Three-dimensional efficiency indicator of the grant support for innovative development of small business forms

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Abstract. The essence of the peasant (farm) enterprise as a separate direction of entrepreneurial activity is reviewed. The factors of agricultural production and features of peasant (farm) enterprises that affect the efficiency of their activities and predetermine their competitive advantages are presented. The relevance of the State support for the development of small business forms is specified. The essence of the basic methodological approach for evaluation of the efficiency of grant support for peasant (farm) enterprises, involving the evaluation upon the performance criterion, is presented. The concept and advantages of the methodological approach, involving the calculation of a three-dimensional efficiency indicator, are presented. The indicator is based on the determination of the strength and directions of the correlation between: the volume of grant support and operating income, the volume of grant support and material production costs, the volume of grant support and the volume of investments in technical equipment. The three-dimensional efficiency indicator allows normalizing the results of the evaluation to a unified scale that shows quantitative measures of efficiency: relevance, performance, efficiency, influence, stability.

1. Introduction
At the present time in Russia, there are various State programs, including sectoral programs, of economic support of small and medium-sized business entities. Some of these programs involve financing the development of business entities in the form of grants. They activate not only production activity, but also innovative activity of the enterprises, thus solving the problem of economic diversification.

The current need for grant financing for the development in Russia significantly exceeds the existing volume of funds for the agriculture development, allocated from budgetary and extra-budgetary sources [1]. The growth of the need for this form of financing is due to the transformation processes in the Russian and world economy: the growth of globalization level, the rate of the global food crisis, the need for import substitution and food security assurance, the restructuring of consumption [2].

2. Materials and methods
Grant support is the main form of the State support for small business forms in the Pskov region. Since 2013, the region annually holds a competition for provision of grants for the creation and development of the peasant (farm) entities and one-time payments for the domestic arrangements of novice heads of the peasant (farm) enterprises, as well as a competition for provision of grants for the development of family livestock farms on the basis of peasant (farm) enterprises.
In accordance with the Strategy of socio-economic development of the Pskov region until 2020 and the State program “Development of agriculture of the Pskov region for 2013-2020,” innovative development of the agriculture is considered as a priority scenario for the development of the industry [3]. However, the methodological basis for a comprehensive assessment of the influence of the State grant support on the innovative development of the industry is not formed.

Peasant (farm) enterprise is a small business form in the agricultural sector, working on the principles of entrepreneurship and market relations [4,5].

Peasant (farm) enterprises have characteristics that manifest themselves to varying degrees, and, therefore, make each enterprise unique. One of the basic principles of creation and assurance of the effective functioning of peasant (farm) enterprises is innovative activity [6]. It lies in the fact that the production scales of peasant (farm) enterprises do not allow competing with medium-sized and large enterprises in terms of the cost of agricultural production [7]. Competitive advantages are provided by advanced innovative development.

In order to be competitive not only in regional, but also in interregional and foreign markets, peasant (farm) enterprises must successfully solve the following tasks [8]:

- to use innovative technologies in the production, processing and realization of manufactured products;
- to use efficiently and effectively and to develop existing production forces and capabilities, including the use of digital technologies;
- to provide optimal employment for the members of peasant enterprise.

All this makes peasant (farm) enterprises potentially more innovatively active agricultural producers. However, innovations require significant investments, and the level of profitability of agricultural production of small business forms is inferior to that of medium-sized and large agro-industrial enterprises. This makes the State support for peasant (farm) enterprises the main, if not the only, source of financing for innovative development.

The efficiency of the State support is determined on the basis of performance indicators established by regulatory legal acts, which regulates the provision of the State support measures. These performance indicators are based on the achievement of planned values, which are defined by the agreements (contracts), concluded by the executive authorities with the recipients of grants. These indicators are included in the List of indicators characterizing the efficiency of the State support measures [9,10].

In order to assess the efficiency of the State support measures are used [11]:

1) performance indicators of the use of subsidies and grants:

The performance of the use of subsidies and grants in general, which is defined as the arithmetic mean of result evaluations of the use of subsidies and grants. Result evaluation of the use of the grant is determined on the basis of the score of 1 point for 1 percent of the result of the use of the grant, but not more than 100 points.

The criterion of “performance” is contained in the standard forms of grant agreements concluded between the Authorized body of the Administration of the Pskov region and the recipient of a grant, regardless of the specific direction of the State support.

2) the efficiency of the use of grant, which establishes a relation between the productivity of the use of grant for the reporting year and the utilized resources.

When the value of the efficiency of the grant provision, the measures of the State support for a direction (target) is:

- from 95 points and above – provision of grants, measures of the State support for a direction (target) is recognized as effective;
- below 95 points - provision of grants, measures of the State support for a direction (target) is recognized as ineffective.

It is important to note that in accordance with the basic conditions for the implementation of the Programs of support for the development of agricultural sectors, grant support should provide the following targets (indicators): the growth of production and sale volume by peasant (farm) enterprises
for at least 10% of the volume of produced and sold agricultural products in the year preceding the year of receipt of the grant.

Thus, the basic methodological approach to evaluation of the effectiveness of grant support for peasant (farm) enterprises involves the evaluation of the performance criterion, similar to the evaluation of the regional or municipal development, the efficiency of the implementation of any State sectoral programs and strategies. Business performance is based on the achievement of stated goals and the solution of assigned tasks in accordance with predefined performance indicators. Business performance is measured by the index method, i.e. it is not the absolute or relative change of the result that is evaluated, but the level (positive or negative) of its achievement or failure of achievement. This does not allow assessing the real state of things in the industry, does not allow determining the vector of innovative development of each business entity and the entire industry.

The main factors of agricultural production affecting the efficiency of peasant (farm) enterprises include [12]:
1) factors reflecting the availability, state and use of productive forces;
2) factors that show the productive relations;
3) factors characterizing specific conditions of agricultural production.

It is the first group of factors that is the direct result of the intensification processes, which reflects the quantitative and qualitative changes in production resources. Consequently, these factors are the factors of innovative development of peasant (farm) enterprises. If we are to solve the problem of evaluating the efficiency of grant support for innovative development, it is necessary to assess the influence of this measure of the State support on the state of this group of factors. It is the productive forces and their state that determine the level of innovative activity of a business entity.

3. Results and Discussion
We propose a methodological approach that involves the calculation of three-dimensional efficiency indicator. The approach assumes the calculation of correlation of the volume of the State support and the indicators characterizing a state and use of productive forces of peasant (farm) enterprise:
- operating income;
- volume of material costs;
- investments for the purchase of machinery and equipment.

Initial data for calculation of correlation are available, contained in the reporting forms 1-KFH (KFH - peasant (farm) enterprise), 2-KFH (KFH - peasant (farm) enterprise), 10-farmer or their modern variations.

Table 1. Initial data for calculation of efficiency indicators of grant support for peasant (farm) enterprises of the Pskov region.

| No. in sequence | Indicators                                | 2013   | 2014   | 2015   | 2016   | 2017   |
|-----------------|-------------------------------------------|--------|--------|--------|--------|--------|
| 1.              | Income                                    | 246684 | 299042 | 460721 | 541582 | 712483 |
| 1.1.            | Income from the sale of agricultural products | 184615 | 246488 | 380503 | 416293 | 590491 |
| 2.              | State support (subsidies and grants)      | 45751  | 33875  | 53327  | 85290  | 71480  |
| 2.1.            | Grant support                             | 22521.6| 21790  | 46812  | 59745  | 41700  |
| 3.              | Expenses                                  | 226776 | 307406 | 439301 | 526754 | 653922 |
| 3.1.            | Investment expenses for the purchase of:  |        |        |        |        |        |
| 3.1.1.          | fixed assets                              | 54776  | 72473  | 138054 | 138899 | 166015 |
| 3.1.2.          | machinery and equipment                   | 21870  | 46405  | 71488  | 73968  | 102994 |
| 3.1.3.          | breeding and productive animals           | 23130  | 17142  | 18081  | 40388  | 33051  |
| 3.2.            | Production expenses for the purchase of:  |        |        |        |        |        |
| 3.2.1.          | material resources                        | 112650 | 158800 | 223898 | 286752 | 376154 |
3.2.2. seeds and planting material 9724 16775 43937 31281 44309
3.2.3. fodder 35707 45578 72709 92822 122419
3.2.4. petroleum products 19400 23542 24297 30208 44285
3.2.5. electricity 6555 6795 7854 12422 17459
3.2.6. fertilizers and chemical plant protection products 12515 24450 23575 33133 48244
3.2.7. other material costs 28749 41660 51526 86885 91577
3.2.8. labor costs 20160 24581 23845 27197 34340

4. Average annual number of peasant farm enterprise members and wage workers 373 401 428 436 484

Correlation (1) and determination (2) coefficients should be calculated to assess the strength and directions of the correlation between the volume of the State support and the parameters determining the innovative development.

\[ y = \frac{\bar{x} \cdot \bar{y}}{\sigma_x \cdot \sigma_y} \] (1)

where \( \sigma_y = \sqrt{\frac{\sum y^2}{n} - (\bar{y})^2} \) and \( \sigma_x = \sqrt{\frac{\sum x^2}{n} - (\bar{x})^2} \)

\[ d = y^2 \cdot 100 \] (2)

Let’s calculate the correlation and determination coefficients to assess the relation between the volume of grant support and operating income (Table 2).

| Year | Volume of grant support (X) | Operating income (Y) | XY | X2 | Y2 |
|------|-----------------------------|----------------------|----|----|----|
| 2013 | 22521.6                     | 184615               | 4157825184 | 507222466,6 | 34082698225 |
| 2014 | 21790,127                   | 246488              | 5371004824 | 474809634,7 | 60756334144 |
| 2015 | 46811,777                   | 380503              | 17812021584 | 2191342466 | 1,44783E+11 |
| 2016 | 59745                       | 416293,05           | 24871428272 | 3569465025 | 1,733E+11 |
| 2017 | 41700                       | 590490,8            | 24623463630 | 1738890000 | 3,48679E+11 |
| Total: | 192568,504                 | 1818389,85         | 76835746224 | 8481729592 | 7,61601E+11 |

The value of the correlation coefficient (\( y_1 \)) equal to 0.38 shows that there is a direct and average correlation between the production of agricultural products by peasant (farm) enterprises and the volume of grant support. This means, that the growth of the volume of grant support in the Pskov region leads to the increase in the production of agricultural products by small business forms. In particular, the volume of agricultural production by 14.48% depends on the volume of the grant support.

Let's calculate the correlation and determination coefficients to assess the relation between the volume of grant support and the volume of material production costs for the main business activity (Table 3).

The value of the correlation coefficient (\( y_2 \)) equal to 0.24 shows that there is a direct and relatively weak correlation between the costs of agricultural production by peasant (farm) enterprises and the volume of grant support. This means, that the growth of the volume of grant support in the Pskov region leads to the slight increase in the volume of costs for agricultural production by small business.
forms. In particular, the volume of costs for agricultural production by 5.8% depends on the volume of the grant support.

Table 3. Initial data to assess the connection between the volume of grant support and volume of material production costs.

| Year | Volume of grant support (X) | Operating costs (Y) | XY | X² | Y² |
|------|---------------------------|-------------------|----|----|----|
| 2013 | 22521.6                   | 112650            | 2537058240 | 507222466.6 | 12690022500 |
| 2014 | 21790.127                 | 158800            | 3460272168 | 474809634.7  | 25217440000 |
| 2015 | 46811.777                 | 223898            | 10481063247| 2191342466   | 50130314404 |
| 2016 | 59745.7                   | 286751.59         | 17131973745| 3569465025   | 82226474368 |
| 2017 | 41700.0                   | 368292.4          | 15357793080| 1738890000   | 135639E+11  |
| Total: | 192568.504               | 1150391.99        | 48968160479| 8481729592   | 3.05904E+11 |

Let’s calculate the correlation and determination coefficients to assess the relation between the volume of grant support and the volume of investments for the purchase of machinery and equipment (Table 4).

Table 4. Initial data to assess the connection between the volume of grant support and the investment volume.

| Year | Volume of grant support (X) | Investments for the purchase of machinery and equipment (Y) | XY | X² | Y² |
|------|---------------------------|-------------------------------------------------|----|----|----|
| 2013 | 22521.6                   | 21870                                           | 492547392 | 507222466.6 | 478296900 |
| 2014 | 21790.127                 | 46405                                           | 1011170843| 474809634.7  | 2153424025 |
| 2015 | 46811.777                 | 71488                                           | 3346480314| 2191342466   | 5110534144 |
| 2016 | 59745.7                   | 73968.15                                        | 4419227122| 3569465025   | 5471287214 |
| 2017 | 41700.0                   | 102994.2                                        | 4294858140| 1738890000   | 10607805234 |
| Total: | 192568.504               | 316725.35                                       | 13564283811| 8481729592   | 23821347517 |

The value of the correlation coefficient (γ₁) equal to 0.24 shows that there is a direct and relatively weak correlation between the volume of investments directed by peasant (farm) enterprises for the purchase of machinery and equipment and the volume of grant support. This means, that the growth of the volume of grant support in the Pskov region leads to the slight increase in the production forces of small business forms. In particular, the volume of investments by 6.03% depends on the volume of the grant support.

The three-dimensional efficiency indicator (α) of grant support for innovative development may take different values, but the ideal value should be the following:

γ₁ – direct and strong correlation. Grant support should provide the increase of profitability of the main production activity of peasant (farm) enterprises as a result of the increase of productivity of fields and farms, increase of labor productivity;
γ₂ – inverse and strong correlation / direct and weak correlation. Grant support, directed for the development of production (including high-tech) forces, should provide the reduction of material production costs (fuel, electricity, working time, seed material, fertilizers, plant protection products);
γ₃ – direct and strong correlation. Grant support should provide intensive development of production forces of small business forms: means and objects of production, their qualitative and quantitative characteristics, technologies.
The value of three-dimensional efficiency indicator of grant support for peasant (farm) enterprises of the Pskov region for the period of 2013-2017, equal to 0.38; 0.24; 0.24, demonstrates the relative efficiency of grant support for innovative development. On the one hand, grant support provides the growth of incomes of peasant (farm) enterprises. On the other hand, this measure of the State support does not have a strong influence on the volume of investments for the purchase of machinery and equipment. The connection between the grant support and the volume of material costs is not strong, has negative direction, it is direct and weak. It can be concluded that grant support to some extent has a resource-saving influence on the main production activities of small business forms.

Thus, the values of correlation coefficients in the three-dimensional efficiency indicator of grant support will allow indicating the availability and strength of the correlation between the level of innovative development (the state of productive forces) and the volume of grant support. In addition, the three-dimensional indicator will predict the effect of changes in the volume and priority directions of the expenditures of the State support.

The development of the methodological approach will allow conducting a comparative analysis of the efficiency of grant support abstracting from the influence of factors that show production relations, and factors that characterize the specific conditions of agricultural production.

The three-dimensional efficiency indicator allows normalizing the results of the evaluation to a unified scale that shows quantitative measures of efficiency: relevance, performance, efficiency, influence, stability.

The use of the proposed methodological approach will create a serious informative base for the effective use of the State support by representatives of small businesses and the need to maintain measures aimed at the State support for peasant (farm) enterprises.

4. Conclusion
The essence of the peasant (farm) enterprise as an entrepreneurial unit with increased innovation activity is considered. The relevance of the State support for the innovative development of small business forms is specified.

The essence of the basic methodological approach for evaluation of the efficiency of grant support for peasant (farm) enterprises, involving the evaluation upon the performance criterion, is presented.

The concept and advantages of the methodological approach, involving the calculation of a three-dimensional efficiency indicator, are presented. The interpretation of the calculation results of the grant support efficiency indicator for innovative development of peasant (farm) enterprises of the Pskov region is presented.

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