Modern methods of evaluating the efficiency of agricultural enterprises

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Abstract. Enterprise management, from the point of view of the manager, is expressed in a closed circle of certain interactions, which is aimed at achieving the goals set. Sustainable development of an organization is a functioning in which the influence of external factors allows it to maintain its integrity and autonomy in achieving strategic goals. These factors directly affect the efficiency of the enterprise.

1. Introduction
For effective enterprise management, there must be a formalized assessment, so we need a comprehensive methodology for evaluating the effectiveness of the enterprise, which will include an assessment of all logistics functions (supply, warehousing, distribution, transportation, inventory management).

2. Questions and purpose of the research
The study of methods for evaluating the effectiveness of enterprises has shown that most of them are limited only to evaluating the overall performance of the enterprise, or to individual elements of activity. In this regard, there is a need to develop a new methodology for evaluating the effectiveness of the enterprise, which includes evaluating all the main elements of the logistics system using various qualitative and quantitative indicators [1-3].

The proposed methodology will include an evaluating the effectiveness of the company's activities by its main functions, namely:

- supply;
- distribution;
- warehousing;
- transportation;
- inventory management.
Table 1. Indicators for evaluating the company's activities.

| Indicators | Advantages |
|------------|------------|
|            | General indicators of activities | It allows you to evaluate the overall performance of the enterprise in terms of profitability and efficiency |
| 1. Profit per 1 rub of expenses, rub | | |
| 2. Profitability of operations, % | | |
| 3. Return on sales, % | | |
| Activities evaluation indicators for the company's business areas | It takes into account all economic changes that occur during any changes in the logistics system [4-6]. |
| Supply | 1. Scoring from the point of view of delivery reliability, price; | |
| | 2. Volumes of raw materials received; | |
| | 3. The index of irregularity of receipt of raw materials. | |
| Distribution | 1. The volume of raw materials issuance; | They are effective when analyzing certain logistics operations, for example, determining the nomenclature of resources. |
| | 2. The level of raw materials issuance; | |
| | 3. Indicator of uneven issuance of raw materials. | |
| Warehousing | 1. Annual cargo turnover; | Simple and clear logic of implementation; ability to assess the reality (achievability) of the goals set; universality of the approach |
| | 2. Cargo area of the warehouse; | |
| | 3. Cargo volume of the warehouse; | |
| | 4. Coefficient in utilization of warehousing areas; | |
| | 5. Coefficient in utilization of warehouse size; | |
| | 6. Average load per 1 m² of warehousing area; | |
| | 7. Load capacity | |
| Transportation | 1. Time from order receipt to delivery; | It allows you to identify the main trends in changes in the size and composition of stocks |
| | 2. Completeness of order fulfillment; | |
| | 3. Delivery reliability, % | |
| Inventory management | 1. Inventory turnover (in turnover) | It allows you to evaluate the overall performance of the company in terms of profitability and efficiency |
| | 2. Duration of inventory turnover (in days) | |
| | 3. The profitability of the stocks, % | |

According to experts in the assessment of supply processes, there are the following methods – the method of selecting suppliers, forecasting models: raw materials market indicators; needs, demand (in MRP, DRP systems), Make or Buy model, ABC-, XYZ-analysis [7-11].

The essence of the method is as follows. The number of criteria can be several dozen. The company selected the following criteria: delivery reliability, price, product quality, payment terms, possibility of unscheduled deliveries, and financial condition of the supplier.

All suppliers are evaluated according to each criterion on a ten-point scale. The supplier that best meets this criterion gets a higher rating. At the second stage, the company's specialists set the significance coefficient for each expert criterion, the value of which depends on the importance of a particular criterion. A prerequisite for this is the following restriction:

\[ \sum_{i=1}^{n} a_i = 1 \]

where \( n \) is the number of selection criteria.

At the third stage, the values of the criteria are calculated, which is done by multiplying the significance coefficient by its estimate. The company with the highest number of points meets the
requirements of the integrated supplier selection criterion to the greatest extent and can be selected as the best partner.

Thus, the company with the highest number of points meets the requirements of the integrated supplier selection criterion to the greatest extent and can be selected as the best partner [12-17].

Table 2 presents the indicators of integrated evaluating efficiency of functioning of JSC “AgroYarsk”.

| Показатели | 2018 г. | 2019 г. | Dynamics | Evaluation |
|------------|---------|---------|----------|------------|
| Efficiency of supply | | | | |
| Volumes of raw materials and supplies received, thousand rubles | 11575010 | 11629020 | + | 15 |
| Coefficient of irregularity receipt of raw materials, coeff-t | 1.21 | 1.18 | + | 15 |
| Distribution efficiency | | | | |
| Volumes of raw materials and supplies, thousand rubles | 11025890 | 11154220 | + | 15 |
| Level of output of raw materials, % | 95.3 | 95.9 | + | 15 |
| Uneven release coefficient of raw materials, coeff-t | 1.16 | 1.17 | – | 5 |
| Warehouse efficiency | | | | |
| Annual turnover, t | 105622000 | 106114800 | + | 15 |
| Square coefficient of JSC “AgroYarsk”, coeff-t | 0.15 | 0.16 | + | 15 |
| Coefficient of useful volume utilization in JSC “AgroYarsk”, cal-t | 0.13 | 0.13 | +/- | 10 |
| Specific load per 1 m² of usable area, t/m² | 50238.8 | 50473.2 | + | 15 |
| Load capacity of 1 m² of the total area of JSC «AgroYarsk”, t/m² | 3030.6 | 2829.0 | + | 15 |
| Labor productivity of warehouse employees, t | 42248.8 | 42445.9 | + | 15 |
| Cargo area of the warehouse, m² | 230400 | 230400 | +/- | 10 |
| Cargo volume of the warehouse, m³ | 1382400 | 1382400 | +/- | 10 |
| Efficiency of transport activities | | | | |
| Time from receipt of the order to delivery (delivery not on time), units | 6830 | 7450 | – | 5 |
| Completeness of order fulfillment, % | 91.81 | 91.70 | – | 5 |
| Reliability of delivery, % | 74.10 | 73.80 | – | 5 |
| Quality of transport packaging, % | 65.44 | 70.80 | + | 15 |
| Delivery stability, % | 91.48 | 91.62 | + | 15 |
| Stock management efficiency | | | | |
| Inventory turnover (in turnover) | 0.35 | 1.18 | + | 15 |
| Duration of inventory turnover (in days) | 1051.92 | 308.37 | + | 15 |
| Return on inventory, % | 15.16 | 9.10 | – | 5 |
| Profitability and efficiency | | | | |
| Profit per 1 rub of expenses, rub | 0.63 | 0.12 | – | 5 |
| Profitability of operations, % | 62.73 | 12.30 | – | 5 |
| Return on sales, % | 44.93 | 7.90 | – | 5 |

Profit per 1 rub of expenses decreased by 0.50 rub, profitability of operations and return on sales also decreased – by 50.4 and 37.0 respectively.

To improve the efficiency of JSC “AgroYarsk”, it is necessary to:

- synchronize functions by developing and implementing an approach to organizing the operation of the enterprise [10-12];
implement an inventory management system that allows you to determine the optimal stock size (necessary for uninterrupted production + insurance stock);
make decisions based on the calculation of the optimal size and frequency, based on the needs of end users (for example, production sites) and total operating costs [17-24];
simulate the supply chain using simulation or VR technologies;
implement a balanced motivation system based on the KPI assessment and related to the expenditure budget of JSC “AgroYarsk”.

In table 3, we present the expected effect of the implementation of measures, which is predicted based on a survey of employees of JSC “AgroYarsk”.

Table 3. Expected impact of proposed activities.

| The event | Expected result |
|-----------|-----------------|
| Synchronization of functions through the development and implementation of an approach to organizing the functioning of the enterprise | Improving the efficiency of JSC “AgroYarsk”, resulting in a 10% increase in profit and a 15% increase in profitability %. |
| Implementation of an inventory management system that allows you to determine the optimal inventory size | Reducing the duration of the production and entire operating cycle by 15 days, reducing current storage costs by 15%, releasing part of the financial resources from the current economic turnover for their reinvestment in other assets. |
| Decision making based on optimal size and frequency calculations based on end-user needs and total operating costs | Ensuring that the risks of changing the plan are minimized by preliminary analysis and modeling of possible scenarios for the development of events in the supply chain. |
| Supply chain modeling using simulation or VR technologies | Growth of labor productivity by 15% and economic efficiency of the enterprise by 10%. The KPI system helps to increase employee satisfaction and, consequently, reduce employee turnover by 5%. |

In table 4, we present the calendar of events.

Table 4. Calendar of events.

| The event | Deadline | Responsible for the implementation |
|-----------|----------|-----------------------------------|
| Synchronization of functions through the development and implementation of an approach to organizing the functioning of the enterprise | 10.02.2021-25.02.2021 | Commercial Director |
| Implementation of an inventory management system that allows you to determine the optimal inventory size | 07.03.2021-20.03.2021 | Warehouse Manager |
| Decision making based on optimal size and frequency calculations based on end-user needs and total operating costs | 11.04.2021-22.04.2021 | Warehouse Manager |
| Supply chain modeling using simulation or VR technologies | 10.05.2021-21.05.2021 | Head of logistics Department |
| Implementation of a balanced motivation system based on the KPI assessment and related to the expenditure budget of JSC “AgroYarsk” | 13.06.2021-25.06.2021 | Head of HR Department |

3. Results

Thus, complex evaluating the efficiency of JSC “AgroYarsk” according to the proposed method by functions (profitability and return ratios, the efficiency of procurement, efficiency of distribution
activities, the effectiveness of warehouse activities, the efficiency of transport activities, the efficiency of inventory management) showed that efficiency of functioning is estimated at 10.9 points out of 15 (maximum score), that is, there are some reserves (27.3 %; 10.9 / 15 x 100 % = 72.7 per %; 100 – 72.7 = 27.3 %) to improve activities. According to the algorithm, the activity of JSC “AgroYarsk” is in the zone of permissible operation.

4. Conclusion
A modern agricultural enterprise today is a system that coordinates the various types of transport and performs the functions of organizing the acceptance, temporary storage, processing, distribution and delivery of the product to the final recipient. In this regard, various methods are used to assess the effectiveness of an enterprise, depending on the purpose of the analysis. It is recommended to use groups of indicators based on the functions performed to evaluate the company's performance: supply, distribution, warehousing, transportation.

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