Development of the process map "research and development" for agricultural organizations

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Abstract. The quality management system is developing rapidly and dynamically in organizations of agriculture. The management of agricultural enterprises realizing the role of a leader in quality work is aimed at continuous improvement in all aspects of activity. The management of agricultural enterprises, realizing the role of a leader in quality work, is aimed at continuous improvement in all aspects of activity. The QMS in food production is implemented based on international standards such as ISO 22000, ISO 9001, where successive processes are described, which also include the principles of HACCP. This standard combines risk analysis and critical control points. Based on all these consistent measures, enterprises are striving to improve both the quality of the products and the work of the company as a whole. This is a necessary measure, it is obligatory in today's time, because thanks to it, not only the product quality, but also the competitiveness of the production in the market increases. As a result, the enterprise opens an export opportunity. Without the introduction of a quality management system, the company cannot move on. This article discusses the QMS documentation, which allows controlling the processes and fruitfully developing the organizations of agriculture. Developing of the research engineering and development work process map for agricultural organizations. The input and output data of the process are determined, as well as the performance and risk indicators for the process. To improve the process management system, thresholds for process performance indicators are defined. The risks of the activities of the processes, to minimize the risks and prevent them in the future. The method of determining the effectiveness of the process is implemented. Indicators must be met in full size, without fail, of the number of non-compliances detected by the customer leads to a deterioration in the performance of the process by a percentage.

Keywords: agriculture, quality, effectiveness, risks, process map, research.

Introduction

An effective quality management system functions in agricultural organizations. The system is constantly being improved taking into account an intensive, dynamic development and strategic goals. Requirements for quality assurance are stated both in the standards of management systems and in the state programs for the development of the agricultural market [1-2]. For example, five main objectives are defined in the state program for the development of agriculture and regulation of the markets of agricultural products, raw materials and food for 2013–2020:

- provision with food base, taking into account the economic and territorial availability of products of the agro-industrial complex;
- achievement of the value of produced value added generated in agriculture;
- growth rate of exports of products of the agro-industrial complex;
- index of physical volume of investment in fixed capital of agriculture;
- achievement of volume of the household disposable resources in rural areas.

Due to the fact that the decision was made to transfer the state program to the mechanisms of project management, this provides for the allocation of the project and process parts in its structure.

The project part consists of four projects:
- The development of branches of the agro-industrial complex that provide accelerated import substitution of the main types of agricultural products, raw materials and food;
- Stimulation of investment activity in the agro-industrial complex;
- Technical modernization of the agro-industrial complex;
- Export of products of the agro-industrial complex.

The process part includes measures for the development of the raw material base for providing light industry with high-quality agricultural raw materials, the development of melioration for agricultural lands in Russia, the development of rural areas, performance monitoring [3].

Methodology.

The activity of the enterprise is always more or less affected by the risk factor. Under the conditions of the objective existence of risk, there is a need for a certain mechanism that would allow the best method of the possible ones, in terms of the goals set by the enterprise, to take risk into account making and implementing business decisions. In agricultural production, risks arise under the influence of numerous factors as they have an objective and subjective basis [4]. That’s why the risk in agriculture can be defined as the likelihood of certain consequences (positive or negative) due to management decisions and changes in the conditions of production and realization of products under the influence of internal and external factors affecting the final result [5-7].

This definition allows to take into account the specifics of agricultural production, which includes several phases, at each of which there is a probability of loss as a result of wrong actions or the negative impact of external factors. A high level of risk does not mean that the chosen type of activity is not acceptable, and a low level of risk that the risk will be minimal. Therefore, it is necessary to consider the probability of occurrence of any type of risk at all stages of production and sales [8,12].

Taking into account the specifics of agricultural production and sales, we proposed a classification of the main risks by factors of occurrence. In the sphere of production, this is the influence of natural and climatic conditions and biological features of the resources used on the final result. These factors cause the seasonality of production, the deviation of the actual result from the planned one, the discrepancy between product quality, the time gap between investing resources and obtaining the final result [9,10]. In the sphere of circulation, the main risk factors are: price fluctuations in the markets of material resources and sales markets, loss of product quality during transportation and storage, low elasticity of demand.

Threshold values for process performance indicators were identified to improve the process management system. Process performance indicators can be determined by any method of calculation with threshold values. Then you need to match the process performance indicators with risks and identify measures to minimize risk [11].

Analysis of the process control system and the development of indicators

The main purpose of the introduction of QMS in agriculture is to assess the cost of quality as the lost properties of products are not restored. Thus, reducing the level of product quality is one of the main types of risk in agricultural production, which need to be managed competently [13]. The widespread use of quality management principles in agricultural enterprises and the introduction of QMS are hampered by such factors, as minimum of resources; costs concerned with the development and maintenance of the QMS; difficulties in understanding and applying the QMS requirements.
Table 1. The input and output data of the process

| The input data of the process | Process | The output data of the process |
|-------------------------------|---------|-------------------------------|
| Requirements of consumers (customers) to products (tender / procurement documentation and / or terms of an agreement with the customer for the execution of works / services) | Planning and organization of work | Requirements for the development of customer requirements for management documentation (procedures) |
| Annual program and/or procurement plan | Development of technical specifications for research | Technical task for the implementation of R & D |
| Internal requirements important for design and development, including TK related specialties | Choice of research direction | Interim reports |
| List of research and development | Implement of the stages of R&D | Reports on the stages of R&D |
| Technical task for the implementation of R & D | Generalization and evaluation of R&D results | Report on R&D |
| Interim reports | Development of of TOR for R&D | Technical task for the implementation of OCD |
| Reports on the stages of R&D | Implement of the stages of for R&D | Reports on the stages of of OCD |
| List of research and development | Generalization and evaluation of OKP results | Final report on of OCD |
| Technical task for the implementation of OCD | | |
| Reports on stages of design and development work | | |

Definition of performance indicators and risks of the process

Table 2. Process Performance Indicators

| Process Performance Indicators | Performance thresholds |
|--------------------------------|------------------------|
| 1. Implementation of planned revenue/labor productivity for R & D for a project portfolio with a cumulative total from the beginning of the year | 11 700 euro / person |
| 2. Compliance with the design budget (% deviation from the plan) | 10% |
| 3. Number of customer complaints | 0 |
| 4. Time spent on the analysis and coordination of requirements for reporting documentation | 1 week |
| 5. Compliance with the deadlines for the implementation of research and development (% deviation from the plan) | 5% |
| 6. Time spent on the development of reporting documentation | 1 week |
| 7. Compliance with the timing of the reporting documentation to the Customer | < 2 days |
| 8. The percentage of reporting documentation adopted from the first time | 100% |
| 9. The number of discrepancies detected by the Customer | 0 |

Table 2 «Process Performance Indicators» shows the following measures to minimize the risk:

- monthly checks on the implementation of planned revenues/productivity of research and development work on the project portfolio;
- monthly checks for compliance/compliance;
introducing and conducting training programs for staff, staff development, keeping records of previous claims, in order to further prevent them;
weekly monitoring of compliance with deadlines/requirements;
introduction of a classifier of nonconformities/claims and risk management [14].

Based on the requirements of ISO 9001 section "4.4 Quality management system and its processes”, subsection 4.4.1, clause "c) determine and apply the criteria and methods (including monitoring, measurements and relevant performance indicators) necessary to ensure the effective functioning of these processes and manage them "we implement a method for determining the performance of processes, in which there will be mandatory indicators, without which the overall performance will be equal to 0%, regardless of how well the remaining performance indicators for the process are implemented [15].

Table 3. Process risks

| Risk | Probability of risk | Risk minimization measures |
|------|---------------------|---------------------------|
| Non-fulfillment of planned revenues/labor productivity for R & D for a project portfolio with a cumulative total from the beginning of the year | average | ✓ | ✓ |
| Non-compliance with the design budget (% deviation from the plan) | low | ✓ |
| Exceeding the number of customer complaints | low | ✓ | ✓ | ✓ |
| Long-term analysis and agreement on reporting documentation requirements | average | ✓ |
| Failure to meet the deadlines for the implementation of research and development | average | ✓ |
| Failure to meet deadlines for the development of reporting documentation | average | ✓ |
| Non-compliance with the deadlines for sending the reporting documentation to the Customer | average | ✓ |
| Failure to comply with the percentage of reporting documentation adopted from the first time | high | ✓ |
| Excess of quantity of the discrepancies revealed by the Customer | low | ✓ | ✓ | ✓ |

Table 4. Method for determining the performance of the process

| Process Performance Indicators | Mandatory Process Performance Indicators | % implementation of the performance indicator of the process |
|-------------------------------|------------------------------------------|------------------------------------------------------------|
| 1. Implementation of planned revenue/labor productivity for R & D for a project portfolio with a cumulative total from the beginning of the year | ✓ | 20% |
| 2. Compliance with the design budget | ✓ | 30% |
| 3. Number of customer complaints | - | 5% |
| 4. Time spent on the analysis and coordination of requirements for reporting documentation | - | 5% |
| 5. Compliance with the deadlines for the implementation of research and development | ✓ | 20% |
6. Time spent on the development of reporting documentation - 8%
7. Compliance with the timing of the reporting documentation to the Customer - 2%
8. The percentage of reporting documentation adopted from the first time - 5%
9. The number of discrepancies detected by the Customer - 5%

Conclusion
Failure to meet the planned revenues/labor productivity indicators for R & D for the project portfolio with a cumulative total from the beginning of the year; compliance with the design budget; meeting the deadlines for the implementation of research and development work leads to 0% of the performance of the process. These indicators should be implemented in full size without fail [16].

Complete or partial failure to comply with indicators of the number of customer complaints; time spent on the analysis and coordination of requirements for reporting documentation; the time spent on the development of reporting documentation; Compliance with the dates of departure of the reporting documentation to the Customer; percent of reporting documentation adopted from the first time; the number of discrepancies detected by the Customer leads to a deterioration in the performance of the process activity by a percentage.

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