

Information Systems Audit in Higher Education Institutions

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Abstract - Information systems are an integral part of higher schools. Effective management of information systems helps higher education institutions to optimise their activities, to manage resources correctly and to achieve outlined objectives properly. However, information systems not only provide benefit but also cause risk. The development of higher education, growing requirements for higher education institutions encourage the installation of new information systems. However, it is not enough only to install a new system, it is necessary to adjust it in accordance with institution activity processes in order to use all the advantages. It is necessary to evaluate changes and be sensitive to them. In order to reduce risk, information systems audit in higher schools becomes very important. Scientific literature often relates information systems audit with business companies and pay little attention to educational institutions. The paper analyses existing methods of information systems audit, evaluates the need for and specific character of information systems audit in higher education institutions. The aim of the paper is to assess the possibilities of the applying of information systems audit in higher education institutions.

Keywords - information systems; audit; audit methods; risk evaluation

I. INTRODUCTION

While public digitalization increases and data amount constantly grows, information gains greater importance. Accurate, reliable and timely information is vital to effective decision-making. Effective information management is essential not only for business companies but also for higher education institutions. As the importance of information systems grow the task of information systems assessment, which is done by conducting the audit of those systems, becomes more and more topical [2].

The main task of information systems audit is to make sure that information systems are effective and significant for the achievement of organization purposes [9]. Information systems auditing is the process of collecting and evaluating evidence to determine if a computer system safeguards asses, maintain data integrity, allow organizational goals to be achieved effectively, and use resources efficiently [2]. Auditing of information system (IS) is a form of IS measurement. Higher education institutions also take an advantage of information technology (IT) in performing academic services as their main activity [6].

Scientific papers usually analyse the performance of the information systems audit of business companies and

pay little attention to the assessment of the information systems of higher education institutions. Information systems in higher education institutions can be considered more complex than the usual information systems used in commercial organization [1]. But still it must pay the same attention to its customers (students and members) [1]. As competition among higher education institutions grows the quality of information systems in use becomes an important condition in order higher education institutions gain competitive advantage. Thus, the paper analyses the existing methods of information systems audit and their applicability evaluating the information systems of Lithuanian higher education institutions.

Research object: information systems of higher education institutions.

Research objective: to evaluate the possibilities of the application of information systems audit methods in higher education institutions.

Research tasks:

- To carry out the analysis of information systems being used in Lithuanian higher education institutions.
- To evaluate the need for information systems audit and the situation in Lithuanian higher education institutions.
- To compare various information systems audit methods and evaluate the possibilities of their application in Lithuanian higher education institutions.

Research methods: analysis of scientific articles, comparison, statistical data analysis.

The paper is structured as follows: Section 2 presents the analysis of information systems being used in Lithuanian higher education institutions; Section 3 reviews the need of information systems audit and the situation in Lithuanian higher education institutions; Section 4 compares various information systems audit methods and evaluates possibilities of their application in Lithuanian higher education institutions; and the last section concludes and summarises the paper.

II. THE ANALYSIS OF INFORMATION SYSTEMS BEING USED IN LITHUANIAN HIGHER EDUCATION INSTITUTIONS

According to AIKOS data, in 2018 there were 40 higher education institutions in Lithuania (26 state and 14 non-state institutions). The analysis of information systems being used in higher schools rests upon the Report prepared in 2017 on request of the Ministry of

Education and Science of Lithuania, and the information published on the websites of Lithuanian higher schools. The conducted research showed that higher education institutions of Lithuania use both information systems adapted for the needs of a certain institution (internal), and interinstitutional information systems (common) for the planning and management of studies [11]. The abovementioned information systems have been created by institutions themselves or purchased from the companies that create information systems for Lithuanian market using world-recognised technologies and solutions.

Analysing information systems used in higher education institutions of Lithuania it is possible to notice that information systems of both business companies and higher education institutions computerise finance management, bookkeeping, salary accounting, human resource management, management of documents and processes. Assessing the solutions chosen by higher schools it is possible to notice that for finance management, bookkeeping, salary accounting, human resource management the greater part of Lithuania's higher schools use information systems created for Lithuanian market and adapted for public institutions such as DB apskaita, Stekas, Labis III, Debetas, Biudžetas, Alga HR. 24 percent of higher education institutions use Oracle/PeopleSoft Campus Solutions solution – interinstitutional information system EDINA created in order to satisfy frequently changing needs of higher education institutions.

The conducted analysis showed that in Lithuania's higher schools document management and activity analytics spheres are the least automatized. Document management is not automatized in 32 percent of Lithuania's higher schools, and 56 percent of higher schools do not use special-purpose information systems for activity analysis [11]. Kontora and Webpartner are the most popular document management systems.

As contrasted with information systems of business companies, information systems of higher education institutions also computerize activity sphere essential only for higher schools – administration of studies. The statement that administration of studies in higher schools is one of the most important activity management functions is also proved by the fact that this sphere is computerized almost in all Lithuania's higher schools, only 8 percent of higher education institutions have not computerized administration of studies yet [11]. Even 40 percent of Lithuania's higher schools use their own created and meeting their needs information systems for the administration of studies [11]. 36 percent of higher schools also choose interinstitutional information system EDINA for the administration of studies [11]. Information systems used in Lithuania's higher schools for study administration are shown in Figure 1.

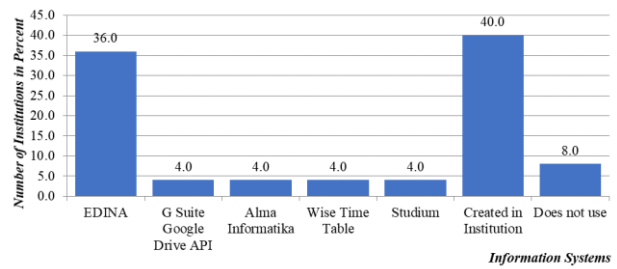


Figure 1. Information systems used for study administration in Lithuania's higher schools [11]

For the implementation of distance learning, higher schools use virtual learning environments. The greater part of Lithuanian higher schools have installed virtual learning environment Moodle or use LieDM e-study information system (ESIS) which includes virtual learning environment Moodle.

National policy and strategy to combine higher education institutions encourage the development of the infrastructure of higher schools information systems, the main trends of which are IT resource consolidation, and transfer to centralised information systems. Table 1 shows interinstitutional information systems higher schools are encouraged to use.

TABLE I. THE LIST OF INTERINSTITUTIONAL INFORMATION SYSTEMS OF LITHUANIA'S HIGHER SCHOOLS

No	Name	Description
1.	eLABa	Lithuanian Academic Electronic Library in which educational and study documents and/or their metadata are kept and provided for public access.
2.	KVIS	National career management information system which consists of graduate career monitoring component, career management component (personal, employer and career centre specialist spheres).
3.	MIDAS	National open access scientific (educational) information data archive established to collect, save and provide empirical data of scientific (educational) researches and other information related to scientific (educational) researches, to form statistical data reports, provide mathematical algorithms intended for data processing in very fast high-capacity calculating environment.
4.	LieDM (ESIS)	E-studies information system (ESIS) which consists of video conference solution, system of video lectures, Moodle e-learning environment, open education resources subsystem.
5.	EDINA	Lithuanian education, studies, activity and process management system the separate modules of which are intended for bookkeeping, personnel management, administration of studies, documents management, activity analytics.

Thus, summarizing the above it is possible to state that except for usual information systems and information systems applied in business companies, Lithuania's higher schools use special-purpose information systems, which computerize exceptional spheres of the activity of higher education institutions such as administration of studies, implementation of distance learning, graduate career monitoring. More and more Lithuania's higher schools apply interinstitutional information systems that are

administered centrally and higher education institutions do not have to take care of their maintenance.

III. THE NEED FOR INFORMATION SYSTEMS AUDIT AND THE SITUATION IN LITHUANIA'S HIGHER SCHOOLS

Information systems audit is the audit of an organization's IT systems when collected evidences and conducted assessment allow deciding if information systems effectively use organization resources, ensures their safety, data integrity and helps to pursue organization aims in an efficient way. Main objective of IS auditing activities is to review the company's control procedures associated to IS, collect analytical evidences about possible misuse, evaluate the level of operational risks for different control areas and suggest to company executives corrective control counter-measures [10]. The need for information systems audit appeared because information systems became an integral part of each organization activity and one of the most important activity execution tool. The heads of organizations and IT departments understood that computers and information systems are valuable resources that should be managed as well as other organization property, so economic feasibility, efficiency and ability to deliver good results of information systems creation, installation and application were started to be assessed.

The requirements of ISO 9001 standard are used in 96 percent of quality management systems of Lithuanian higher schools [7]. Higher schools provide procedures related to information systems management and maintenance, but defined procedures do not include processes necessary for comprehensive information systems audit and do not perform information systems audit or perform it only superficially. Interinstitutional information systems audit should be conducted centrally because their manager is not higher education institutions. Information systems of higher schools should satisfy the requirements for information systems safety provided by laws. These requirements are related to electronic data security, personal data security, organizational and technical cybernetic security parameters, accidents management, etc. Thus, information systems audit is necessary in order to check whether information systems meet the above-mentioned requirements and whether their owners use necessary technical and organizational means.

IV. THE METHODS OF INFORMATION SYSTEMS AUDIT

In order to form recommendations for the process of information systems audit in higher education institutions, it would be desirable to make assessment of existing methods, standards and models taking into account already identified needs and specific character of higher education institutions. The most widely used standards and methods are COBIT, ITIL, and ISO/IE [5].

COBIT (Control Objectives for Information and Related Technologies) is a framework made by ISACA (Information Systems Audit and Control Association) and ITGI (IT Governance Institute) with the aim to assist management of information systems [3]. It represents one of the most popular frameworks for information system control published for the first time in 1996, while actual

version 5 was published in 2012. COBIT 5 is a comprehensive framework that helps enterprises to create optimal values from information systems, by maintaining a balance between realizing benefits, optimizing risk levels and resource use [4].

COBIT 5 contains 34 control objectives and 37 processes, the fulfilment of which allows the successful achievement of the objectives of functional information systems [3]. These are grouped into five domains [3]:

- Evaluate, Direct and Monitor – EDM,
- Align, Plan and Organise – APO,
- Deliver, Service and Support – DSS,
- Monitor, Evaluate and Assess – MEA,
- Build, Acquire and Implement – BAI.

ITIL (IT Infrastructure Library) presents a set of best practices for IT service management. ITIL is based on defining best practice processes for IT service management and support, rather than on defining a broad-based control framework [8]. It focuses on the method and defines a more comprehensive set of processes. IT service management is concerned with planning, sourcing, designing, implementing, operating, supporting and improving IT services that are appropriate to business needs. The basis of ITIL consists of five main processes described in 5 volumes of ITIL [3]:

- ITIL Service Strategy;
- ITIL Service Design;
- ITIL Service Transition;
- ITIL Service Operation;
- ITIL Continual Service Improvement.

The family of ISO/IEC 27000 standards deals mainly with setting up of a valid system for management with information security called Information Security Management System [3]. The family of ISO/IEC 27000 standards includes: ISO/IEC 27000 Information security management systems – Overview and vocabulary; ISO/IEC 27001 Information security management systems – Requirements; ISO/IEC 27002 Code of practice for information security controls; ISO/IEC 27003 Information security management system implementation guidance; ISO/IEC 27004 Information security management – Measurement; ISO/IEC 27005 Information security risk management; ISO/IEC 27006 Requirements for bodies providing audit and certification of information security management systems; ISO/IEC 27007 Guidelines for information security management systems auditing; ISO/IEC TR 27008 Guidelines for auditors on information security controls; ISO/IEC 27010 Information security management for inter-sector and inter-organizational communications; ISO/IEC 27011 Information security management guidelines for telecommunications organizations based on ISO/IEC 27002; ISO/IEC 27013 Guidance on the integrated implementation of ISO/IEC 27001 and ISO/IEC 20000-1; ISO/IEC 27014 Governance of information security; ISO/IEC TR 27015 Information security management guidelines for financial services;

ISO/IEC TR 270136 Information security management – Organizational economics.

The family of ISO/IEC 27000 standards is much more different between COBIT and ITIL, because it has smaller but deeper domain compare to COBIT and ITIL. Its goal is to provide information to parties responsible for implementing information security within an organization. It can be seen as a best practice for developing and maintaining security standards and management practices within an organization to improve reliability on information security in interorganisational relationships.

Comparative analysis allows stating that COBIT methodology ensures the efficiency of institution information systems, helps to define IS processes, practice and control methods. As information management in higher education institutions is regulated by laws, the use of COBIT methodology for information systems audit is a proper solution. ISO/IEC 27000 standard requirements emphasize information safety and risk management. ISO/IEC 27000 standards cannot be considered as comprehensive IS management tool. For the management of the information systems of higher education institutions it would be worthwhile to combine COBIT methodology and the requirements of ISO/IEC 27000 standards. ITIL methodology is oriented towards work optimization and quality assurance in IT companies IT departments. This methodology is more suitable for business companies that render various services.

The greater part of Lithuanian higher education institutions have already installed quality management systems with regard to the requirements of ISO 9001 and Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG), have prepared procedures specifying requirements for processes, responsibility for performed actions, links with other internal and external documents. So, it would be advisable to integrate information systems management processes provided by COBIT methodology into higher schools quality management systems. Whereas higher education institutions use information systems every day and perform a lot of action on the Internet they must take care of information safety rest upon the requirements of ISO/IEC 27000 standards when preparing the description of procedures related to information systems and data safety.

V. CONCLUSION

The conducted analysis of higher education institutions information systems showed that higher schools use both their own created information systems and purchased and interinstitutional information systems. Both business companies and higher education institutions apply information systems for finance management, bookkeeping, and management of human resources, documents and processes. As contrasted with information systems of business companies, information systems of higher education institutions also computerize activity sphere essential only for higher schools – administration of studies, remote studies implementation etc.

The evaluation of the information needs of higher schools shows that in order to satisfy the requirements for

information systems safety provided by laws, to reduce information systems safety problems, to eliminate risk related to information systems and to increase the effectiveness of higher education institutions activity, higher education institutions must conduct information systems audit.

The comparison of various methods of information systems audit and the assessment of their applicability in information systems audit in Lithuania's higher schools show that for the conducting of information systems audit in Lithuanian higher schools it is desirable to apply COBIT methodology and the requirements of ISO/IEC 27000 standards.

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