

## AGRICULTURAL MECHANISATION AND ELECTRIFICATION

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**Abstract.** *The article discusses the techniques used in the agricultural sector, their use, providing the agricultural sector with modern, resource-efficient, and highly productive techniques. The issue of providing farmers with tractors, combine harvesters and agricultural machinery is discussed on the need for further development of the new mechanism that has been formed in practice to encourage the purchase of machinery by subsidizing them. Opinions were expressed about the need to start the production of spare parts for the assembled equipment in local machine-building enterprises. Attention was paid to the development of cooperative relations between machine-building plants and metal-working industrial enterprises in the production of agricultural machines and their spare parts, as well as technical service.*

**Keywords:** *tractor, agricultural machines, cotton picking machines and grain harvesters, working equipment, detail, friction, wear, resource, plow, mechanization, reliability, failure, defect, performance, technological process, farmers and peasant farms, power, agrotechnical process, technical service, spare parts, localization.*

### Introduction

President of the Republic of Uzbekistan Sh.M. Mirziyev's "Agricultural machinery" rapid development of the agrarian sector in the village on measures related to state support for the provision of agricultural machinery" Decision No. PQ-4410 dated July 31, 2019, on wide use of the scientific potential of higher education institutions in the areas of mechanization of agriculture, agricultural machinery and the use of agricultural machinery and technical service specified /1/. Sh.M. As stated in Mirziyev's address to the Oliy Majlis entitled "2019 - the year of active investments and social development" dated December 28, 2018, some farms and agricultural enterprises do not have enough working capital, necessary equipment and other material and technical resources. This has a negative impact on the productivity of agricultural crops, the fulfillment of contractual obligations and the profitability of farmers and agricultural enterprises /2/. President Sh.M. Pursuant to Mirziyev's Decree No. UP-4857 of November 17, 2016

Creation of a single system of mechanized service to agricultural producers, maintenance of agricultural machinery and production interaction, as well as agricultural machinery, technical service future technical and technological rearmament, modernization of demonstration enterprises and machine-tractor fleets, active attraction of investments in the network, including foreign investments, were emphasized /3/.

As can be seen from the above-mentioned Decrees and Decisions of the President, there is a great need for the modernization of the agricultural sector, the implementation of technical and technological renewal production works in almost all branches and complexes that are part of it. Therefore, the modernization of production, technical and technological re-equipment, and rapid renewal of the leading sectors of the economy are consistently continued as the most important priority tasks for our government. This can be seen in a number of documents accepted by the President of our country.

### **PERFORMANCE OF THE RESEARCH TASK**

In recent years, special attention has been paid to providing this system with equipment and machinery in our country. It is worth noting that long-term preferential loans and subsidies were allocated to farmers and peasant farms, and up to 80% of the cost of transportation to the workshop for the repair of equipment was covered by the state. In the next two years, in our republic, the number of modern machinery that meets international standards is increasing in the agricultural sector, at the same time, the analysis of the service life of the machinery shows that 65.4 percent of the machinery has served for more than 10 years, and 16.9 percent are agricultural machinery. completely obsolete. Therefore, it remains a priority to provide farmers and peasant farms with high-quality, modern, cheap, reliable, agrotechnical and operational equipment /4/.

Since these works are supported by the state, in order to effectively and fully use the resources of the agricultural machinery delivered to the farms, full compliance with the rules of technical procedures such as timely maintenance, troubleshooting, repair, diagnostics and proper storage is required.

Consequently, high technical and reliability indicators (unbroken operation, accuracy, maintainability, maintainability) of the machinery used in the agricultural sector depends on high adaptability to technical service, i.e. repair, maintenance and diagnostics. Along with the increase in the number of supplies of agricultural machinery, the problem of improving their quality and accuracy in use is also of primary importance. Every year, 20% of machines, including working equipment of agricultural machines, need to be restored and repaired due to a large amount of wear /4/.

Currently, due to economic difficulties, purchase of new equipment requires a lot of money, so the development of repair enterprises and the use of new methods for repair work in them gain special value. Therefore, it is necessary to use new methods in the repair of machines, to organize modern production, to apply new technologies for repair, and to improve the scientific organization of work.

### **RESEARCH METHOD**

In solving the tasks set in this article, the use of agricultural machinery in accordance with existing basic requirements and regulations (state and industry standards) is at a low level, the reasons that lead to the failure of the main details, and the methods of management decision-making theory and practice were followed in their determination.

### **RESEARCH RESULTS**

Based on this, we can say that there are a number of systemic problems in providing agriculture with modern and energy-efficient *ysmarty* equipment adapted to use, use, repair, maintenance, and diagnostics:

In recent years, during the agricultural reform of our country, in particular, in the *y*Strategy of the Development of Agriculture of the Republic of Uzbekistan for 2020-2030 years<sup>y</sup>, the development of the field of minimization of the cost of agricultural products at the expense of management of factors that lead to increasing the productivity of cultivated areas and crop yields, *eafineddreadsucing* the cost of products was one of the priority directions. It is known that although the agricultural sector exists independently of each other, it is managed based on the coordinated management of a number of factors that complement and support each other depending on the place they occupy in crop care.

One of these factors is preparation of land areas for planting seeds of crops, mechanization of planting, maintenance and harvesting, as well as service and supply of used agricultural

machinery. In particular, today there is a need for 563 types of agricultural machinery in the agriculture of our country, of which 104 types or 18% are imported, 258 types or 46% are produced in local machine-building enterprises and 49 types or 9% in joint machine-building enterprises, other 152 types are 27 percent is in situations such as re-creation, adaptation to local conditions, modernization, testing and decommissioning. Taking into account the above justifications, the theory of management decision-making and implementation methods was used in the analysis and presented to your attention/5/. 1.

Suitability of tractor power to local conditions. Small-power (20-60 hp), medium-power (60-160 hp) and high-power (more than 160 hp) tractors in the republic's agriculture is used.

The existing equipment in the system of JSC "Uzagroservis" consists mainly of high-power combine harvesters intended for cotton and grain fields. Since five bodies plows used on tractors have four to (due to the small size of the field contours, plows with more than four bodies are not widely used), they usually have 50 horsepower per body. When 30 horsepower per hull is optimal, an unnecessary 20 horsepower is being used inefficiently. So, when using a four-body plow, 80 horsepower of the tractor is spent on the corresponding amount of fuel and service costs. Therefore, the cost of the product is also steep becomes more expensive.

It should be noted that the use of such high-powered tractors in the fields of peasant farms and homestead landowners, which grow more than 70 percent of agricultural products, is not economically efficient. Nevertheless, in the fields of peasant farms and estates, today the capacity is 80-100 hp tractors are used. So here too, the costs of food and service are more than necessary. According to the analysis, it is desirable that the power of tractors used for land use in the small-sized fields of farmers and homestead owners should be 20-60 horsepower.

Number of tractors.

The method used to determine the need for high-powered tractors is usually based on the need to plow land with one tractor in the autumn months. This style is not suitable for this season. In the summer season, plowing the land after grain harvesting or other types of tillage is not done in time, due to the rapid loss of moisture, the soil will harden and the plow will be of poor quality, and the cuttings will move. Planting crops in such areas requires a large amount of water to soften the soil. In places where there is a lack of water, it is impossible to plant perennial crops. Therefore, it is appropriate to determine the agrotechnical term of soil cultivation as one week, based on the working conditions of the months, not the amount of work done by the autumn plow.

If calculated in this way, it turns out that the number of tractors is five times less. As a result of the increase in the number of tractors, it is possible to plant crops on all lands without spending too much water and fertilizers due to the reduction of soil tillage periods. Due to the use of the water saved from the plow to irrigate the crop, the productivity will be guaranteed compared to the usual case, and the size of the crop will also increase. 2.2. To date, the account of the need for tractors working in the fields of peasant farms and landowners has not been kept. It is wrong to use tractors designed for farmers and agroclusters in these fields, because the use of high-powered tractors is not economically effective here due to the small size of the land areas.

Although the number of farms is not large, but if we take into account that the number of landowners is more than 5 million, if we assume that one tractor with a power of 60 horsepower can work on average 9 ha of land in a week, then the republic will receive 90 it becomes clear that there is a need for a thousand small power tractors. Today, more than 40,000 cotton tractors are used in the fields of farmers and landowners. There is a need for additional 50,000 units of small power (20-60 hp) tractors to perform agrotechnical activities in optimal terms. It is clear from the

analysis that the cultivation of crops in the fields of peasants and landowners is mainly based on manual labor. Technical agricultural measures lack of because of some are not performed, and some are specified agrotechnical will be completed late. If the demand for tractors is fully met, the loss of agricultural crops will be avoided, labor productivity and productivity will increase.

**Mechanization service.**

In 1995-2010, only the "Ozagroservis" (former "Uzagromashservis") system was engaged in providing mechanization services for the cultivation of cotton and grain, the main crops of the republic. Purchased tractors and agricultural machines were granted concessional loans by the government, with benefits such as exemption from value added tax bride Despite this, the system has, until now, relied on state aid and soft loans from banks, has large creditor debt, and is fully dependent on its own working capital does not have Although the current mechanization service contract stipulates the obligation to fulfill agrotechnical requirements, these agrotechnical requirements are not formulated as a legal obligation of a responsible entity.

The most important thing is that the renovation coefficient (depreciation allowance necessary for the renewal or restoration of equipment) was calculated in the cost part of the contract less than the specified rate. As a result, it was not possible to form a fund for the renewal of outdated equipment and could not get out of the situation of needing the bank's preferential credit.

The provision of mechanization services to product growers in the fields of farmers and landowners is not systematically formed. According to the analysis, the tractors and equipment purchased by business entities with their own funds make up only 5% of the total demand. Due to the lack of special techniques, applying organic fertilizers to the field, fighting weeds, reclamation and soil are some agricultural measures aimed at restoring productivity remain unfulfilled.

**Period of use of techniques.**

Most of the tractors, combine harvesters and agricultural machines in the republic are 20 years old and older, so they are both mentally and physically worn out. According to the analysis, at least more than 200 million US dollars are spent annually on the maintenance of these tractors and agricultural machinery.

**Tractor and agricultural machines supply.**

During 1995-2000, tractors, combine harvesters and agricultural machinery manufactured by Keys were imported free of value added tax and customs duties. At the same time, 15 percent of the cost of equipment and spare parts was paid from the state budget. Until 2019, the price of tractors, combine harvesters and agricultural machines produced in our country was supported by the State in order to encourage their localization. This operation was mainly carried out by leasing tractors, combines and agricultural machines produced in joint ventures with the participation of Keys and Klass companies to farmers by "Ozagrolizing" JSC.

In these enterprises, where the technology of assembling tractors, combine harvesters and agricultural machines from large units is used, the privilege of exemption from value added tax and customs fees was also applied to the large units and spare parts imported from abroad. Starting from 2019, in order to support the industry by the state, a mechanism of subsidizing 10% of the margin of credit and leasing services to agricultural producers and 15% of the sale price of tractors and agricultural machines, where more than 20% of the production is localized, is being used. The old procedure for cotton picking machines and grain harvesters, i.e., exemption from value added tax and customs duties, was maintained, and in addition, a procedure for payment of

a certain part of the cost of mechanization services for cotton picking machines from the state budget was established.

**Technical service.**

The procedure for providing technical service for tractors, combine harvesters and agricultural machines during the warranty period by the selling entities has been resolved. But in the post-warranty period, technical service provision is not systematically formed, which in most cases is the responsibility of tractor operators. Due to the relatively cheap price of the provided mechanization service and the high price of technical service, services and supplied spare parts, there is always a shortage of funds in the repair and maintenance of tractors, combine harvesters and agricultural machines.

John Deere and some other leading companies engaged in the import of combine harvesters' agricultural tractors, enterprises with an intermediary or dealer contract, are responsible for the implementation of technical services after the warranty period for the delivered equipment and the supply of spare parts.

Also, the local enterprises did mechanical engineering not take responsibility for the maintenance of tractors, combine harvesters and agricultural machines produced by them after the warranty period, and for providing the customer with spare parts.

For 10 years from the date of sale of the products produced by the tractors, combine harvesters and agricultural machinery enterprises in foreign operation, through their dealers, with spare parts, to their own service centers convenient for the consumer (service is provided to the consumer in an area of no more than 30 km radius) (two service responsibilities (to the enterprise that has loaded on the basis of the contract) will be allowed to trade only after taking responsibility for the delivery and technical service in advance. Due to the complexity of the construction of used tractors, harvesters and agricultural machines, the use of intelligent control and management systems, the installation of a system for determining their coordinates (GLONASS, GPS) during the work process, the establishment of online information exchange, the appearance of electric tractors, harvesters and robotic systems, modern service services demand is increasing.

In particular, the use of different standards of technical service in companies producing equipment, the fact that an agreement on the transition to a single system has not been reached creates a complicated situation. It is inappropriate for a specialist providing service for equipment manufactured by one company to use his knowledge and diagnostic tools in servicing equipment of another company, (programmatic) software disparity arises.

The fact that the enterprises of the JSC "Uzagroservis" system have focused on the mechanization service, the existence of debtors and creditors in the field, and the fact that it has not found its solution, creates some difficulties in providing technical service.

As a result of objections to the terms of the contract, the customer is suffering along with the agribusiness operator. This situation leads to the inability of the contractor example, and the customer to fulfill their duties. For if the operator does not sharpen the ploughshare, energy consumption increases and productivity decreases. Soil fertility if the customer does not apply organic fertilizers to the soil the weight of cultivated products decreases, efficiency decreases, and a chain of negative results occurs, such as an increase in the consumption of labor, food and other resources. decreases, and a chain of negative results occurs, such as an increase in the consumption of labor, food and other resources.

Tractors, combine harvesters and agricultural machines that have passed their service life, that is, their technical resource (defined from 7 to 20 years depending on the type of equipment,

accuracy and working conditions) in foreign operation, are fully repaired and re-sold on the secondary market. An economic mechanism is followed to encourage the process of providing obsolete (outdated) equipment for perfect repair. Farmers who sell their old equipment to repair companies are given a subsidy of up to 25% of the cost of new equipment and a long-term interest-free loan from the state. In the application of this mechanism, based on the relevance of the need for each technique and according to the proposal of the Ministry of Agriculture, the amount of the subsidy is adjusted annually to the conditions.

**Production of tractors, combine harvesters and agricultural machines and spare parts for them at local machine-building enterprises.**

Due to the mass application of the technology of assembling tractors, combine harvesters and agricultural machines from leading foreign companies to local machine-building enterprises, in the past 30 years we have not been able to start the full production of our own tractors and agricultural machines, which are necessary for the agricultural sector. Due to the lack of localization of details in assembled techniques.

Therefore, domestic machine-building enterprises do not have the opportunity to produce spare parts for their assembled equipment. As a result, they do not have the opportunity to fulfill the obligation of technical service during the warranty period of the equipment and during the subsequent work process.

**Reforms carried out in the next two years on the renewal and replenishment of the agricultural equipment park and state support of the technical service sector.**

Starting from 2019, the economic support of the industry by the state will be implemented through the producers of agricultural products, that is, with the procedure of giving them 10% of the margin of bank loans and leasing services for the purchase of equipment, and 15% of subsidies for more than 20% of localized equipment.

As a result, today, cooperation relations between machine-building plants and metal-working industrial enterprises have started to revive in the production and technical service of agricultural machines and spare parts for them.

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