Enhancement of the Quality Assurance Model at the Slovak University: Case Study

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ABSTRACT

Purpose: The aim of the paper is to present an enhanced internal quality assurance model based on the requirements of ISO 9001:2015 European Standards and Guidelines (ESG) principles, criteria for accreditation, and data management support in the web-based environment developed within the European Structural Fund (ESF) project.

Methodology/Approach: A literary survey and personal interviews with university representatives and ICT professionals have been conducted to evaluate and analyse the possibility of the enhanced internal quality assurance model implementation at the University. The SWOT analysis and TELOS framework feasibility study have been used to design the proposal for the decision makers.

Findings: A case study confirmed the feasibility of an enhanced quality assurance model utilisation and also revealed the possibility of the existing system of quality management improvement concerning the teaching and learning process.

Research Limitation/implication: The study is the output of an ESF project and is supposed to be implemented by top management in the very near future.

Originality: The originality of the solution is that it connects the existing university QMS to the ESG standards and evaluation criteria for the internal system of quality assurance in Higher Education Institutions (HEI) in Slovakia. The case study showed that the utilisation of a web-based quality management system has many advantages in comparison to the existing decentralised data management system.

Category: Case study

Keywords: feasibility study; higher education; quality assurance; web-based QMS

1 INTRODUCTION

The internal quality assurance processes represent the essential components of institutional autonomy (Sursock, 2011). HEIs develop their various management systems to support processes and utilise several tools to improve the quality of the teaching and learning process, and data management.

The survey carried out within the study (Loukkola & Zhang, 2010) showed that nearly 99% of HEIs utilise Data Information Systems (DIS). 93% of HEIs introduced the centralised system. In Slovakia, most universities also have the centralised system, but with the non-integrated information system (data in different activities are not gathered in one data warehouse).

HEI quality management system architecture may vary. For example in Portuguese public universities, these systems are usually only implemented in administrative or specialised faculties such as medical schools, chemistry departments, and business schools (Fonseca, 2011).

In general (and this also applies to Slovakia QMS), it has the following forms (Sursock, 2011):

- tailor-made to the institution's needs and does not apply any ready-made model;
- institution-specific but follows national quality assurance frameworks and guidelines;
- a ready-made model such as ISO, EFQM, CAF, etc.

Despite the fact that the majority of universities within the European Union (EU) utilise the centralised DIS, such systems consist of closed, independently working academic information systems (IS), library IS and administration and finance IS. Then we can implement quality management systems, for which ICT support is impacted by additional financing and difficulties related to management, updating and maintenance. Such QMS (which mainly use the ISO 9001 model, especially in Slovakia) are frequently discussed issues between users (students, academic staff, and other interested parties), as well as uninvolved professionals and the public.

These days, the advanced world of technologies can provide efficient solutions for integration issues, whether they are related to the usual computer support of QMS data information in some organisations or by providing QMS as cloud computing services.

Many professional software organisations are making significant investments in solutions for the higher education industry. According to the (Oracle, 2014) press release: „*Oracle provides institutions with the functionality, flexibility and choice they need to support institutional excellence, enhance the student experience and drive student success*".

Between 2013and 2015, the ESF project has been implemented in a university case study. The design of the enhanced internal model for quality assurance and feasibility study of ICT support were two of the main project activities.

Three objectives have been chosen for the case study preparation:

- to propose an enhanced quality assurance model as a basis for the university decision-makers;
- to prepare and specify interconnections between external and internal HEI databases for the enhanced model;
- to realise the feasibility study.

The paper includes the comparison and explanation of the changes in the ESG, in 2015 compared to 2005 and ISO 9001:2015 versus ISO 9001:2008, which form the basis of an enhanced model at the university. The shortened literary survey of quality assurance web-based solutions and the new model graphical and verbal presentation in the case study are described. The feasibility study is attached as well.

2 HEI QMS STANDARDS, GUIDELINES AND CRITERIA

Thirty-six HEIs operate in Slovakia, which are located in sixteen cities. According to (EUA, 2006, p. 32): "*Success factors for effectively embedding a quality culture include the capacity of the institutional leadership to provide room for a grass-roots approach to quality (wide consultation and discussion) and to avoid the risk of over-bureaucratisation".*

Therefore, based on the model published by Sursok (2011, p. 57) the culture of Slovak universities was examined. It was found that in most cases, a managerial culture exists and the employee's involvement is relatively low.

In 2015, twenty-two Slovak universities have been evaluated during a so-called "Complex Accreditation", which takes place every six years based on the evaluation criteria of the Accreditation Commission as an Advisory Body of the Slovak Government (MESRS SR, 2013a).

According to a survey from the evaluation reports of the Accreditation Commission (AC, 2015) the majority of Slovak universities have developed tailor-made management systems. They combine the criteria of the (MESRS SR, 2013) together with ISO 9001:2015 or ISO IWA 2:2007 (ISO, 2007). Some of the larger universities also use the ESG, 2005 ver. 3 from the year 2009.

2.1 European Standards and Guidelines for quality assurance

In 2012, the revised ESG were prepared, to improve their clarity, applicability and usefulness, including their scope. Both versions of the (ESG, 2005; 2009)

and (ESG, 2015) are divided into three parts: Part 1: Standards and guidelines for internal quality assurance; Part 2: Standards and guidelines for external quality assurance; Part 3: Standards and guidelines for quality assurance agencies.

The paper is connected to Part 1: Standards and guidelines for internal quality assurance that includes ten subtopics (Table 1).

Table 1 – ESG, 2005 and ESG, 2015 comparison and interconnections

ESG, 2005		**ESG, 2015**
1) Policy and procedures for quality assurance		1) Policy for Quality Assurance
2) Approval, monitoring and periodic review of programmes and awards		2) Design and Approval of Programmes
3) Assessment of students		3) Student-centred Learning, Teaching and Assessment
		4) Student Admission, Progression, Recognition and Certification
4) Quality assurance of teaching staff		5) Teaching Staff
5) Learning resources and student support		6) Learning Resources and Student Support
6) Information systems		7) Information Management
7) Public information		8) Public Information
		9) On-going Monitoring and Periodic Review of Programmes
		10) Cyclical External Quality Assurance

The Table shows that point 3) Assessment of students, has been divided into two separate standards and guidelines (Student-centred Learning, Teaching and Assessment and Student Admission, Progression, Recognition and Certification).

Two new standards and guidelines have been added:

- On-going Monitoring and Periodic Review of Programmes connected to the necessity of clear, accurate and objective, up-to-date publishing and readily accessible information.
- Cyclical External Quality Assurance, which means that the university should undergo an external quality assurance in line with the ESG on a cyclical basis.

2.2 ISO 9001 requirements

ISO 9001:2015, which was finalised and published in September 2015, is less prescriptive than its predecessor, focusing more on performance. All the requirements of ISO 9001:2015 are generic and are intended to apply to any

organisation, regardless of its type or size, or the products and service (ISO, 2015) and contain some significant, positive changes in an organisation (Table 2).

Table 2 – ISO 9001:2008 and ISO 9001:2015 comparison and description of changes

ISO 9001:2008 (chapter)	**ISO 9001:2015 (chapter)**	**Change**
(4.) Quality management system	(4.) Context of the organisation	New requirements
(5.) Management responsibility	(5.) Leadership	Integration into all processes and greater accountability to top management
	(6.) Planning	6.1 Risks and Opportunities – a new requirement 6.3 Planning changes – focus on a wider area
(6.) Resource management	(7.) Support	A new requirement 7.1.6. Knowledge 7.5 The documented information - New Terminology
(7.) Product realisation	(8.) Operation	The requirements are more clearly described 8.3 Design and Development 8.4 Management of external processes, products and services 8.5.5 Activities after delivery
(8.) Measurement, analysis and improvement	(9.) Performance evaluation	Focusing on the wider areas, especially on the performance and risks 9.1.3 Analysis and evaluation 9.3 Management review
	(10.) Improvement	A clarification of the approach to improving and the omission of preventive measures from this section 10.3 Continuous improvement

2.3 External evaluation criteria of HEIs in Slovakia

The Ministry of Education, Science, Research and Sport of the Slovak Republic publishes, updates and manages the criteria related to the external evaluation of HEIs, and maintains related databases (MESRS SR, 2013a):

- *The criterion for the accreditation of HEI study programmes* (KSP), which contains two sub-criteria:
  - KSP-A: Criterion for assessing the attributes of the university and its departments ensuring the implementation of the study programme, which has three attributes:

    - Attribute 1: The level of research, respective artistic activity, with one sub-criterion.
    - Attribute 2: Material, technical and information support of the study programme, with one sub-criterion.
    - Attribute 3: Staffing, with four sub-criteria.
  - KSP-B: Criterion for the evaluation of the study programme attributes that have three attributes:
    - Attribute 4: The contents of the study programme, with seven sub-criteria.
    - Attribute 5: Requirements for applicants and method of their choice, with one sub-criterion.
    - Attribute 6: Requirements for completion of the study, with three sub-criteria.
- *The criterion for the assessment of the HEI to conduct habilitation procedures, and the procedure for the appointment of professors* (KHKV) which contains four attributes:
  - Attribute 1: Basic requirement, with one sub-criterion.
  - Attribute 2: Scientific or artistic profile of the HEI, with one sub-criterion.
  - Attribute 3: Level of HEI criteria to conduct the pedagogic title – docent (associate professor) and pedagogic title – university professor and compliance – with two sub-criteria.
  - Attribute 4: Staffing – with two sub-criteria.
- *The criterion for the inclusion of HEIs in categories* (KZU) which contains three attributes:
  - Attribute 1: The level of research, respective artistic activities.
  - Attribute 2: Results of the university study programmes in the implementation of the third stage.
  - Attribute 3: Structure of study programmes provided by the university.
- *Criterion for assessing the internal quality assurance system of the HEI* (KVSK) which contains two attributes:
  - Attribute A: Policy in the field of quality assurance of the HEI, with six sub-criteria.
  - Attribute B: Processes and procedures of the HEI in the field of quality assurance, with eleven sub-criteria.
- *Criterion for assessing the level of research, development, artistic and other creative activities for the complex accreditation of the HEI* which contains three attributes:
  - Outputs attributes
  - Surroundings attributes
  - Awards attributes

3 STATE OF THE ART OF WEB-BASED QMS SUPPORT

Developing specific quality management software is expensive, hard to build and use (CloudQMS, 2015); therefore, designing a web-based application that simplifies customer compliance, gets organisations through audits, and supports improvements, is useful and effective.

Web-based quality management software applications can be realised and utilised in three different forms: (a) on-premise solution; (b) on-demand (cloud solution); (c) hybrid-solution.

According to Technopedia (2015) and Microsoft (2015):

- *On-premises* software is a type of software delivery model that is installed and operated from a customer's in-house server and computing infrastructure. It utilises an organisation's native computing resources and requires only a licence for each server and/or end user or purchased copy of software from an independent software vendor. The customer is responsible for the security, availability and overall management of on-premises software. However, the vendor also provides after sales integration and support services (Technopedia, 2015).
- *On-demand software* is a type of software delivery model that is deployed and managed on a vendor's cloud computing infrastructure and accessed by users over the Internet as and when required. On-demand software enables a user/organisation to subscribe to software on a pay-as-you-go, e.g. monthly billing method (Technopedia, 2015a). On-demand software is also known as Software as a Service (SaaS), online software or cloud-based software (Microsoft, 2015).
- Hybrid solution – combination of on-premise and on-demand solutions (Microsoft, 2015).

RightScale (2014) surveyed 1068 technical professionals across a broad cross-section of organisations about their adoption of cloud computing and identified several key findings:

- 94 percent of organisations surveyed are running applications or experimenting with infrastructure-as-a-service, and 87 percent of organisations are using the public cloud.
- 74 percent of enterprises have a hybrid cloud strategy, and more than half of those are already using both public and private cloud.

The possibility of the cloud-based support of quality assurance models has been examined in a research paper (Zgodavova, et al., 2014). It can be summarised that:

- A cloud maturity profile of respondents according to (RightScale, 2014): 6% – no plans; 18% – cloud watchers; 29% – cloud beginners; 25% – cloud explorers; 22% – cloud focuses.
- There are many cloud solutions available for QMS. It is possible to use such solutions to support one's own QA frameworks and guidelines or for a ready-made model such as ISO, EFQM, CAF, etc. The examples include M-Files; NextDocs, CloudQMS, Verse QMS, Mango QSG software or CloudQMS™. IBM and Microsoft are the major providers of cloud services for HEIs in different areas, e.g. academic information system services, web page services, etc.

The question is, however, whether the „pre-cooked" cloud solution such as provided by Oracle, IBM, Microsoft are suitable and efficient for HEIs because all HEIs have their own unique quality culture, specific processes and their know-how for education and research activities. All such services are also available for the application of the most widespread mobile operating systems (iOS, Android and Windows Phone).

4 THE UNIVERSITY ENHANCED QUALITY ASSURANCE MODEL – CASE STUDY

The case HEI is a public, well-established university in Slovakia. Since 2006, it has utilised QMS according to ISO 9001. The university applies the system of introduction, monitoring and evaluating quality assurance principles in all processes. The basis for internal quality assurance at the university is created by: (a) A university quality management system according to ISO 9001:2008; (b) A university academic information system; (c) Student surveys; (d) The further education of teachers; (e) Education improvement projects; (f) A library information system; g) A Learning Content Management System – Moodle; and System for finance and personal management – SAP.

Guidelines stipulate proceedings and rules for planning, implementation, documentation and the evaluation of internal and external quality audits.

At the same time, they determine the functional responsibilities and cooperation principles when securing such activity. Currently, for the internal evaluation of the internal quality system, the guidelines for quality management system auditing according to requirements set by ISO 9001:2008 are followed.

In 2006, the university was included in the international evaluation according to ENQA standards. The EUA recommendations have been partly incorporated into the QMS objectives in the following years.

In parallel with the quality management system according to ISO 9001:2008, the university excellence system according to EFQM (European Foundation for Quality Management) model is being built as well. In 2010, 2011 and 2012, the

university took part in the Slovak National Quality Awards (SOSMT, 2015), and in 2010 and 2012 it received the "Performance Improvement Award".

4.1 The current model of the university QMS and quality objectives

The current QMS model is based on a process approach, which is structured according to ISO 9001: 2008. Processes are divided into three groups:

Main, value-added processes: H1 Educational process; H2 Research and development process; H3 Business process.

Managerial processes: M1 Management responsibility; M2 Marketing; M3 Documentation control and communication; M4 Resource management.

Supportive processes: P1 Library support; P2 Provision of infrastructure; P3 Metrological support; P4 Contractual obligations; P5 Purchasing; P6 Monitoring, analysis and improvement.

The QMS quality objectives (O) for the year 2015 are as follows:

O1: Maintain and improve the overall performance of the quality management system by the requirements of ISO 9001:2008 for the successful university accreditation fully competitive on a national and international scale.

O2: The success, attractiveness and stability of the university as a whole, to build on the success, attractiveness and stability of the faculties.

O3: Create and maintain a motivating environment in which employees are involved in the strategic objectives of the university, they create conditions for personal and professional growth, strengthening their loyalty and using their abilities for the benefit of the university.

O4: Ensure students' lasting satisfaction, understand their current and future needs and, by fulfilling their requirements, try to overcome their expectations, strengthen the pride of students and graduates at their university.

O5: The intense communication with leaders in the region, the Ministry of Education and the Slovak Government, Employers' Associations actively influences Slovak university policy development.

O6: Systematically promote the university, study options, popularise and promote the results of science, technology, art and culture in the national and international environment through continuous planning, evaluation and the subsequent improvement of the quality of all processes at the university.

4.2 The current QMS strengths and weaknesses

The SWOT analysis developed by the project team was an important part of the project planning. The analysis results indicate the following current state of the strengths and weaknesses:

Strengths:

- Well-defined and structured processes;
- Process models can be easily adapted to the amendment of ISO 9001 as they are developed in the ARIS modelling software.

Weakness:

- The QMS is not fully synchronised with the ESG;
- ICT support is not efficient mainly due to the following: (a) documentation is stored on the intranet; (b) searching is complicated and lengthy; (c) updating is hampered by problems related to version documentation administration; (e) access to documentation is subject to connection to the internal university network;
- Databases of other management systems are not linked with the QMS or vice versa;
- Maintenance of the QMS is not easy and is very costly.

4.3 Enhanced quality assurance model proposal

A graphical model of the proposed enhanced QMS is shown in Figure 1. The possibility of linking the ESG, 2015 standards and guidelines and the External evaluation criteria, 2013 with the requirements of ISO 9001:2015 in the context of the PDCA cycle are described at the first decomposed level in Table 3.

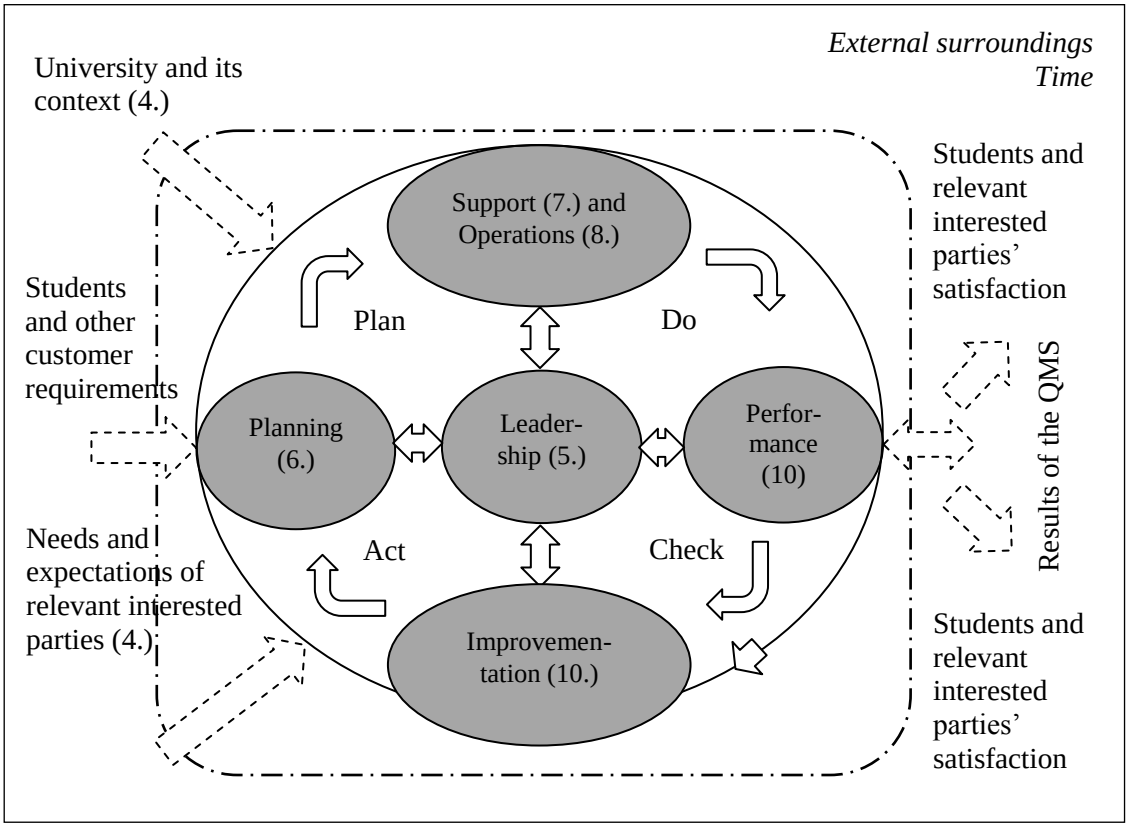

Figure 1 – ISO 9001:2015 model (modified for the University)

Table 3 – Linking the (ESG, 2015) *standards and guidelines and the External evaluation criteria* (MESRS SR, 2013) *with the requirements of* (ISO 9001, 2015)

Cycle	ISO 9001:2015	ESG, 2015	External evaluation criteria, 2013
Plan	4. Context of the organisation 4.1 Understanding the organisation and its context 4.2 Understanding the needs and expectations of interested parties 4.3 Determining the scope of the quality management system 4.4 Quality management system	3) Student-centred learning, teaching and assessment	KVSK-A2: The characteristics of the relationship between HEI and research, developmental, artistic and other creative activities at the university. KVSK-A3: Organisation of the internal quality system
	5. Leadership 5.1 Leadership and commitment 5.2 Quality policy 5.3 Organisational roles, responsibilities and authorities	1) Policy for quality assurance	KVSK-A2: The characteristics of the relationship between HEI and research, developmental, artistic and other creative activities at the university. KVSK-A4: Allocation of responsibilities in quality assurance at HEI KVSK-A5: Characteristics of student involvement in the internal quality system
	6. Planning 6.1 Quality objectives and planning to achieve them 6.2 Planning of changes	1) Policy for quality assurance	KVSK-A1: Basic tools to achieve the objectives of the internal quality system
	7. Support 7.1 Resources 7.2 Competence 7.3 Awareness 7.4 Communication 7.5 Documented information	5) Teaching staff 6) Learning resources and student support 7) Information management 8) Public information	KVSK-A2: The characteristics of the relationship between HEI and research, developmental, artistic and other creative activities at the university. KVSK-A2: The characteristics of the relationship between HEI and research, developmental, artistic and other creative activities at the university. KVSK-B3: Quality assurance of university teachers KVSK-B4: Provision of material, technical and information resources to support the education of students

Cycle	ISO 9001:2015	ESG, 2015	External evaluation criteria, 2013
			responding to the needs of study programmes. KVSK-B5: Collection, analysis and use of information needed for the effective management of the implementation of study programmes. KVSK-B6: Regular publication of objective, quantitative and qualitative information on study programmes and their graduates.
Do	8. Operation 8.1 Operational planning and control 8.2 Determination of market needs and interactions with customers 8.3 Operational planning process 8.4 Control of external provision of goods and services 8.5 Development of goods and services 8.6 Production of goods and provision of services 8.7 Release of goods and services 8.8 Nonconforming goods and services	2) Design and approval of programmes 4) Student admission, progression, recognition and certification	KVSK-B1: Development, approval, monitoring and the periodic evaluation of study programmes,
Check	9. Performance evaluation 9.1 Monitoring, measurement, analysis and evaluation 9.2 Internal Audit 9.3 Management review	9) On-going monitoring and periodic review of programmes 10) Cyclical external quality assurance*	KVSK-A6: Methods for introduction, use, monitoring and review of the principles of HEI in quality assurance. KVSK-B1: Development, approval, monitoring and the periodic evaluation of study programmes KVSK-B2: The criteria and rules for student assessment
Act	10. Improvement 10.1 Nonconformity and corrective action 10.2 Improvement		

Note: *9.2 The Internal Audit can include external findings as inputs in ESG, 2015 point 10).

4.4 University QMS web-based support

A proposed hybrid solution built by web-based QMS that simplify customer compliance, get the university through audits, and support improvement, is presented in Figure 2. Such a solution provides a dynamic workflow, scalability, and reporting capabilities in the flexibility of a web-based solution.

Time →

HEI external surrounding				*HEI internal surrounding*		
External databases		**Criteria – KPI**		**Internal databases**		**QMS logs**
Central register of HEI employees (CRZ)	❶ (A) ③ [B] {1}	The criterion for the accreditation of HEI study programmes (KSP)		Administration and finance system (SAP)	(A) ① ② ③ ④ [B] {1} {2}	CAPA documents Complaints management Lesson learned External provision Management review KPI dashboard Performance and audit Calibration Training
		Attribute A	(A)			
		Attribute B	(B)			
Central register of HEI students (CRŠ)	❶ ❷ ② {1}	The criterion for the assessment of the HEI to conduct habilitation procedures, and the procedure for the appointment of professors (KHKV)		Academic information system (AIS)	❷ (A) (B) ① ② [B] {1}	
		Attribute KHKV 1	①			
		Attribute KHKV 2	②			
		Attribute KHKV 3	③			
		Attribute KHKV 4	④			
Central register of HEI publications (CRPČ)	② ③	The criterion for the inclusion of HEIs in categories (KZU)		Library information system (LIB)	❶ ❷ (B) ② ③ [B] {1} {2}	
		Attribute KZU 1	❶			
		Attribute KZU 2	❷			
		Attribute KZU 3	❸			
Central register of HEI students thesis (CRZPŠ)	❶ ❷ (B) [B] {1}	Criterion for assessing the internal quality assurance system of the HEI (KVSK)		eLearning content management (Moodle)	[B]	
		Attribute KVSK A*	[A]			
		Attribute KVSK B	[B]			
Register of MESRS SR and accreditation commission (RAC)	❶ ❷ ①	Criterion for assessing the level of research, development, artistic and other creative activities for the complex accreditation of HEI				
Registers of projects (RPMŠ)	③ (B)	Outputs attributes	{1}			
		Surroundings attributes	{2}			
		Awards attributes**	{3}			

Figure 2 – Interconnections of the external and internal HEI databases and proposed enhanced QMS logs

Notes: KPI – Key Performance Indicator;
*Criteria of KVSK A are in existing QMS; **No databases for Awards attributes

For the future enhanced AQ model following databases are missing in the existing QMS: Projects internal database; Gauges and calibration databases; KPI database; linking the educational process with research and business; CAIRO – corrective, innovation, and reorganization actions.

4.5 Feasibility study

After finishing the Technical, Economic, Legal, Operational, Scheduling (TELOS) feasibility study, we achieved specific solutions and proposals that evaluate the project's results potential for success.

The utilisation of the enhanced Quality Assurance Model at the university, in the case study prepared by the executed feasibility survey (Zgodavova, Horvath and Mizla, 2014) and (Sinay, et al., 2015) showed many advantages in comparison with the existing system:

Technical feasibility: The solution of mobile application, coexistence with various operating systems, assurance of multipurpose authenticity, data protection and encryption, following the standards, adaptability to the existing hardware and software of the university, guaranteed a low error rate, and adaptability is technically solvable with the web-based solution supplier, and may be contractually provided as software as a service.

Economic feasibility: Costs related to the QAM solution as on-demand – cloud service are approximately 15% lower than maintaining the current state. Obviously, it is a rough estimate as costs are influenced by several factors such as the size of HEIs, repeated use for further HEIs, etc. However, it is obvious that the web-based solution of the quality management system may provide significant cost saving and provide wider functionality, better reliability and efficiency as well as usability, maintainability and portability.

Legal feasibility: If the Data Protection Act remains as it is, there are no significant obstructions to the project. The supplier-guaranteed contract provides many benefits in comparison with the current solution.

Operational feasibility: According to the analysis of the requirements of the interested parties, the proposed QAM with new characteristics and functions will provide new features that are compatible with the (ESG, 2015) and (MESRS SR, 2013a) criteria.

Scheduling feasibility: It is possible to execute the project within one year (but again, depending on the size of the HEI), and it will not disrupt the running of the current management system.

5 CONCLUSION

This paper presents one of the main outcomes of the ESF project, which was realised at the Slovak University. The university has had the functioning in place

for nearly ten years, regularly auditing management systems for all its branches by ISO 9001. The result is described as a case study, which also contains the TELOS feasibility study. As a method for obtaining inputs, literary research and interviews with students and other interested parties were used. The proposed enhanced quality assurance model shows the possibility of linking the revised standard ISO 9001:2015, the new Standards and Guidelines ESG, 2015 to Criteria for Assessing the internal system of quality assurance in HE (MESRS SR, 2013).

For the feasibility of the project results it is necessary to:

- declare the project changes of the university QMS under the enhanced quality assurance model according to Figure 1;
- synchronise the requirements of ISO 9001: 2015 with current versions of the European Standards and Guidelines, and criteria (MESRS SR, 2013a), according to Table 3, and introduce them to the documented information of the new enhanced QMS;
- create missing database for: projects; gauges and calibration; KPIs; corrective, innovation, and reorganization actions.
- link the educational process with research and business processes;
- link quality objectives with KPIs;
- opt for a variant web-based solution (on-premise, on-demand or hybrid model) and supporting software: e.g. M-Files; NextDocs, CloudQMS Verse QMS, Mango QSG or CloudQMS™; or IBM or Microsof solution.

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