

About one approach to the assessment of technical equipment of agricultural enterprises in conditions of economy modernization

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Abstract. The problem of conformity of technical equipment and the number of employees in the agricultural enterprises arising in the process of modernization of the agricultural sector. As a means for evaluation of technical equipment are invited to use a special type of production functions, the distinctive feature of which is the simultaneous display of the micro - and macropaedia industry.

Introduction.

A modern agricultural production is a difficult organizationally-economic process functioning at his continuous providing capital goods, necessary for implementation of agrotechnological measures and operations at the production of goods and implementation of works, services. In this connection, the system of logistical support of production of agricultural goods in the agrarian sector of economy occupies a central place. An agricultural technique, along with the landed resource, makes basis of agrarian sector of economy, accordingly efficiency, the competitiveness of agricultural produce straight depends on material energywell-being and energyequipped of industry. In an agricultural production the system of logistical support with the resources engaged in her determines the more than half of all expenses [1].

The programs of modernisation of the economic system carried out in practice embrace her different elements. Modernisation affects quite different parties of life of country. At her realization an important value has correct combination of socio-economic, technological and political factors, because at liquidation of bottlenecks in one spheres, they involuntarily arise up in other. In our view, one of reasons such the phenomena consists in violation of principle of accordance, in underestimation of all limiting factors.

As a result, development of integration processes, addition of mainly intra-branch forms of associations, becomes the necessary condition of modernisation of agrarian sector of economy – major productive and processing concerns – by more difficult inter-branch and territorial forms, such as the apeak-integrated forming of holding type.

Exactly these forms of integration are specific for the agrarian sector of economy, and exactly to them today decision possibilities of native increase of efficiency and drawing on accomplishments of scientific and technical progress and innovations are related. However realization of these possibilities



depends on the row of terms, including development of theory of co-operation of the integrated forming with the developing systems of the territorial and programmatic-having a special purpose planning and management. Only on this basis it is possible correctly to define a role and place of rural territories in realization of long-term tasks of socio-economic development of region and country. Necessity ecologically and the socially balanced passing to modernisation produces the row of requirements to forming of conception and strategy of development of rural territories. Term "rural territory" stops to be the simply general name for the intermediate levels of territorial structure of the socio-economic system or totality of the natural, social and technical phenomena on this territory [2, 3, 4].

Providing of steady development of agroindustrial complex in the conditions of entering of Russia to WTO maybe only on condition of his substantial technical and technological modernisation. Modernisation implies mastering and introduction of intensive technologies, new generations of agricultural technique [5, 6].

In obedience to strategy of machine-technological modernisation of agriculture of Russia on a period 2020 to next priority tasks are certain: to provide the height of the labour productivity no less what in 4 times, including by a way:

- technological rearmament of agriculture, promoting in 1,6-1.7 time the productivity of industries of plant-grower and stock-raising and attaining on this indicator of average world indexes;
- increases of gross production of agricultural goods in 1,9-2 times, using for this purpose, except intensive factors, present landed potential not engaged in a turn;
- technical retooling of industry the machines of new generation, allowing to provide the more than double increase of the industry average loading on the worker of machine-technological sphere [7].

Without technical and technological modernisation agriculture is not in strength substantially to promote production volumes, that especially topically in the conditions of the conducted politics of import substitution of agricultural produce. Thus a hardware of small forms of management on a mud flow is today a stumbling-stone.

Analysis and discussion of research results. In Republic of Tatarstan in 2016 agricultural organizations are purchase more than 5 thousand units of technique and equipment, to the amount of an about 6 milliard of rub.

At the same time from data of Tatagroleasing, a park of combines and tractors on 40% is outside the terms of exploitation, side by side with this, in obedience to data of Tatarstanstat, the quantity of these machines continues to grow short. In 2016 as compared to 2008 the park of tractors grew short on 30,6%, combine harvesters – on 33,8% (table 1).

However, as be obvious from a table, power powers per employee grew on 37,6%. It is constrained, first of all, by the not height of the productivity of the used technique, and with the high rates of decline of quantity busy in industry (in the investigated period – 38,6%). Material Energywell-being calculating on 1 ha of sowing area went down for 2008 - 2016 on 16,6%.

Very evident are next comparisons: in world practice there is a 21 tractor (in RT – 3,6 tractors) on 1000 ha of plough-land; combine harvesters on 1000 ha of sowing of grain-crops - 6,3 pcs. (in RT are 1,6 pcs.). Consequently, on the amount of tractors on 1000 ha of plough-land our republic falls behind from a world level more than in 5,8 time, and on the amount of combine harvesters - in 3,9 time.

Table 1 – Power powers are in agricultural organizations of Republic of Tatarstan

	Years					
	2008	2010	2014	2015	2016	2016 in % by 2008
Power powers - all, thousand, hp.	4690	4296	3909	3885	3965	57,2
calculating on:						
– one worker, hp.	51,1	51,5	62,1	65,5	70,3	137,6
– 100 ha of sowing area, hp.	157,4	146,7	134,6	129,5	131,3	83,4

It is expected on: agriculture of Republic of Tatarstan: Statistical collection / Tatarstanstat. – Kazan, 2017. – 358 p.

On the estimations of specialists for providing of food safety of country, implementations of works in optimal agrotechnical terms it will be required to have material energywell-being calculating on 1 ha of sowing area – no less than 300 hp. (actually on Republic of Tatarstan in 2016 – 131,1 hp.), while in EC – 450-500 hp., the USA – 850 hp., Republic of Belarus – 500 hp. For Republic of Tatarstan optimal is a machine-tractor park including 55-60 thousand tractors taking into account mastering 3,4 million ha of plough-land, while in 2016 his quantity made only 10,8 thousand pcs. with middle power of 120-150 hp. Thus the amount of combine harvesters it is necessary to lead to 10 thousand pcs. (in 2016 are 2507 pcs.). Obviously, a native break is needed and not only quality but also quantitative.

Within the framework of Program of development of agriculture in Russia in a period from 2013 to 2020 subprogramme "Technical and technological modernisation of innovative development" is sent to creation of favourable economic environment assisting innovative development and bringing in of investments in industry, to the exit of Russia on leading positions in area of agricultural biotechnology. On realization of these aims from a federal budget it is pre-arranged to distinguish more than 23 milliards of roubles, from regional budgets is an about 12,5 milliard of roubles [7].

The resources of production come forward the basic factors of economic development of agrarian sector of economy in form material resources, labour and capital. Exactly they must be taken into account first of all in all set programs of development. There are two going near the decision of the indicated problem. The first is based on principle of distribution of each of resources on all agricultural enterprises, a deficit is here distributed and saved. The second supposes the selection of the most effective part of production, concentration of resources in her limits, removing to the same the problem of deficit for this part. Low effective productive units leave from functioning of the system [8, 9].

In connection with reduction of increase of labour resources in a country the problem of tying up of increase of units of technical equipments of production and their providing additional labour resources gets up especially sharply. For her decision many economists deem it wise the use of the second approach from afore-named.

In [10, 11, 12] it is reasonable, that, since the defined value, when the increase of material resources becomes surplus in relation to the resource of labour, maximum efficiency of his use goes down. In addition, dispersion of expensive, power-hungry new technique on the numerous enterprises of small and middle enterprise, with low removable office hours results in the decline of the real effect from application of new technique as compared to potential possibilities. Therefore at surplus of technical equipments of production it is necessary to accelerate their leaving due to pre-schedule liquidation of technique.

Such method of intensification of updating of technical equipped of production, though attended with losses in size of their remaining cost, does not need investment expenses and does not increase loading on an engineer and metallurgy. Leaving without a compensation supposes liquidation of the technical aggregates, not provided with labour resources, what the level of drawing on new technical and technological units will allow to promote. This is important, because the labour productivity on new technical and technological units is substantially higher, than on out-of-date.

Modernisation morally and physically out-of-date machine and tractor park over the pre-arranged leaving is difficult and responsible procedure. Before to begin her realization, it is necessary all-round to ground expediency of freeing of resources from the row of uneffective agricultural enterprises and use of them in more productive terms [13].

The preliminary estimation of technical equipped of machine and tractor park is required, to material well-being by his labour resources, estimation of productive possibilities of functioning agricultural enterprises. As means allowing to get the required estimations, it is suggested to use the special type of productive functions simultaneously representing micro- and macrodescription of

objects. The construction of productive function of industry comes true on the basis of analysis of her structure, i.e. macrodescription of industry is base on her microdescription.

For the construction of branch productive function next assumptions are entered. It is assumed that a machine and tractor park executes the homogeneous types of works, services. And here an only limiting factor are labour resources, i.e. material resources do not limit a production within the limits of the distinguished funds.

Technological descriptions of technical and technological units are the productivity and norm of expenses of resource of labour on unit of the executed agrotechnological operation (λ). Accepted, that the norms of expenses of resources of other industries, and also productivity of aggregates, are identical for all agricultural enterprises. Then the technological structure of industry can be presented by means of closeness of distribution of $h(t, \lambda)$ of stakes of the total productivity of technical and technological units of $M(t)$ on different technologies λ in the moment of time of t . The function of $h(t, \lambda)$ is certain at $\lambda \geq v(t)$, where $v(t)$ – the best of worked out and used in agriculture resource-saving technology that comes forward description of level of modernisation in the moment of time of t .

On the first stage of research we will be limited to consideration of permanent structure, i.e. we will not take into account appearance of new technologies because of modernisation. It means that $v(t) = \text{const}$ and $h(t, \lambda) = \psi(\lambda)$, i.e. does not depend obviously on time. A productive function looks like

$$Y(t) = M(t)f(x), \quad x(t) = R(t) / M(t). \quad (1)$$

Here the function of $f(x)$ is related to distribution $\psi(\lambda)$ by correlation

$$f(x) = \int_v^{\xi(x)} \psi(\lambda) d\lambda, \quad (2)$$

where a top limit $\xi(x)$ is determined by equalization

$$x = \int_v^{\xi} \lambda \psi(\lambda) d\lambda, \quad x \leq x^* = \int_v^{\xi} \lambda \psi(\lambda) d\lambda. \quad (3)$$

As $f(x)$ is the function of distribution, correlations of $f(0) = 0$ are just, $f(x^*) = 1$. The built productive function (1) in an obvious kind is determined by the technological structure of the industry set by distribution $\psi(\lambda)$.

By means of an additional research it is possible to establish the properties of production function postulated usually: positivity of the first and negativity of the second of derivatives.

If the amount of workers is determined busy in the agricultural production of $R(t)$ and productive potential of agricultural enterprise $M(t)$, then correlations (1), (2), (3) describe productive potential of enterprise, that must be involved, to provide the level of production of agricultural goods, determined $Y(t)$. In this case under the production of agricultural goods the volume of gross products not really got for a year is understood, and potentially attainable in the conditions of the set resources and technical and technological units.

It is known that in practice the level of loading of technical and technological units is subzero enough (on occasion at the level of 40%). Therefore actual distribution of busy workers on agricultural enterprises does not comport with distribution of technical and technological units on the norms of expenses of technological works, services. As a result we look after functioning of agricultural enterprises with the subzero labour productivity, and also shortage busy on agricultural enterprises with a high yield. To provide a maximal production of agricultural goods volume, it is required so to redistribute workers, first of all to provide technical and technological units with a burst performance.

Thus, the considered branch productive function gives an overhead estimation for the level of production of goods of agriculture as a function of present for her technical and technological units and busy on a production labour resources.

As follows from correlations (2) and (3), enterprises with the norms of expenses of labour higher $\xi(x)$ must not participate in a productive process from the present deficit of agricultural workers. It is possible to suppose that technical and technological units and accordingly the productive technical equipments not involved in a productive process are subject to leaving first of all.

The described going near the construction of productive functions helps to ground the real possibilities of intensification of production due to the acceleration of leaving of ineffective technical

and technological units. In addition, he sets structural procedure on determining the amount and composition of leaving technical and technological units.

It is important to underline that the value of potential level of production of agricultural goods $Y(t)$ always excels values productions that can be got at other variants of the use of technical and technological units.

Conclusion. Thus, as a major task of modernisation of economy the not increase of technical equipped of production is pulled out, and increase of their balanced with labour and material resources. The balance of factors of production is followed by delay of dynamics of updating of technical means of production as a result of elimination of low-productive and obsolete technical and technological units.

The considered approach of construction of productive functions of agriculture helps to define the most effective directions of the use of resources. A final decision about the rational concentration of technical and technological units on agricultural enterprises is accepted as a result of complex analysis of all factors and criteria of efficiency. In the conditions when the settling leaving of technical and technological units can not be in short space realized, offered approach can be used for forming of strategy of development of agrarian sector of economy.

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