

Improving the Internal Auditing Procedure by Using SIPOC Diagrams

Tzvetelin Gueorguiev¹

Angel Kanchev University of Ruse, Ruse, Bulgaria

Abstract

Auditing is intended to provide a better understanding of a system and to provide insights on the possibilities for improvement. The University of Ruse has implemented a management system in compliance with ISO 9001 since 2004. Thus, for more than a dozen of years it has experience in auditing its management system – both by internal and external audits. In 2017 ISO has published the draft standard ISO / DIS 21001 that defines the requirements for a quality management system of any type of educational organization. This article presents a proposal for improvement of the current internal auditing procedure.

Keywords: *audit, SIPOC, Educational Organization Management System, EOMS, ISO 19011, ISO 21001.*

INTRODUCTION

The international standardization in the field of quality management systems (QMS) is a success story of more than 30 years. The standard with requirements for quality management - ISO 9001 (ISO 9001, 2015) is applicable to organizations of any size, industry sector or country. The degree of conformity to the requirements of management systems' standards is assessed by audits. The self-assessment of the

¹ *Corresponding authors:* Principal Assistant Eng. Tzvetelin Gueorguiev, Ph.D.

E-mail: tzgeorgiev@uni-ruse.bg

QMS is called an internal audit, or a first party audit. The external audits could be second party audits which are usually performed by customers, and third party audits done by independent bodies, normally certification and re-certification audits. ISO 19011 is the international standard for auditing management systems (ISO 19011, 2011). It is applicable to all organizations that need to conduct internal or external audits of management systems or manage an audit program. According to Denise Robitaille (Naden, 2017), Chair of ISO/PC 302, the ISO project committee responsible for the revision, *“There are now MSSs that cover areas such as health and medical, environment, services, information technology and more. In addition, the two most popular MSSs – ISO 9001 and ISO 14001 – have recently been updated, so the auditing of these systems needs to reflect the variety and number of standards being developed”*.

In the end of January 2018 the Final Draft International Standard of ISO 19011 is registered for approval by ISO. The third edition of the standard is expected to be issued in the middle of 2018.

The University of Ruse has established, implemented and continually improves its internal quality management system. The first quality manual dates back to 2004. It was the result of the efforts of a team of internal experts who were helped by other partner universities. A project (Zhelezarov, 2003) and several other publications (Zhelezarov, 2001a, 2001b) by Prof. Zhelezarov from the Technical University in Gabrovo have facilitated the successful start of the system.

GENERAL LAYOUT OF THE RESEARCH

This research is the result from considering several scientific methods for quality management, and aligning them with the requirements from a number of sources.

The main requirements for the higher education institutions (HEI) in Bulgaria are mandated and controlled by the Ministry of Education and Science. Some of the laws (Ministry of Education and Science, 2018) that define the operation of universities are:

- The Law of Higher Education (LHE) (with latest update as of 1 January 2017);
- The Law for Promoting Scientific Research (with latest update as of 18 July 2017);
- The Law for Development of the Academic Staff (with latest update as of 2 August 2013);
- The Law for Crediting Students and PhD Students (with latest update as of 1 January 2015), etc.

Article 6 of the LHE requires the universities to have an internal system for assessment and maintenance of the quality of education and the academic staff. This seemingly easy task remains a challenge to the development of Bulgarian HEI. This is one of the findings in the paper (Terziev, 2017) who sees “*Weaknesses in the implementation of internal quality management systems*” as an obstacle for achieving compatibility with European higher education systems.

In its Art. 11, the LHE defines the National Evaluation and Accreditation Agency (NEAA) as a specialized governmental body at the Council of Ministers which shall ‘*perform quality assessments, control and accreditation*’. The NEAA monitors the ability of institutions, their main units and branches to provide high quality of education and scientific research through an internal quality assurance system (NEAA, 2018). Articles 32, 73, 75, 77, 78, 79, 83, 85, 88 and 91 also add to the intended profile of a QMS of a HEI.

More specifically, Art. 78 requires that for a successful accreditation each HEI must demonstrate how it ‘*manages the quality of education*’. Art. 79 allows partnerships with foreign HEI only if they are accredited by an agency which is a member of the European Association for Quality Assurance in Higher Education (ENQA), and/or are listed in the European Quality Assurance Register for Higher Education (EQAR).

Being a member of the European Union, Bulgaria has to meet the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG, 2015). This has become reality by the adoption of ESG as a system of criteria of the NEAA. The ESG defines standards and guidelines in the following 3 sets:

- 10 Standards for internal quality assurance;
- 7 Standards for external quality assurance;
- 7 Standards for quality assurance agencies.

The internal auditing reflects standards 1.9 and 1.10 of the ESG standards for internal quality assurance.

When it comes to the international standards for quality management systems, such as ISO 9001, HEI have tried for years to adapt the more general ideas to the realm of education. The forerunner was the International Workshop Agreement (IWA) approved in Mexico in October 2002 and published as IWA 2:2003. The purpose of this agreement to assure the overall effectiveness of the quality management system of an educational institution was confirmed 4 years later with the second edition - IWA 2, 2007.

After the revision of IWA2:2007, in 2017 ISO has published a Draft International Standard ISO/DIS 21001 “*Educational organizations — Management systems for educational organizations — Requirements with guidance for use*”. As of January 2018, this standard has moved to the Final Draft stage (FDIS, 2018).

PROBLEM AREAS AND KEY CHALLENGES

The current version of the Quality Manual of the University of Ruse has been approved in February 2012. Thus, it meets only those requirements of ISO 9001:2015 which have remained unchanged from its 2008 edition. The quality professionals are well aware that the fifth edition of ISO 9001 has introduced a different structure based on Annex SL of the ISO Directives, ideas like context of the organization and risk-based thinking, greater focus on services and relevant interested parties, etc.

The second version of the documented procedure also dates back to 2012. It is 10 pages long, including 5 annexes. The procedure is written in a descriptive manner which makes it easy to understand. But in fact one of the key challenges is that some of the requirements fail to achieve a smooth and complete flow of information.

This paper proposes to use the Suppliers-Inputs-Process-Outputs-Customers (SIPOC) diagram as a tool to improve the current internal auditing procedure.

IMPROVING THE INTERNAL AUDITING PROCEDURE

The structure of the current procedure for internal audits follows the elements recommended in ISO/TR 10013:2001 *Guidelines for quality management system documentation*. Since this standard is significantly older than ISO 9001:2015, it doesn't reflect the most recent development of QMS.

It is proposed that the improved procedure follows the **structure** listed below:

1. **Purpose**- defined based on the requirements of ISO 9001:2015 and in the case of the University of Ruse, the specific requirements of ISO/FDIS 21001:2018. The criteria for defining the purpose are those for the so called SMART goals- specific, measurable, attainable, relevant and timely.
2. **Context of the process**- it includes the process owner and his deputy, the internal and external interested parties, the process interaction network and the turtle diagram of the process.
3. **Documented information**- documents, forms and quality records of internal and external origin.

4. **Description of the process**- the SIPOC diagram of the internal auditing process, described below.

5. **Improvement of the process**- the forms that are to be completed are provided as annexes; a commitment to review the procedure at least once per year, and update it as necessary; listing actions to address risks and opportunities.

The **SIPOC diagram** is a tool used in Total Quality Management (TQM) and in Six Sigma projects. It closely resembles the logic of supply chain management but is adapted to the QMS processes of the organization. The description of the process can be done from right to left, or from left to right. If one starts from the right hand side, the following elements should be completed:

- *Suppliers* - which employee of the organization or which external party is needed to support the implementation of the process by providing resources (material inputs and/or information) to the process owner;
- *Inputs* - the documented information which is necessary to manage the process;
- *Process steps* - the requirements of the standard (ESG, ISO 9001, ISO 21001, etc.) are listed and arranged in logical order. Then they are compared to the activities which are applied in the process according to the internal process of the organization. Next, the process flowchart is drawn based on the combined list of requirements and activities;
- *Outputs* - the quality records and the results achieved as a result of the process step;
- *Customers* - similar to the 'Suppliers', they can be both internal and external. This last segment of the SIPOC lists the employees or other interested parties who are informed about the results achieved and/or who expect them in order to begin an activity or a process of their own.

Another approach to creating the SIPOC diagram is reversing its order, i.e. COPIS. It is a Lean influence or the so called 'pull' system where one begins with the customers, define what result (output) is expected, what process steps are necessary to achieve this result, what resources (inputs) are needed for the given process element, and who to obtain them from (supplier).

The development of the process continues with listing the **ISO 21 001 requirements**.

The requirements in the standard are listed below:


- 1) The organization shall perform internal audits at planned intervals to provide information whether the EOMS conforms to the organization's own requirements for its management system and the requirements of ISO 21001;

- 2) The organization shall perform internal audits at planned intervals to provide information whether the EOMS is effectively implemented and maintained.
- 3) The organization shall plan, establish, implement and maintain an audit program, including the frequency, methods, responsibilities, planning requirements and reporting, which shall take into consideration the EOMS's objectives, the importance of the processes concerned, feedback from relevant interested parties, and the outcomes of previous audits;
- 4) The organization shall define the audit criteria and scope for each audit;
- 5) The organization shall select auditors to ensure objectivity and the impartiality of the audit process. Auditors shall not audit their own work;
- 6) The organization shall conduct audits to ensure objectivity and the impartiality of the audit process;
- 7) The organization shall ensure that the results of the audits are reported to relevant management;
- 8) The organization shall identify opportunities for improvement;
- 9) The organization shall take appropriate correction and corrective actions without undue delay;
- 10) The organization shall retain documented information as evidence of the planning, implementation of the audit program and the audit outcomes.

Before creating the flowchart of the internal auditing process, the abovementioned requirements need to be reviewed for duplicates or if multiple actions are listed in one sentence. Therefore, requirement 3 consists of 4 verbs: *plan*, *establish*, *implement* and *maintain*. They need to be separated in individual process steps. In the same time, requirements 1, 2 and 6 can be merged because they all mean the actual implementation of an internal audit, only using different verbs- *perform* and *conduct*. Based on the resulting list, the flowchart of the internal auditing process is created. Then it is inserted in the middle section of the SIPOC Diagram (see Table 1).

Table 1. SIPOC diagram of the internal auditing process

Suppliers	Inputs	Process steps	Outputs	Customers
Quality manager, Quality inspector, Secretary, Lawyer	International and national normative documents; QMS	<div style="border: 1px solid black; padding: 5px;"> P1 The audit program shall take into consideration the EOMS's objectives, the importance of the processes concerned, feedback from relevant interested parties, and the outcomes of previous audits. </div>	Audit program	Quality manager, Quality inspector, Dean of Faculty
Quality manager, Quality	Normative documents; QMS	<div style="border: 1px solid black; padding: 5px;"> P2 The organization shall define the audit criteria and scope for each audit. </div>	Audit plan	Lead auditor

Suppliers	Inputs	Process steps	Outputs	Customers
inspector, Lawyer				
Quality manager, Quality inspector, Dean of Faculty	Nonconformity report, Corrective and preventive actions	P3 The organization shall plan an audit program, including the frequency, methods, responsibilities, planning requirements and reporting.	Audit program	Quality manager, Quality inspector, Dean of Faculty
Quality manager, Quality inspector, Dean of Faculty, Lawyer	Normative documents; Nonconformity report, Corrective and preventive actions	D1 The organization shall establish an audit program, including the frequency, methods, responsibilities, planning requirements and reporting.	Audit program	Quality manager, Quality inspector, Dean of Faculty
Quality manager, Lead auditor, HR	Auditor certificates, Audit plan		Audit plan; Order/ Mandate	Lead auditor, auditors, Dean of faculty
Quality manager, Lead auditor	Audit program	D2 The organization shall implement an audit program, including the frequency, methods, responsibilities, planning requirements and reporting.	NEAA report, Audit report, Audit plan, QMS, audit questionnaires	Lead auditor, auditors, Dean of faculty
Lead auditor, auditors, Dean of faculty; Inspector in the Faculty/ Department	Normative documents; NEAA report, Audit report, Audit plan, QMS, Audit questionnaires	D3 The organization shall conduct audits at planned intervals to ensure objectivity and the impartiality of the audit process, to provide information whether the EOMS conforms to the organization's own requirements for its management system and the requirements of ISO 21001, and to provide information whether the EOMS is effectively implemented and maintained.	Audit report, Audit questionnaires, Recommendations for improvement, Nonconformity report, Corrective and preventive action request	Rector, Dean of faculty, Quality manager, Quality inspector, Lead auditor, auditors
Lead auditor, auditors	Audit report, Recommendations for improvement, Nonconformity report, Corrective and preventive action request	A1 The organization shall ensure that the results of the audits are reported to relevant management.	Audit report, Recommendations for improvement, Nonconformity report, Corrective and preventive action request	Rector, Dean of faculty, Quality manager, Quality inspector
Rector, Dean of faculty	Audit report, Corrective and preventive action request	A2 The organization shall take appropriate correction and corrective actions without undue delay.	Corrective and preventive action report	Lead auditor, auditors, Quality manager, Quality inspector
Rector, Dean of faculty	Suggestions, Nonconformity report, Corrective and	A3 The organization shall identify opportunities for improvement.	Register of risks and opportunities, Action Plan	All relevant interested parties

Suppliers	Inputs	Process steps	Outputs	Customers
	preventive action request			
Lead auditor, auditors	Audit program, Audit plan, Audit questionnaires, Audit report, Suggestions, Nonconformity report, Corrective and preventive action request, Register of risks and opportunities, Action Plan	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> A4 The organization shall retain documented information as evidence of the planning, implementation of the audit program and the audit outcomes. </div>	Audit file (containing all inputs of A4 in the form of paper documents and/or digital archives)	Quality manager, Quality inspector
Rector, Dean of faculty, Quality manager, Quality inspector, Lead auditor, auditors	Audit program, proposal for updating the audit program	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> A5 The organization shall maintain an audit program, including the frequency, methods, responsibilities, planning requirements and reporting. </div>	Audit program (updated)	Quality manager, Quality inspector, Lead auditor

CONCLUSION

The SIPOC diagram (Table 1) presents the updated and improved sequence of process steps and information flow. It is based on the most recent statutory and regulatory requirements, the system of criteria and guidelines of the ESG and the NEAA, and the requirements of ISO 9001:2015 and ISO/FDIS 21001:2018.

The SIPOC model has been used as a gap analysis tool to uncover the deficiencies in the process description. The improved internal auditing procedure has been approved by the Quality Manager of the University of Ruse and is proposed to be adopted by the Quality Council.

REFERENCES

ESG. (2015). *Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG)*. http://www.enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf/.

ISO 9001. (2015). *Quality management systems – Requirements*.

ISO 19011. (2011). *Guidelines for auditing management systems*.

- ISO/FDIS 21001. (2018). *Educational organizations – Management systems for educational organizations – Requirements with guidance for use.*
- Ministry of Education and Science (MES). (2018). *Laws.*
<https://www.mon.bg/?go=page&pageId=7&subpageId=57/>.
- Naden, C. (2017). *Taking auditing to new level with International Standard under revision.* <https://www.iso.org/news/2017/01/Ref2149.html/>.
- National Evaluation and Accreditation Agency (NEAA). (2018). *Criteria and procedures.* <https://www.neaa.government.bg/en/pamc/criteria-and-procedures/>.
- Terziev, V, N. Nichev, P, Bogdanov. (2017). *Prospects for development of higher education in Bulgaria.* International E-Journal of Advances in Education, Vol. III, Issue 9, December 2017, pp. 438 - 449.
- Zhelezarov, I. S. (2001a). *A system for assurance and management of the quality of education.* AMTECH 2001. Sozopol. 2001. Vol. 4, pp. 83 - 88.
- Zhelezarov, I. S. (2001b). *The quality management system of TU - Gabrovo.* Proceedings from the XIIth scientific and practical national conference with international participation 'Quality- for better life '2001'. Sofia 2001, pp. 76-81.
- Zhelezarov, I. S. (2003). *Documenting the information of the universities' quality management systems.* Informational bulletin 1. Project 'Improving the universities' systems for quality management if education. Ruse. 2003. pp. 82-110. ISBN 954-712-211-8.