

РЕСУРСНИЙ ПОТЕНЦІАЛ АГРОВИРОБНИЦТВА

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ORGANIZATIONAL AND ECONOMIC BASES OF FUNCTIONING OF ORGANIZATIONAL FORMS OF MACHINE AND TRACTOR STATION USE OF AGRICULTURAL ENTERPRISES

Метою дослідження є розробка методичних положень і практичних рекомендацій щодо визначення оптимальної з позиції економічної ефективності організаційної форми використання технічних засобів в сільськогосподарських підприємствах.

В процесі дослідження було використано такі наукові методи: економіко-статистичний, систематизації та узагальнення, монографічний, діалектичний.

У статті обґрунтовано вибір критеріїв оптимізації складу технічних ресурсів у сільськогосподарських підприємствах, проаналізовано переваги та недоліки внутрішньогосподарського та міжгосподарського використання техніки, визначено критерії прийняття управлінських рішень про вибір форм використання спеціалізованої техніки. Розкрито сутність об'єднань із спільного використання техніки. Розглянуто базові принципи створення та функціонування сільськогосподарських механізаторських кооперативів. Виявлено основні гальмуючі чинники, що впливають на розвиток кооперативного руху в Україні.

Внесені пропозиції щодо вибору критеріїв оптимізації складу технічних ресурсів сільськогосподарських підприємств. Проаналізовано бригадно-ланкову і цехову організацію використання техніки, визначено плюси і мінуси використання послуг підприємств агротехнічного сервісу для сільськогосподарських виробників.

Результати, отримані в ході дослідження, сприятимуть розвитку технічного забезпечення сільськогосподарського виробництва. Прийняття управлінського рішення про спільне використання техніки доцільно ґрунтувати на порівнянні приросту прогнозованої врожайності сільськогосподарських культур та продуктивності тварин (виражений у прогнозованих цінах), який має бути не менше відношення приросту питомих витрат на гектар (на 1 голову худоби).

Ключові слова: технічні ресурси, організаційні форми, сільськогосподарські підприємства, оптимізація.

Formulation of the problem. The machine and tractor station, as the most important component of the production potential of agricultural enterprises, ensures mechanization and automation of production processes and, to a greater extent, determines the level of labour productivity and the efficiency of production activity. The effectiveness of the use of agricultural machinery is formed by a number of factors that operate in isolation and in interconnection, with the influence of natural, technological, organizational and production, socio-economic factors, etc.

At the same time, the results of the conducted research indicate that the machine and tractor station of agricultural enterprises has been formed and continues to be formed without proper economic assessment and development of a corresponding strategy.

Analysis of recent research and publications. The research of this topic was carried out by such scientists as V.E. Skotsyк, V.M. Antoshchenkov, V.V.Rossokha, M.G.Mikhailov, however, a number of questions regarding the choice of the optimal form of technical resources use at agricultural enterprises require a more detailed study.

Setting objectives. The purpose of the study is to develop methodological guidelines and practical recommendations for determining the optimal, from the standpoint of economic efficiency, organizational form of the use of technical means at agricultural enterprises.

Presentation of the main research material. In most cases, the existing composition of the machine and tractor station of farms was formed spontaneously and is characterized by a large list of different brands of machines. Each farm has more than 10 types of tractors and over 100 agricultural machines. It creates practical difficulties in their operation and maintenance. We have found out that for

complex mechanization of one agricultural crop cultivation 5-8 brands of tractors are used on farms, with the corresponding tractor tracks of agricultural machines.

Studies have also shown that there is a problem at most agricultural enterprises, namely the lack of trailed (mounted) agricultural reagent. In the course of studying the problem, there has been revealed a low level of maintenance of tractors that are part of the soil cultivating aggregates. Due to their frequent use they are being deteriorated. And also the shortage of tractors on the farm is explained by the fact that this machinery is the subject of security for bank loans, which were provided to agricultural enterprises and were mostly sold due to non-backpayment of loans. A significant negative factor influencing this situation is low solvency of the corporate sector enterprises, as well as the lack of access to loans and other sources of modernization of the machine and tractor station.

From the above it can be noted that when deciding on the organization of inter-farm cooperation or the use of mechanized services of specialized enterprises, it is necessary not only to take into account internal economic factors but also to evaluate external factors such as: market availability and developed infrastructure of agricultural machinery market for execution of a certain technological process, reliability of partners and contractors, the probability of non-fulfillment of obligations, etc.

When choosing an organizational form for the use of specialized equipment, it is advisable to use proven methodology, since the proceeds and profits from the sale of agricultural products are directly related to the use of a particular machine. This methodology should take into account change in costs and yields and, consequently, involvement of specialized equipment. In the basis of calculations, it is advisable to implement a common methodology for evaluation of efficiency of technological servicing of agricultural producers, since agricultural enterprises management, in substantiating either the variant of formation and use of their own machine and tractor station or the variant of use of third-party organizations' services, should compare the cost of the technological process, taking into account the cost of services, which third-party organizations provide.

In the course of the study, a comparison of the cost of plowing by the tractor T-150K in aggregating with the plow PYA-5-35 was made and the cost of services provided by the subjects of entrepreneurial activity in Kyiv region and in the conditions for the establishment of a cooperative (Table 1).

Table 1 – The cost of services provided by third-party organizations and the actual cost of plowing per 1 hectare (UAH)

Indicators	Own technical resources	Services of third-party organization	Servicing cooperatives
Payroll with deductions	17,8		17,8
Fuel	186,1		186,1
Depreciation	2,3		2,3
Spare parts and repairs	2,6		2,6
Other expenses	2,1		1,1
Total expenditure	210,9		209,9
Profit			5,2
The cost of services		219	215,1

Source: author's calculations.

The data in table 1 indicate that the cost of plowing by own agricultural machinery is lower than the cost of services of third-party organizations by 3,8%, and the cooperative – by 2,4%. It is obvious that it is more profitable to use own equipment, but it is necessary to take into account that the cultivating area, its geometric contours and other factors greatly affect the amount of plowing costs.

In order to determine benefits of certain forms of using machinery, we conducted a questionnaire survey among managers and specialists of agricultural enterprises of Vasylkivsky, Stavishchensky and Volodarsky districts of Kyiv region, 40 respondents were involved. Our research showed that 35% of the respondents require involvement of mechanized third-party providers, 65% are focused only on the use of intra-farm equipment.

It is obvious that various forms of agricultural machinery use lead to different approaches to assessment of crop production efficiency [1]. Thus, in the first variant, agricultural commodity producers provide crop production by using their own machine and tractor station. The intra-farm use of technical equipment involves the use of machines at one agricultural enterprise. Such a method of using agricultural machinery is divided, according to the territorial and sectoral principle of farm management, into two types: brigade-team and shop organization of technical equipment use.

Under the brigade-team organization of use of technical equipment at enterprises, there are mechanized (tractor) brigades serving the entire area or crop rotation, with a group of machines being assigned to a brigade of mechanics. By their very nature, permanent mechanized brigades at an agricultural enterprise are subsidiary production units [2].

For performing various types of mechanized work, within a brigade temporary structural units are formed – complexes, which in their turn consist of mechanized teams and units. The complex should be considered as a temporary production unit to carry out a full cycle of technologically interrelated work, by specializing and concentrating equipment working on the basis of the current-group method. In its turn, the mechanized team is a part of a complex consisting of equipment that carries out one type of work (sowing, harvesting, transportation, etc.) or a type of maintenance (technical, household, etc.), which can be both temporary and permanent. Complexes, as a rule, include subunits for harvesting and transport operations, mechanized teams do arable, sowing, weed controlling work, units do forage harvesting work. The mechanized team is an incomplete complex, that is, an independent subunit for performing 1-2 types of interrelated kinds of work using the current-group method. Among scholars, it is commonly believed that mechanized complexes are the basis of the forms of organization of technical equipment use [3].

With workshop organization of technical equipment use at agricultural enterprises based on a branch principle, shops (sections) are formed, each of which is involved in the implementation of certain technological processes. This type of intra-farm machinery use allows the interaction of shops connected by a single production cycle.

In choosing a rational form of organizing the use of machinery, first of all, it is necessary to create the conditions for the most complete annual load of machines, in order to ensure their high-performance use [4].

Distribution of one or another organizational form of the use of machinery is not accidental. According to scientists and practitioners, it is due to peculiarities of production in a certain natural-economic zone. So, tractor brigades are used on farms where there are small production sites, and the volume of mechanized works is not sufficient for the full load of high productivity equipment. With this approach more efficient use is made of machinery and a group of mechanics, that allows to maintain machinery more easily.

Concentration of agricultural machinery in mechanized complexes creates conditions for rational organization and management of the production process, operational control over technological discipline and the quality of work, wide maneuverability of all technical means, maintenance of equipment in proper condition, optimization of the mode of mechanics' work, improvement of social conditions [5].

Compared with other forms, the intra-farm use of technical equipment has a number of advantages: a high degree of efficiency (the technical equipment is always at the disposal of the farm); relative autonomy in solving the issues of organizing the use of machinery; lower probability of a breakdown of machines due to belonging to only one owner; reducing the probability of spreading weeds and various diseases of plants; the possibility of changing the agronomic terms of implementation of technological processes in adverse weather conditions.

For this reason, the intra-farm use remains one of the main forms of machinery use, but it is possible that there may be some negative points, namely: a low level of technology, the impossibility of full loading of complex equipment; the lack of sufficient amount of equipment for cultivation of the farm-land in the established agrotechnical terms; impossibility of applying modern technology due to deterioration of the machine and tractor station; failure to purchase expensive mechanisms; an increase in the current costs of maintenance and operation of machines.

With the second variant – agricultural commodity producers are oriented on the use of mechanized services of specialized enterprises of agrotechnical service or participate in inter-farm cooperation, involving machinery for the implementation of certain or complex technological work on cultivation of agricultural crops. The activity of enterprises providing technical services has certain technical and technological, organizational and economic advantages and disadvantages. Positive features almost coincide with the benefits of inter-farm cooperative enterprises, which, as a result of specialization, increases the quality of work performed by the machinery. Negative features of using technical equipment of third-party technical service companies are as follows: an increase in the amount of paid taxes, since the agro-technical enterprises do not belong to agricultural producers; the inability of consumers to influence the level of prices and the quality of services those enterprises provide.

We believe that, subject to inter-farm use of machinery, it is advisable to highlight the following benefits: the possibility of introducing new and improved methods and technology; application of modern and productive equipment; achievement of optimal loading of agricultural machinery; reduction of labour costs (less labour force per unit area of agricultural land); more effective use of employees' skills and qualification; reduction of work intensity in "peak" periods; reduction of investment needs for each enterprise; making the terms of technical equipment supply for agricultural enterprises shorter; reduction of current expenses for maintenance and operation of machines; the possibility of expanding production due to the use of own labour and machines at neighboring enterprises; increase in income; reduction of production and economic risks. Among the list of deterrent factors for the joint use of machines, one should highlight the following ones: lack of information on positive and negative experience of inter-farm use of machinery; possible lack of the machine when it is most needed; reducing the amount of time to cultivate own fields because of providing assistance to other farms; possible spreading of weeds and various diseases by machines; impossibility of using large high-performance machines in small fields; losses due to increased transactional costs; increase of cases of failure of machines in common use; absence of a state system of cooperation stimulation; the risk of enterprises losing independence; the risk of adverse weather conditions and, thus, appearance of unequal conditions between co-operators; the risk of disagreements in the settlement of disputes; the risk of organizational errors.

Not less important criterion for making a decision on the choice of the form of specialized equipment use is the distribution of cumulative income or produced agricultural products between the subjects of cooperation, taking into account production costs of the technological operations performed.

The algorithm for choosing the organizational form of the use of specialized equipment involves observing the sequence of actions. An important step in the proposed algorithm is the development of complex technological maps for the joint production of agricultural crops. Taking into account the involvement of technical equipment of inter-farm cooperation enterprises (or technological services enterprises) there are opportunities for improvement of technology, increasing the size and adjusting the structure of crop areas. The development of complex technological maps is completed by forecasting crop yields taking into account technological and organizational and technical measures, justifying the amount of regulatory planned expenditures per 1 hectare, which also include expenditures of subjects of inter-farm cooperation (specialized enterprises) within the framework of joint production activity.

An important and necessary step, according to the proposed algorithm, is assessment of the economic efficiency of the form of machinery use by comparing production and economic indicators of agricultural crops obtained on the basis of primary technological maps. The effectiveness of the chosen organizational form of machinery use to a large extent depends on the level of prices for services rendered. In order to regulate the cost of machinery, it is necessary to take care of improving economic conditions of agricultural producers and technological service enterprises' functioning at the state level.

Consequently, from the standpoint of an agricultural enterprise, one of the most important elements of organization of production is the choice and justification of the form of machinery use. The composition and sequence of stages of organizational and economic work in substantiating the use of specialized and universal technical equipment differ significantly. The algorithms proposed on the basis of the conducted research considerably facilitate the task of agricultural commodity producers to improve the organization of equipment use.

The main advantage of such a mechanism for choosing the form of specialized equipment use is the convergence of economic interests of the subjects of production activity within a single technological process, on the basis of distribution of technological functions and ensuring a mutual economic responsibility for the final result of production.

According to the results of the research, the improvement of organizational measures, first of all, needs the development of the system of economic relations between entities in the inter-farm use of machinery. Currently, one of the most acceptable ways of solving the problem of technical and technological support for agrarian production is the development of a system of technological servicing of agricultural producers on the basis of organization and operation of inter-farm cooperative enterprises and specialized enterprises of agro-technical service.

In the market of technological services, specialized enterprises (in our case, enterprises of inter-farm cooperation are considered) and agricultural commodity producers, on the one hand, are inextricably

cably linked, ensuring the implementation of a single technological and production process, and on the other hand, they are competitors in obtaining part of the revenue from realization of jointly produced agricultural products [6]. This specific feature causes certain difficulties while forming mutually beneficial economic relations in the system of technological service.

In the conditions of the market environment, the main tasks, within the framework of forming an effective system of economic relations between subjects of inter-farm equipment use, are: defining economic parameters (boundaries) of effective interaction of participants of technological services market and the choice of optimal form of such interaction, including the system of mutual payments, the definition of prices (tariffs) for technological services [7].

It is worth pointing out that the forms of mutual payments of subjects of inter-farm co-operation for the services rendered may be of a variety: in kind (products, services), financial (cash or non-cash) and mixed. In our opinion, special attention should be paid to the issue of calculations of participants of inter-farm cooperation in kind, the amount of which can be determined by two different methods:

- on the basis of mutual agreement of the parties a fixed rate (percent) of transfer of products to the enterprise, which performed the work (services) is set, depending on the level of productivity of agricultural crops or the productivity of live-stock obtained from farms;
- the in kind payment is calculated on the basis of contractual prices.

The most acceptable and widespread practice is the second method, which enables farms, on the basis of the contractual price, to turn the total amount of the contractual payment or part of it for the performed types of work at procurement or contractual prices into in kind payment.

In the formation of an effective system of economic relations of subjects of inter-farm cooperation, besides the optimal system of pricing and forms of mutual settlements, an important issue is the improvement of contractual relations [8]. The contract characterizes, first of all, economic interests of the parties, by establishing relations on mutually beneficial grounds, which is the basis for ensuring expanded reproduction for both agricultural producers and specialized enterprises of agrotechnical service [9]. Each party must fulfill its obligations in the most economical way. Contractual relations should be real and economically sound, taking into account financial, economic and other facilities of the parties. In doing so, the manifestation of any subjectivism should be eliminated.

In our opinion, it is necessary to conclude an agreement for a period of no longer than three months. Over a longer period of time, the change in certain factors will have less traceability (crop yield, crop structure, new equipment supply to the farm and cancellation of the old one, weather conditions, prices for fuels and lubricants, etc.). The annual contract should be considered only as a protocol of intentions, and it is inappropriate to foresee the responsibility of the parties for non-fulfillment of these intentions.

Besides the agreed deadline, agricultural enterprises-participants in inter-farm cooperatives submit a request for the performance of work in the next quarter, indicating its types, volumes and terms of execution to the coordinator (or specialized agricultural service enterprise). If the volume exceeds the production capacity of the contractor, he submits counter-proposals to reduce the volume or change the timing of the work. Volumes and terms of work are obligatory for performance.

In addition to data on types, volumes and terms of work execution, the contract must contain such data agreed by the parties as: forecast (estimated) cost of ordered kinds of work (services), determined by the current quarter tariffs, taking into account their possible increase influenced by expected rates of inflation; the procedure of calculating the performed work (prepayment, payment after performance of work, with partial advance, full or partial in kind payment, mutual settlements, etc.); the size of the penalty in percentage of the tariff for the work performed (service provided) because of the customer's refusal from the agreed amount of work in the absence of force majeure circumstances or claims to the executor regarding violation of terms, technology performance and other conditions that caused or could cause a decrease in yield, loss, deterioration of quality, price increase of agricultural products; the size of penalties for poor quality of execution and non-compliance with the agreed terms of work in the absence of force majeure circumstances and the amount of material incentives for the performer for the early completion of works at the request of the customer [10,11]. The amount of sanctions or incentives is set as a percentage in accordance with the tariff for work (services) on the basis of relevant norms and norms approved by the general meeting of stockholders (shareholders) of the inter-farm cooperative association (enterprise).

All disagreements that arise in evaluating the quality of work (services) and damages are settled by the commission, created from among representatives of subjects of inter-farm cooperation.

Conclusions. Thus, in our opinion, the priority directions of the development of organizational forms of agricultural machinery use in the region studied can be defined as:

1) provision of a reasonable choice of the organizational form of agricultural machinery use based on the application of the proposed algorithms and a differentiated approach to universal and specialized machines, taking into account specific production and economic conditions;

2) when comparing different variants of organizational forms of machinery use, and when forming mutually beneficial prices for mechanized services, and when justifying the effectiveness of investments in projects for creation of specialized machine-and-technological enterprises, the proposed adapted assessment methodology should be applied, a differentiated approach to the cost of different organizational forms of machinery use should be implemented;

3) when organizing a cooperative for the joint use of machinery and when creating of a machine-and-technology enterprise, specialization of agricultural enterprises and their need for mechanized services should be taken into account. It is also necessary to complete the enterprise with modern high-productivity equipment, ensuring its intensive loading.

LIST OF REFERENCES

1. Skotsyk V.Y. (2013). Technical support of agricultural producers: current state and problem solving. *Economy and management of agrarian and industrial complex*. Issue 10. pp. 56-60.
2. Antoshchenkov V.M., Antoshchenko R.V. (2012.) The Market Overview of Agricultural Machinery for Enterprises of the Agroindustrial Complex of Ukraine. *Bulletin of the KhNTUSG. Exp.* 124. Vol. 2. (technical sciences). URL: http://khntusg.com.ua/files/sbornik/vestnik_124-2/03.pdf
3. Rossokha V.V., Naumenko I.V. (2017). Integral assessment of the efficiency of using the material and technical base of agriculture. *Economics of AIC*. No. 1, pp. 60-67.
4. Mikhailov M.G. (2017). Development of material and technical base of agrarian enterprises. *Podolsky Gazette: Agriculture, Technology, Economics*. No. 1 (26), pp. 191-197.
5. Ermakov O.Y., Nagorny V.V. (2015). Formation of Economically Sustainable Production Capacity of Agricultural Enterprises: Monograph. K.: Comprint, 295 p.
6. Grek A. (2017). Modern state of material and technical support of agricultural enterprises of the Kiev region. *Bulletin of agrarian science of the Black Sea region*. No 1 (93), pp. 61-71.
7. Skotsik V.Y. (2016). Organizational and economic approaches to the organization of the information component of the market of agricultural machinery Investment: practice and experience. No. 24, pp. 71-74.
8. Dankevych Y., Dankevych V., Chaikin O. (2016). Ecologically certified agricultural production management system development. *Agricultural and Resource Economics: International Scientific EJournal*. Vol. 2. No. 4th, pp. 5-16. Mode of access: www.arejournal.com.
9. Biba V.V., Machicheva P.V. (2017). Material and technical support of agricultural enterprises of Ukraine. *Economy and region*. No. 5 (66), pp. 70-74.
10. Zakharchuk O.V. (2014). Problems of logistical support of agricultural enterprises of Ukraine. *Economy of agroindustrial complex*. No. 7, pp. 92.
11. Didorenko T.V. (2016). Essence and classification of material and technical resources at agricultural enterprises according to their purpose and role in the process of production. *Ukrainian Journal of Applied Economics*. Vol 1. No 1, pp. 92-99.

Организационно-экономические основы функционирования организационной формой использования машинно-тракторного парка сельскохозяйственных предприятий

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Целью исследования является разработка методических положений и практических рекомендаций по определению оптимальной с позиции экономической эффективности организационной формы использования технических средств в сельскохозяйственных предприятиях.

В процессе исследования были использованы следующие научные методы: экономико-статистический, систематизации и обобщения, монографический, диалектический.

В статье обоснован выбор критериев оптимизации состава технических ресурсов в сельскохозяйственных предприятиях, проанализированы преимущества и недостатки внутривладельческого и межхозяйственного использования техники, определены критерии принятия управленческих решений о выборе форм использования специализированной техники. Раскрыта сущность объединений по совместному использованию техники. Рассмотрены основные принципы создания и функционирования сельскохозяйственных механизаторских кооперативов. Выявлены основные тормозящие факторы, влияющие на развитие кооперативного движения в Украине

Внесены предложения по выбору критериев оптимизации состава технических ресурсов сельскохозяйственных предприятий. Проанализированы бригадно-звеньевую и цеховую организацию использования техники, определены плюсы и минусы использования услуг предприятий агротехнического сервиса для сельскохозяйственных производителей.

Результаты, полученные в ходе исследования, способствовать развитию технического обеспечения сельскохозяйственного производства. Принятие управленческого решения о совместном использовании техники целесообразно

но основывать на сравнении прироста прогнозируемой урожайности сельскохозяйственных культур и продуктивности животных (выраженный в прогнозируемых ценах), который должен быть не менее отношения прироста удельных затрат на гектар (на 1 голову скота).

Ключевые слова: технические ресурсы, организационные формы, сельскохозяйственные предприятия, оптимизация.

Organizational and economic bases of functioning of organizational forms of machine and tractor station use of agricultural enterprises

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The purpose of the study is to develop methodological guidelines and practical recommendations for determining the optimal organizational efficiency of technical equipment use at agricultural enterprises.

In the process of research, the following scientific methods were used: economic and statistical, systematization and generalization, monographic, dialectical.

The article substantiates the choice of the criteria for optimizing the composition of technical resources at agricultural enterprises, the advantages and disadvantages of the intra-farm and inter-farm machinery use have been analysed, the criteria for making managerial decisions on the choice of forms of specialized equipment use have been determined. The essence of cooperatives of joint use of technical equipment has been revealed. The basic principles of creation and functioning of agricultural machinery cooperatives have been considered. The main inhibiting factors that influence the development of the cooperative movement in Ukraine have been revealed.

The suggestions on choosing criteria for optimizing technical resources of agricultural enterprises have been presented. The brigade-team and workshop organization of machinery use has been analyzed, the advantages and disadvantages of using the services of enterprises of agro-technical service for agricultural producers have been determined.

The results obtained during the study will contribute to the development of technical support of agricultural production. It is advisable to base a managerial decision on mutual technical equipment use on comparison of growth of the forecast yield of crops and livestock productivity (expressed in projected prices), which should be no less than the ratio of the increase in specific costs per hectare (per head of livestock).

Key words: technical resources, organizational forms, agricultural enterprises, optimization.

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