Risk management technique for the QMS processes at the university

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Abstract. This paper considers a risk management technique designed for educational performance of the university, because focus on risk management has become one of the ultimate principles of the new version of ISO 9001. The conclusion of the article: it is makes good sense managing both internal and external risks of the educational performance of the university.

Key words: risk management, the QMS processes at the university, risk management of the QMS processes at the university, monitoring system for the QMS processes at the university, Ishikawa diagrams, risk significance, risk assessment, hazard identification, risk analysis, risk assessment.

Introduction

Currently, Russian management is rethinking risks due to a transition to a new version of ISO 9001-2015. Having analyzed available publications on this topic [1-11] we can conclude that risk management in the quality assurance of the university lacks due attention. Focus on risk management has become one of the ultimate principles of the new version of ISO 9001. Standard GOST R ISO 31000-2010 “Risk Management. Principles and Guidelines” sets principles and general guidelines of risk management, however, current methods of risk assessment are not always appropriate for specific activities of an educational institution, are difficult to apply in practice and require high resources. Therefore, it is necessary to create an in-house simple and suitable technique (based on available methods) for the educational institution.

The object of risk management is the process / collection of processes of the university QMS under the risk management procedure.

The subject of the research is a relationship between the risk management model for the QMS processes at the university (treated as a set of procedures and policies) and identification, assessment and analysis of the risks impact on the processes and decisions targeted at boosting positive and reducing negative consequences of undesirable events.

The purpose of the research is to develop a risks management technique for the quality management system (QMS) processes at the university.

The research tasks are: to study if IDEF0 (Integration Definition for Function Modeling) is an applicable technique of building a conceptual model of the university risk management; to analyze information from the QMS monitoring subsystems at the university, information on the performance of the university, information on the external environment of the university; to define and assess the control impact on the university regulatory documents, risk management regulatory documents, risk management tools and the QMS documents of the university on the risk management model; to attract resources, such as an expert group, administration personnel of the university and logistical, financial and information resources to risk management.

Results

This risk management technique is based on integrated methods of quality management, namely FMECA (Failure Mode, Effects and Criticality Analysis) and Ishikawa diagrams, and consists of the following procedures and steps:

• starting stage of risk management;
• overall risk assessment;
• development of operational control actions on the process;
• implementation of operational control actions on the process;
• determining effectiveness and/or efficiency of the undertaken measures

Given that the overall quality management system relies on the process model, a risk management subsystem should also be centered around processes, which will make the quality management system more flexible, efficient and effective. The starting stage of risk management has several key stages:

- Selection of the risk management object;
The risk management object is the process/collection of processes of the university QMS under the risk management procedure.

- Building of a group of internal experts;
Proper selection of members to the expert group is a key factor in successful application of the risk management technique for the QMS process.

Since the group of internal experts detects risks that must be prevented or reduced to an acceptable level, identifies the causes of such risks (cause-effect relations) and participates in developing a strategy to prevent or reduce the identified and assessed risks, all members of the group should be competent in and properly aware of how the risk management object runs.

The group of internal experts should include: a quality manager, a process manager, suppliers and consumers of the process, as well as Quality Service employees. The team of experts should have 5-9 people.

- Collection of source information;
Expert opinions should take into account all available information, including statistical information, typical for the selected process(s).

There are several sources of information to identify hazards of risk management for the QMS process:
- Information from the monitoring subsystems of the QMS processes;
- Measurement and analysis of the process indicators;
- Internal and external audits;
- Self-evaluation of the QMS effectiveness;
- Measurement and analysis of customer satisfaction;
- Information on the performance of the university;
- Information on the external environment of the university;
- QMS documents of the university;
- Regulatory documents on risk management;
- Regulatory documents of the university;
- Opinion of the group of internal experts about special features of the processes.

- Identification of necessary resources;
Depending on the objectives of the study, it is necessary to determine time, material and financial resources allocated for effective risk management.

- Establishing risk criteria.
The technique to be developed herein does not use a single threshold for the risk priority; it rather assesses criticality of any identified risk, using Table 1 (ISO 31000: 2009, Risk Management, Risk Assessment Methods). This will allow us to rank the risks of the process and develop preventive actions adequate to the received Risk Priority Number, which will save resources.

### Table 1. Dependence of the risk significance on the calculated Risk Priority Number (RPN)

| Risk Priority Number (RPN) | Risk significance |
|---------------------------|------------------|
| Below 40                  | Low              |
| 40 – 100                  | Moderate         |
| 100 - 125                 | Critical         |
| Above 125                 | Unacceptable     |

Identification of hazards is one of the critical and ultimate elements in risk management. It is necessary to make a list of all possible hazards that might arise in relation to the object in question. In order to identify hazards of the process, it is advisable to use the "brainstorming" and then build the Ishikawa diagram [12, 13]. We should operate on the premise that a hazard may appear, but a risk may
Risk analysis is determining the level of risk for each identified hazard that affects the process. To quantify the criticality of a hazard, we determine the risk priority - RPN (Risk Priority Number), calculating it as the product of the mean values of three factors: severity of risk consequences, probability of risk occurrence and probability of risk detection. The indicators for calculation of RPN are determined through the expert assessment method using a 10-point scale. Thus, RPN can have values from 1 to 1000. To ensure that the results obtained are adequate, we make analysis of the experts' agreement for each risk by the value of the concordance coefficient.

The purpose of risk assessment is to establish priorities and risks that must be prevented or reduced to an acceptable level. Risks are ranked as: "unacceptable risk", "moderate risk", "critical risk", "low risk". After the stage of the overall risk assessment, we develop operational control actions for the process, i.e. develop special cost-effective strategies and action plans to increase potential benefits and reduce potential costs.

The group of internal experts identifies risks that must be prevented or reduced to an acceptable level and develops a strategy to prevent or reduce the identified and assessed risks. The efforts applied in the risk management of the process should be proportionate to the risk criticality. It is useful to remember that the risk management decisions should meet corporate goals in order to fulfill the long-term priorities of the university. If there is a choice of several preventive strategies, the most economically viable ones will have advantages. After that, comes turn of the combating risks strategy, which is put into effect through the developed preventive actions for the process. It is crucial here to allocate necessary resources in order to gain due effect from operational control actions for the process. To make control actions effective, it is necessary to have a regular monitoring and analysis of results, timing and costs of the planned measures [14-16].

Thus, at the stage of determining effectiveness and / or efficiency of the undertaken measures, we analyze the objectives set by the Board and achieved in the risk management.

If the measures have not been successful, it is necessary to investigate the reasons of failure, take due actions to eliminate their causes, and develop a new plan of preventive actions. The evaluation of effectiveness and / or efficiency of the actions undertaken for the process is important information and should be included in the QMS operation report of the university.

Conclusion

Thus, the technique described herein allows us to perform comprehensive risk management on a regular basis, and ensures reduction of possible risk losses. All this will allow us to go straight to continuous integrated risk management of the QMS at the university.

The advantages of the technique are:
- Direct adaptation of existing risk management approaches to risk management to the QMS processes at the university;
- Risk management is the final stage in the processes monitoring system, where the information from all monitoring subsystems (measurement and analysis of the process indicators, internal and external audits, self-evaluation of the QMS effectiveness, measurement and analysis of customer satisfaction) is used as the source information for risk management.
- Application of such quality management methods as FMECA and Ishikawa diagram ensures a comprehensive scientific approach to risk management;
- In order to develop adequate preventive actions, the risk criticality is assessed as the dependence of the risk significance on the calculated Risk Priority Number (RPN).

This process risk management technique will provide flexible operational and tactical management of internal and external risks for the processes inherent in the current performance of the university. The technique is coordinated with the process structure of the university and existing monitoring subsystems, all which ensures stability and sustainability of the university development.

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