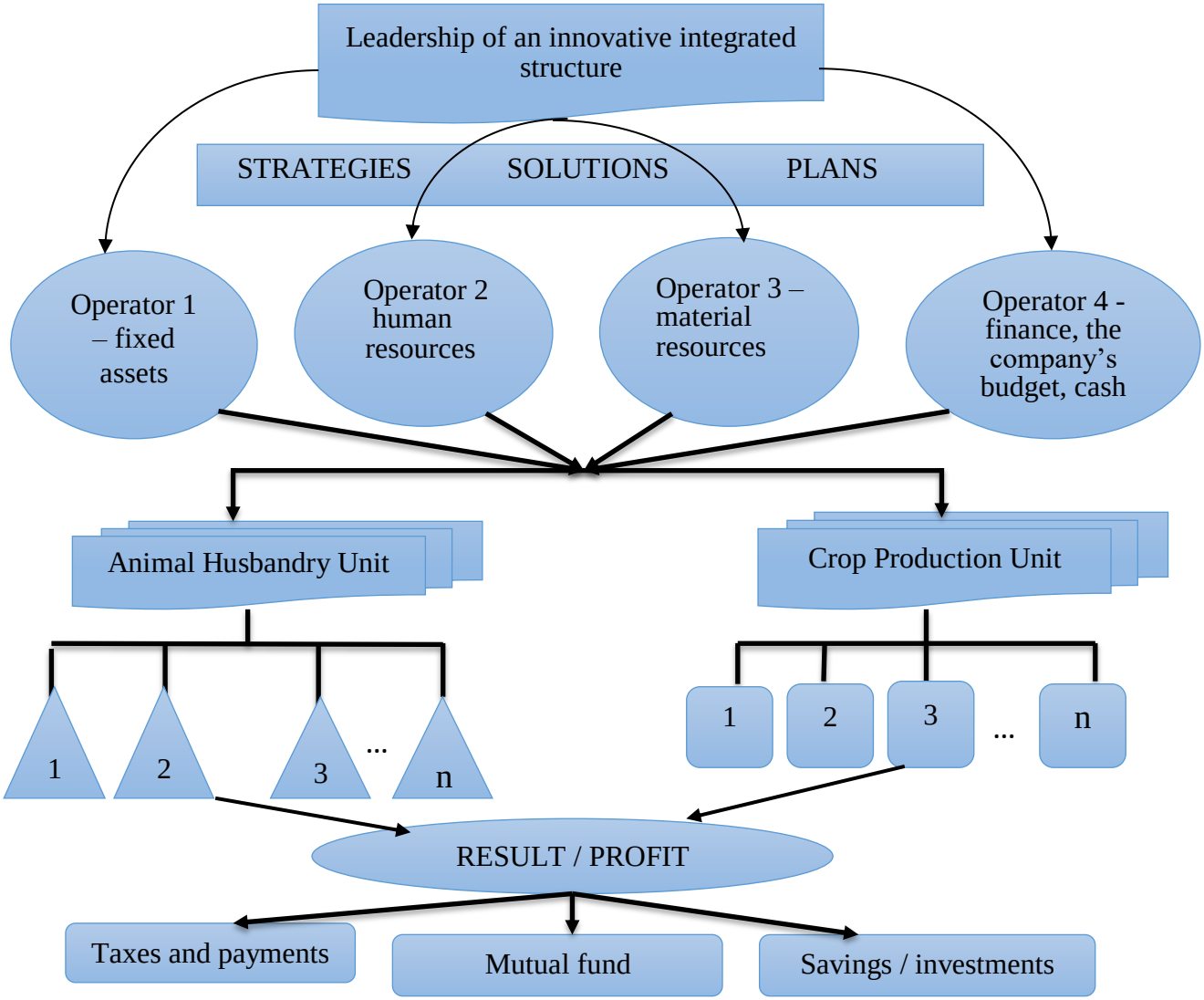

Figure 5. Scheme of an innovative integrated structure for the agro-industrial complex
Note - Compiled by the authors based on data from the literature [25].

Profit distribution takes place according to the size of the share, all shareholders or at least one family member from the shareholder works in the created structure, receives wages as an employee, except for the share of profit from the mutual fund. Shareholders have the right to take their share of profits or invest in the further development of the enterprise by the decision of the general meeting of IP. Such a system allows each shareholder to be interested in effective work and control the administration of the farm.

In market conditions, such associations make it possible to ensure a high speed of capital movement between organizations of different sectors of the national economy in order to quickly saturate the market with goods. Agricultural enterprises, private farms, processing, agricultural service, trading and other enterprises included in the IP can be guided by the Law on Agricultural Cooperation, which allows ordinary shareholders/ shareholders to own a controlling stake themselves and fully manage the enterprise.

As can be seen in the above diagram, almost all structures for the production and processing of agricultural products, their transportation, maintenance of production, financial support of settlements, and sale of final products are involved in production, financial and trade turnover. In the diagram, they are

indicated by numbers in triangles and squares "1,2,3 ...n". The core of the farm is considered to be the livestock unit, because many production cycles for processing milk, meat, wool, waste in the form of bone meal and others depend on how many days the fattening of livestock lasts.

Of course, the crop production unit is more independent, but seasonality strongly affects there. Today, all private farms are multidisciplinary, they keep livestock and are engaged in gardening, therefore, the types of work in IP will not be something new, but specialization and division of labor are possible.

Kazakhstan also provides for food security through customs regulation of the movement of food products across the customs border of the Customs Union. The regime of free circulation of goods within the Customs Union will contribute to the expansion of intra-industry trade and industrial and technological cooperation of the participating countries; will create favorable conditions for mutual investment, the formation of cross-border innovation and industrial clusters [26].

The advantage of the integrated structure is the distribution of risks between the participants (joint insurance of the enterprise, joint responsibility for the effective use of material, labor and financial resources). Integration is justified if, as a result, it succeeds: - reduce taxes; - reduce legal obstacles when concluding contracts; - combine production with auxiliary types of activities; - get significant savings due to the scale of production; - increase investments in the development of individual links in the technological chain.

However, it should be noted that there may be a desire to maintain unprofitable farms at the expense of profitable ones, as a result, the final products may become expensive and not competitive.

Conclusion

Summing up, it is necessary to establish management accounting: analysis of the "costs - sales volumes – profit" chains for various products of the proposed structure in order to avoid a situation where management cannot clearly determine which of the activities brings more income, and which production is unprofitable.

1. The development of vertical/horizontal links between processing enterprises and agricultural producers by reducing barriers to unification within the production chain in order to involve small landowners to supply food to the domestic market, is an important argument in favor of integration.

2. It has been established that integration makes it possible to improve the productivity of the agricultural sector, gain access to agricultural markets, and ensure that food products comply with international quality and safety standards.

The main task is being solved - to provide food to its own consumer, to protect the domestic market, to produce competitive products, to switch to new technologies, to implement faster programs for the development of the agricultural sector in life.

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Қазақстанның аграрлық секторында инновациялық интеграцияланған құрылымдарды қалыптастыру

Аннотация. Тәуелсіздік жылдарында Қазақстан Республикасы нарықтық экономикаға көшкен мемлекет ретінде дамып, айтарлықтай нәтижелерге қол жеткізді. Инновация өнеркәсіптің кейбір салаларын белсенді түрде жаулап жатқанымен, еліміз технологиялық даму жағынан артта қалып отыр. Агроөнеркәсіп кешенін мысалға ала отырып, жеке қосалқы шаруашылықтарды біріктіру арқылы өндірістің техникалық-технологиялық, ұйымдық-экономикалық деңгейін көтеру жолдары көрсетілген. Зерттеудің мақсаты – Қазақстан экономикасында бар технологиялық құрылымдарды зерделеу және агроөнеркәсіп кешені мысалға алып, басқарудың анағұрлым жетілдірілген нысандары мен салаларды біріктіретін инновациялық интеграцияланған құрылымдарды құру бойынша ұсыныстар әзірлеу және құн құрудың жаңа тізбегін көрсету. Негізгі мәселені шешуде аналитикалық-салыстырмалы, жалпы ғылыми және жүйелік талдау әдістері қолданылды. Жобаланатын құрылым – бұл ұжымдық меншік, мұнда меншік иелері акционер болып табылады, ал пайда енгізілген салымға сәйкес бөлінеді. Акционерлер мен олардың отбасы мүшелері бұл кәсіпорында жұмыс істеп, еңбектері үшін жалақы ала алады. Нарық жағдайында мұндай бірлестіктер нарықты азық-түлікпен тез қанықтыру үшін әртүрлі салалардағы ұйымдар арасында капитал қозғалысының жоғары жылдамдығын қамтамасыз етуге мүмкіндік береді.

Түйін сөздер: аграрлық сектор, инновациялар, біріктірілген құрылымдар, өндіріс тізбегі.

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Формирование инновационных интегрированных структур в аграрном секторе Казахстана

Аннотация. За годы независимости Казахстан развивался как страна переходного периода к рынку, достиг значимых результатов. Хотя инновации активно завоевывают некоторые отрасли, страна отстает по уровню технологического развития. На примере аграрной отрасли показано, как

повысить технико-технологический и организационно-экономический уровни производства путем интеграции личных подсобных хозяйств. Цель исследования – изучение существующих в экономике Казахстана технологических укладов и на примере АПК разработка предложений по созданию инновационных интегрированных структур с более совершенными формами управления и сочетания производств, образующих цепочку создания новой стоимости. При решении основной проблемы были использованы аналитико-сравнительный метод, общенаучные методы и системного анализа. Проектируемая структура представляет собой коллективную собственность, где владельцы – пайщики, и доход распределяется в соответствии с внесенным вкладом. Пайщики и члены их семей могут работать на этом предприятии и получать заработную плату за труд. В условиях рынка такие объединения позволяют обеспечить высокую скорость движения капитала между организациями разных отраслей в целях быстрого насыщения рынка продовольствием.

Ключевые слова: аграрный сектор, инновации, интегрированные структуры, производственная цепочка.

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