

The quality management system in education - implementation and certification

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ABSTRACT

Purpose: The purpose of the study is to help the universities in implementing the Quality Management System (QMS).

Design/methodology/approach: This paper presents detailed description of the process of implementation quality management system according to ISO 9001: 2008 standard, which has the significant influence on improving the quality of education. The various factors, which decide on the quality of the university have been described. The basis of the quality management system according to ISO 9001:2008 standard, which is the processes oriented were also presented.

Findings: The own research gives the consciousness about all elements related to the quality and which have crucial impact on the quality management system in education. It can be stated that quality in educational process is understood as the agreement with settled requirements or the degree of the fulfilment of customers requirements or other interested parties, or also the degree of the fulfilment of the assessment criteria (e.g. to didactic tools, lecturers, the results of teaching, needs, satisfaction etc.).

Research limitations/implications: An interesting area of further research would be improvement activities taken at universities after certification quality management system.

Practical implications: Findings from the paper and research are the clue that the quality management system, which became implemented, documented and is certified, assures the supervision over the whole university and makes possible the efficient management, monitoring and improvement of all processes and elements.

Originality/value: The paper provides methodology for all universities who wish to implement the quality management system. Also the guidelines presented in the paper might be helpful for universities considering certification quality management system.

Keywords: Quality management; Quality of education; Process approach

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1. Introduction

The rank of the quality which should be comprehensive understood and should be referred to all areas of functioning an organization decidedly grows for many years. Quality can be understood as something which can be improved. One should also have the consciousness that overall quality comes from people's quality, so it is an important problem investing in the human resources, in knowledge and people skills. Knowledge, however, becomes the determinant of the success of organization functioning in the conditions of the intensifying changeability of closer and faraway surroundings. It is why the problems of education and learning become extremely important in the economy conditions based on knowledge [1-4].

System of education functioning at present in considerable range was designed and shaped in XIXth age. In the system of education the perception the quality was based on the rule of the mutual confidence. In the conditions of the fast development of the higher education, indispensable became creating the formalised systems assuring the fulfilment of the academic standards.

More and more requirements put for the higher education, especially from the point of view of the demand on the job market, caused the necessity of implementing the quality management systems (QMS) compatible with the ISO 9001:2008 standard to universities [5-7].

Additional argument confirmed the necessity of undertaking activities leading to the assurance of the suitable level of the quality of students' education and starting the mechanisms favourable the continuous improvement of the education processes is the increasing competition within the free market of educational services and the approaching drastic fall of the youth amount graduated from secondary schools.

2. Quality at the university

Quality of education is the skill of building the abilities of assimilating the knowledge in the area of educational needs and the implementation of this knowledge to creating mechanisms allowing to fulfill expectations of customers and educational services. One should distinguish pupils, students, teachers and employers among the people who are interested in the quality of education [4].

The series of various factors decide on the quality of the university. In the view of the general quality definition, proposed by J.M. Juran [4], it can be initially accepted, that the quality of the university (the quality of educational service) is the degree, in which it fulfils the growing requirements of surroundings and helps in the students' development, at simultaneous care about the solid development of didactic and scientific personnel. We should remember, that the definition of the university quality, in this the quality of educational services, has in certain degree the very subjective character and it depends on the relations: service's donor – service's recipient. Because of this, the quality should be estimated both through results from the offered services, and through the process itself which leads to the given result [8-10].

On the educational service of the university, and also on its quality, we should look widely. The quality of the university is perceived through the prism of many components, which together decide on the success in the realization of the proposed educational aims. It should be taken into account: the quality of the material potential, the quality of the immaterial potential, the processes quality and the quality of the results. Additionally, two groups of components – technical and functional will influence on each value (Table 1). First group decides on this, what the main recipient of the service receives, the second one – how (in what way, in what conditions, relations) the given service is offered [6].

According to Juran's trilogy [4], the definition of the university quality, and the same the quality of the educational service, should contain the phase of planning and the preparation of its potential, the stages of the service's realization, leading to the achievement of the agreement with plan and requirements (main, supporting and management processes) and the results of working, leading to the achievement of the student satisfaction who through his proper preparation and commitment gains the good position on the job market and in the society [4,6].

The quality of education became the critical factor for famous universities at present and forced the completely different approach to the university management. From there it is large interest of the universities about the quality management systems.

3. The implementation of the quality management system at the university

ISO series 9000 standards are the international standards worked out by the International Organisation for Standardisation (ISO), dedicated to the quality management system. This means that all activities having the influence on the quality should be planned, systematic, documented and supervised, and the organization should deliver proves that all works according to requirements described in ISO 9001:2008 standard and with customers requirements [7,11-13].

The quality management system contains the organization structure, competence division and responsibility, procedures, processes and resources. It defines the conditions and methods of education, establish the proof of the value of the offered educational service, makes possible the comparability of educational institutions in European Union countries and in other countries, can decide in advance about the choice of the university, makes the chance on the growth of workers motivation to better work and leads to lowering the costs [8,14].

ISO 9001:2008 standard makes the basis to implementation and certification the quality management system. The implementation of this system is equivalent with the introduction of the processes management which is the foundation of the rational, effective management in each organization.

ISO 9001:2008 standard has the general and universal character. It relates neither to concrete brand or speciality nor to concrete product or service. It is applied by the production, service enterprises, by organizations set on the profit, but also by the non-profit organizations (e.g. the public administration offices, agencies, hospitals, universities). The basis of the quality management system according to ISO 9001:2008 standard is the processes orientation [7,15].

Table 1.
 Components and determinants of the university's quality [6]

	Technical quality	Functional quality
The quality of the material potential	Technical state of the building and its surrounding Technical condition of didactic, sanitary, recreation rooms Size and quantity (accessibility) of didactic rooms Technical state and the quantity of scientific and didactic tools Quantity, accessibility, technical state and modernity of audio-visual equipment (e.g. projectors) Level of computerization – the quantity of computer posts / number of students Extensiveness, topicality and the accessibility of library resources Service points (e.g. copy centers, gastronomy) Sport base	Cleanness Hygiene Tidiness Aesthetics The care of the realization Modernity
The quality of the immaterial potential	Staff number Level and the kind of education Degrees and scientific titles Authorization of the university / department Work practice of the staff Prize and distinction Scientific publications Patents, inventions Scientific investigation	Communicativeness Leadership skills Professionalism Reliability, credibility External appearance Personal culture Elasticity Objectiveness Using the correct Polish language
The quality of realized processes	Degree of the preparation of personnel Realization of programmes, lecture's plans Kinds of motivating tools Kinds of studies Kinds and the quantity of directions Kinds and the quantity of lectures Programmes, plans, syllabuses Quantity and kind of investigation programmes Service (exploit of subjects) Assessment rules of the students and teachers Scientific circles Kinds and the quantity of meetings with potential employers Individual modes of studying University, department events Foreign exchanges Business co-operation	Atmosphere on lectures Skill of delivering the knowledge Attainability / the lecturer's accessibility Personnels' sense of duty Punctuality of personnel Preparation to lectures Personnel commitment Readiness to help carrying Empathy Kindness Frankness Objectiveness / Justice Cope with difficult situations
The quality of the results	Number of people ready to undertake studying on the given department / number of places Number (%) of graduates employed after the completion of studies Number of foreign students graduated from given university, department Place of the university in the ranking Achieved prizes, certificates, distinctions, authorizations Opinion of the accreditation institution Taking part in competitions, projects Sport results Students scientific results Scientific conferences Number of scientific publications Number of complaints, negative opinions Inquiries results Received grants	Good opinion about the university Students satisfaction and other interested parties (e.g. employers) Graduates loyalty (the recommendation of the university to others) Contact with graduates Contact with retired workers Contact with employers

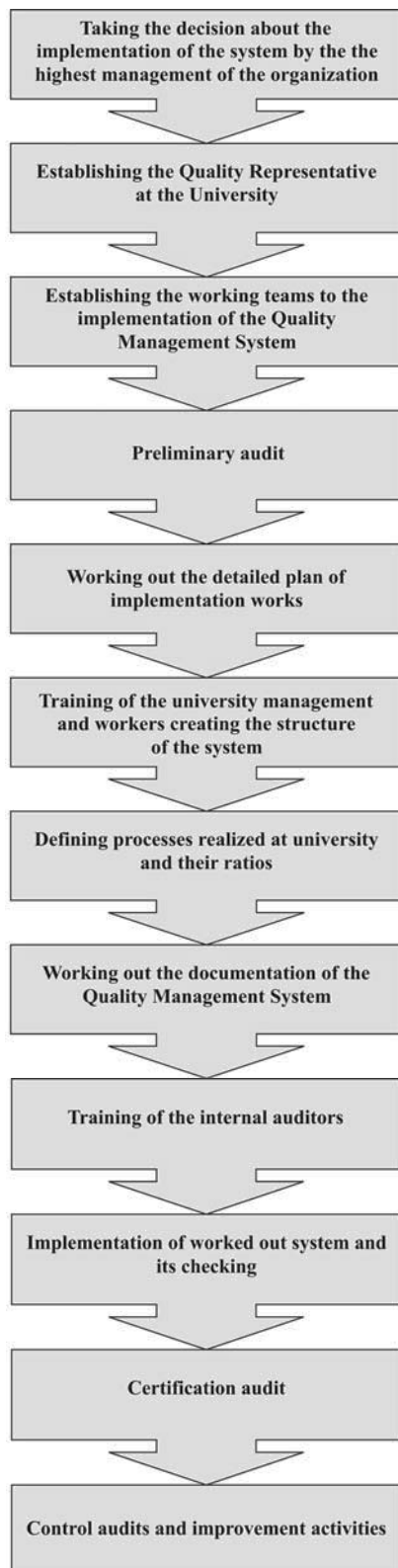


Fig. 1. Stages of the implementation of the Quality Management System

Process approach means the organization management through the processes consisting on its activity [9].

In processes approach the following principles are required [9,16]:

- the basic processes in the organization are documented and analysed,
- the relations inside processes are analysed from the point of view of customers needs,
- repeatability and the quality of the results of processes assure the procedures,
- the basis of defining the aims and the assessment of the processes results are measurable ratios,
- the processes management must lead to the continuous improvement,
- the processes management is connected with the change of the organization culture.

Quality in educational process is understood as the agreement with settled requirements or the degree of the fulfilment of customers requirements or other interested sides, or also the degree of the fulfilment of the settled assessment criteria (e.g. to didactic tools, lecturers, the results of teaching, needs, satisfaction etc.).

At present educational process in larger degree has to take into account the needs and expectations of these, who are the recipients of educational services - it means students, their future employers and local communities. Educational process should also take into account that knowledge, which graduates leaving universities have at present, becomes worthless very quickly. It is important to shape students' skill of self - learning and additional studying in the educational process. Helpful in this is undertaking activities serving to the reconstruction the students own motivation to gaining the knowledge and skills. Teachers should have the consciousness of the role, which they have to fulfill in the realization of this aim [17,18].

The process of implementation of the Quality Management System includes the following stages (Fig.1) [10,19]:

3.1 Taking the decision about the implementation of the system by the highest management of the organization

Rector of an university takes the decision about implementing the quality management system and sends it to deans of all faculties.

3.2 Establishing the Quality Representative at the University

The Quality Representative established by Rector fulfils the function of the connecting link between the Rector of the given university and working group, to which the implementation of the Quality Management System will be charged. The leadership of all activities connected with the Quality Management System is a task of the Quality Representative and also supervision and improvement of this system [10].

3.3 Establishing the working teams to the implementation of the Quality Management System

Appointing persons (organizational units) responsible for implementation of the key elements of the system and specifying the duties range of these persons (organizational units) and relations between them.

3.4 Preliminary audit

Zero audit is the next stage of the implementation of the system. It estimates the current condition of the university from the point of view of the Quality Management System implementation. It covers the whole university at which the implementation of the system will happen. Report defining the current qualitative situation of the university are prepared after its execution.

3.5 Working out the detailed plan of implementation works

The Quality Representative together with the working team works out the detailed plan of implementation works. It marks the dead-lines of fulfilling each stage of implementation and people responsible for it.

3.6 Training of the university management and workers creating the structure of the system

At the beginning of the implementation, the training from the quality area is better to entrust to professional external firms and then carry out the internal training using own specialists from this area.

3.7 Defining processes realized at university and their ratios

The whole process of the education consists of many components, that is: projecting (the programme of studies, the programmes of subjects, didactic tools, ways of estimating), recruitment, preparation and the validation of didactic tools, planning of subjects, didactic process, job practices, the processes of estimating (plan and the programme of studies, students, worker – by students and by superiors, by graduates, by employers) etc. In the turn, each of mentioned process also possesses its own components. For example, the didactic process consists of: aims, contents and principles of teaching and forms, methods and the ways of working the academical teachers and students – and these also pass through the whole cycle of projecting and validation and estimation and actualization. For example, as forms of leading the didactic process can be applied lectures, practices, laboratory practices, project practices and seminars and job practices [20-22].

Generally speaking, processes can be divided on (for example) [23]:

- General processes (management):

The settlement of policy and aims, the office of the student service, management, resources, the quality management system, communication, continuous improvement, book-keeping and administration;

- Basic processes (main):
 - recruitment, that is the process, aiming gathering the students,
 - the designing and planning, that is process connected with working out the programmes of studies, the plan of subjects and indispensable documents to carrying out the subjects,
 - the didactics, that is process including all stages of the students education. This is a very wide process, having the largest influence on the obtainment of the education. It is also the largest carrier of information on the topic of the quality of education at the university,
 - scientific personnel, that is scientific workers directly connected with students didactics, passing on them knowledge and checking it,
 - obtaining professional and scientific degrees, that is the final stages of studies. In this process students get the suitable education for the level of studies what they participate,
 - scientific investigations, that is the process of carrying out the every kind of investigations in investigative laboratories at the university,
 - the control and estimation, that is the process of verification both the students, and scientific workers.
- Supporting processes are: library managing, computer system managing, supervising the documents, trainings, the activity of the scientific circle and other organizations, foreign co-

operation, scientific conferences, infrastructure and job practices.

Division of the processes mentioned above serves to the building of the processes map, that is the graphic presentation of activities taking place at the university (Fig. 2).

The customer in the process of education can be understood as:

- the external customer – the graduate of the secondary school, employer, graduate, interested in the additional learning etc.,
- internal one – student, the recipient of the internal service, e.g. subjects led for the different organizational unit at the university.

Furthermore, as involved parties there are:

- the customers, workers, employers, supplier (e.g. the contractor of lectures charged beyond the organization in the system or at all beyond the university within outsourcing),
- authorities (political, state, council), social organizations, the graduates organizations, estimating the quality of education or expressing the interest to the organization.

Each process should be described (Table 2), which allows to fix the processes realized at the university, and simultaneously makes possible obtaining information necessary to their later formation and optimization.

3.8 Working out the documentation of the Quality Management System

The university documentation includes (Fig. 3):

- Quality Manual - it contains the quality policy (it should contain the obligation to fulfilling the customer requirements and to the continuous improvement of the system) and quality objectives, the system description with discussion and explanation of possible exclusions, the description of relations between processes in the quality management system (the processes map) and procedures (their content or only relations to them),
- Procedures,
- Instructions,
- Other documents (drafts, forms, records).

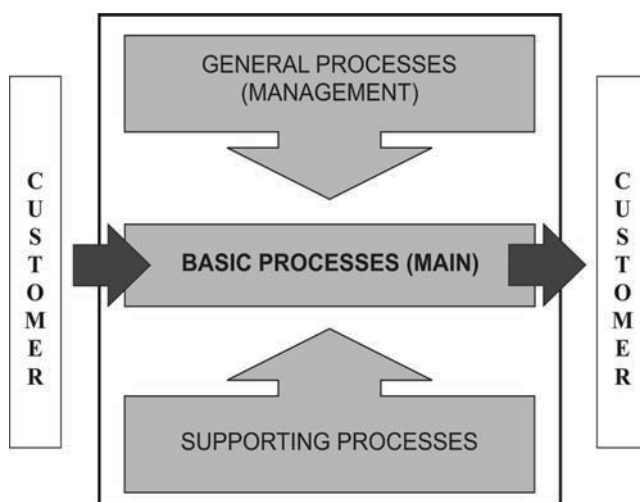


Fig. 2. Processes map of the university

Table 2.
Process data [14]

Lp.	The elements of the process description
1.	The aim of the process.
2.	Input data to the process.
3.	The name of the process.
4.	Exit data from the process.
5.	Organizational units participating in the process.
6.	What functions are realized within the process.
7.	What different processes identified in the organization it joins with
8.	Proposed ratios to the process estimation

The System Documentation is supervised by Quality Representative. All documents functioning within the System are properly appointed in the aim of their identification.

3.9 Training of the internal auditors

It is necessary to choose the potential internal auditors and order all trainings in the independent external certification organization.

3.10 Implementation of worked out system and its checking

Audit proceeds for defining the degree of the fulfilment of criteria described in processes, in the quality system documentation and the requirements of standards and the effectiveness of the quality system, from the other side audit serves to the estimation of the ability, how the worked out system allows to achieve the planned results.

The most important advantage of audit is the possibility of the critical view on realized activities and defining if the present documentation and staff assure the proper realization of tasks and the organization objectives.



Fig. 3. The pyramid of the Quality Management System Documentation [15]

The most effective tool, which lets to estimate the correctness of system solutions is in the case of university the process audit.

3.11 Certification audit

It is described in chapter 4.

3.12 Control audits and improvement activities

Top management of the university carries out in the settled period of time the review of the Quality Management System in the aim of its continuous usefulness, adequacy and effectiveness. This review includes the estimation of the possibility of the improvement and the need of changes in the quality management system, quality policy and realization of the objectives contained in it.

4. The certification of the quality management system in education

The certification is understood as the estimation of the compatibility of the Quality Management System at the university with definite requirements, accomplished by the independent organization. If the required compatibility is shown, the proof in the form of certificate will be given to the university for the period of three years. After the period on which the certificate was given, recertification follows, it means prolongation of the validity of the certificate for the next period [23-24].

The main reasons of subjecting to the certification, carried out by the independent third party are: enlargement of the credibility to the enterprise, the obtainment of competitive superiority on the market, adjusting to requirements imposed by laws, standards, customer and also the co-operating firm, already possessing the certified quality management system [5,25].

The stages of the certification (in this certification audits) includes [8,26]:

- the choice of the certification unit and establish the contact, One should take into account, that the good-will of the certification firm will have the influence on the university image. One should also consider, that at the moment of starting the co-operation with the given certification unit, the university is tied up to this co-operation by the whole period, in which it will want to keep the certificate.
- the certification payment,
- initiating the audit,
- execution of the review of the university documentation, that is defining compatibility of documentation with audit criteria,
- the preparation of audit activities realized at the university,
- the execution of audit activities at the university,
- preparation, confirmation and dissemination of the audit report,
- closing of the audit,
- in the case of the positive opinion from the audit, the university obtain the certificate.

After receiving the certificate the certification organization begins the programme of supervisory visits, which are usually established in six month periods. The aim of supervisory visits is verifying if the confirmed Management System is still maintained, applied and that the continuous improvement is assured.

The quality management system, which became implemented, documented and is certified, assures the supervision over the whole university and makes possible the efficient management, monitoring and improvement of all processes and elements.

It can be said, that the certification of the quality management system forces the development of the quality in education, and also it can be helpful during the accreditation of the studies direction.

5. Conclusions

The care about the quality of education by the universities is one of the basic process, which creates the present market of educational services. The quality of education becomes the basis to working out and implementing the strategy of the development of educational units [8].

When we concern designing and implementing the quality management system at the university we should take into account that this is the long-term process which should be realized in stages, at the significant and sustained support from the side of the university. After implementing the system, its elements should be permanently improved [6,14].

The universities which implemented the quality management system according to ISO 9001 standard, stay in eyes of their customers as credible, reliable and well organized. This raising of the prestige, and assumption of better position in the ranking of universities results directly from the advantages, which the implementation of the quality management system brings. Those are [7,16,23]:

- the assuring the system management for the resources and knowledge,
- starting the constant process of improving the university,
- guaranteeing the efficient flow of information about each task and their realization,
- improvement of functioning the university and its management,
- quick and effective solving problems,
- avoiding the mistakes (instead of repairing them),
- the change of approach to the quality of education,
- the improvement of planning and budget discipline,
- increasing the productivity and effectivenesses of the university,
- the growth of responsibility, motivation and commitment of the workers.

At present the certified system of the quality management by the university becomes one of the most important requirements at concluding various contracts. The certificate of such a system confirms that the given university is organized and managed in the way which assures the fulfilment of all undertaken obligations.

References

- [1] E. Skrzypek, The quality of the education process at the university, *Quality Problems* 10 (2001) 13-22 (in Polish).
- [2] K. Lisiecka, The assurance of the quality of education at the university, *Economy University, Katowice*, 2001 (in Polish).
- [3] M. Dudek-Burlikowska, Quality research methods as a factor of improvement of preproduction sphere, *Journal of Achievements in Materials and Manufacturing Engineering* 18 (2006) 435-438.
- [4] E. Skrzypek, Quality in education – the conditions and factors of the success, *Quality Problems* 2/2006, 15-20 (in Polish). J. Michalska, Quality costs' analysis in the selected production process in material engineering, *Materials and Technologies* 3 (2005) 137-140 (in Polish).
- [5] M. Wiśniewska, The attempt of the definition and the implementing model, *Quality Problems* 9 (2007) 13-22 (in Polish).
- [6] <http://www.umbrella.org.pl/>
- [7] M. Piotrowski, *Quality in education*, ITE, Radom, 1999 (in Polish).
- [8] Ł. Sułkowski, M. Koszmider, The process analysis of education at the university, *Quality Problems* 11 (2004) 11-12 (in Polish).
- [9] B. Zduńczyk, M. Nigot, M. Roszak, Implementation of the Quality Management System in the chosen Department of Technical University, *Student Works of Scientific Circle 2* (2006) 3-8 (in Polish).
- [10] M. Urbaniak, *Quality Management. Theory and practice*. Difin, Warsaw 2004 (in Polish).
- [11] A. Mańka, T. Karkoszka, Realization of didactic service on the Department of Technical University, *Student Works of Scientific Circle 2* (2006) 37-42 (in Polish).
- [12] H.J. Harrington, *Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity, and Competitiveness*, Mc Graw-Hill Inc., New York, 2000.
- [13] M. Nikiel, J. Michalska, S. Topolska, Process approach in the implementation of the Quality Management System on the Department of Technical University, *Student Works of Scientific Circle 2* (2006) 15-22 (in Polish).
- [14] A. Gęsikowska, M. Dudek-Burlikowska, S. Topolska, Quality strategy of the Department of Technical University, *Student Works of Scientific Circle 2* (2006) 9-14 (in Polish).
- [15] J. Michalska, Using the EFQM excellence model to the process assessment, *Journal of Achievements in Materials and Manufacturing Engineering* 27/2 (2008) 203-206.
- [16] S.K. Ho, *TQM an Integrated Approaching – Implementing Total Quality through Japanese 5S and ISO 9000*, Kogan Page, London, 1996.
- [17] J. Michalska, D. Szewieczek, The improvement of the quality management by the activity-based costing, *Journal of Achievements in Materials and Manufacturing Engineering* 21/1 (2007) 91-94.
- [18] R. Karaszewski, *TQM theory and practice*, Dom Organizatora, Toruń, 2001 (in Polish).
- [19] T. Karkoszka, D. Szewieczek, Risk of the processes in the aspect of quality, natural environment and occupational safety, *Journal of Achievements in Materials and Manufacturing Engineering* 20 (2007) 539-542.
- [20] K. Lisiecka, *Quality creating*, Economy Academy in Katowice, Katowice, 2002 (in Polish).
- [21] T. Karkoszka, M. Roszak, Quality and environmental aspects in the technological process management, *Proceedings of the Conference "Projecting & Managing of the realisation of the production"*, Zielona Góra, 2005, 63-68 (in Polish).
- [22] J. C. Whitmore, *Coaching for Performance*, Nicholas Brealey, London, 2000.

- [23] M. Dudek-Burlikowska, Quality estimation of sale process with usage of quality methods in chosen company, *Journal of Achievements in Materials and Manufacturing Engineering* 20 (2007) 531-534.
- [24] R.S. Kaplan, R. Cooper, *Costs and effectiveness management*, ABC, Cracow, 2000 (in Polish).
- [25] J. Michalska, Factors creating quality management in the company, *Proceedings of the Conference INTELLECT 2005: „Intellectual capital as a chance to improve the quality management in the global circumstances”* UMCS, Lublin, 2005, 187-191 (in Polish).