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Enhancing Education Quality by Using the Quality System and Excellence System in Higher Education Institutions

1. Introduction

During the past decade, Czech universities have passed an array of important changes connected both with the change of political orientation and the convergence to the principles and legislation of the EU. Many things have changed – goals, sources, requirements, and conditions. The present management systems of universities do not reflect these changes, they still utilise the traditional principles and are deficient of any element of modern management.

The management of universities is based on the principles of “common law” that don’t correlate in most cases with the actual requirements of a dynamically developing society. Many problems and nearly standard situations are solved by an ad hoc way approach. In many cases there are no clearly defined responsibilities and authorities. The management systems are without the desired level of transparency and formalisation.

Currently, the universities are situated in a competitive environment. It is the principal reason why they have to be identified as organisations providing services that satisfy their customers. To lead and operate an organization successfully, it is necessary to manage it in a systematic and visible manner. Implementation of Quality Management System (QMS), as an inherent part of university management is a way to reach this aim. The new management of the VSB – Technical University of Ostrava (VSB – TUO) decided to implement QMS after their election and appointment in the first half of 2003.

VSB – Technical University of Ostrava

More than 150 years history of the VSB – Technical University of Ostrava is closely connected with the development of mining and metal extraction, which was the oldest industry in the Austro-Hungarian Empire. That is why the Emperor Frantz Josef I decreed (1849) that a mining vocational school be set up in Příbram for the northern countries, and another in Leoben for the southern countries of the

Empire. In 1904, the Příbram Academy was given the status of University – Vysoká škola báňská (VSB). The President of the Czechoslovakia, E. Beneš, issued a decree No. 49 on 8th September 1945 by which the university was transferred from Příbram to Ostrava. This ended the history of Příbram and opened a new era in the history of the university in Ostrava, the centre of widespread chemistry, heavy engineering and mining region.



Fig. 1. VSB-TU Ostrava campus

17th November 1989 was a historic event in the life of Czech universities and the whole society. Significant changes have been made at the VSB – Technical University of Ostrava (VSB – TUO). The reorganisation of all courses and the new provision of modern branches of study transferred the VSB – TUO to a modern polytechnic university.

The VSB –TUO currently consists of seven faculties:

- Faculty of Economics,
- Faculty of Civil Engineering
- Faculty of Mechanical Engineering
- Faculty of Electrical Engineering and Computer Science
- Faculty of Mining and Geology
- Faculty of Metallurgy and Material Engineering
- Faculty of Safety Engineering.

There are more than 19 000 students in bachelor degree, master degree and doctoral degree programmes in presence, distance and combined studies.

Implementation of Quality Management System at the VSB – Technical University of Ostrava

Currently there are two basic concepts of QMS:

- the concept of ISO 9000
- the concept of TQM.

The concept of ISO 9000 is a prescriptive approach based on International Standards ISO 9000 series.

These standards define what is necessary to do (ISO 9001) and how to do the things (ISO 9004). The ISO 9001 certificate is the way to communicate that the organisation implemented QMS successfully.

The concept of TQM is a non-prescriptive approach, more or less a philosophy. TQM is applied according to different models that enable the evaluation of the growth of QMS. The EFQM Model Excellence is used in Europe.

The existence of explicit defined guidance, which has been successfully verified many times in the industry, led to the decision to implement QMS at the VSB TUO according to the ISO 9000 concept. There are no principal reasons why the benefits of implementation of QMS in industry would differ in the case of a university. The decision was supported by the existence of ISO 9001 registration. The ISO 9001 certificate is an outstanding supporting material. It is evidence that a university is being properly managed, the needs of their customers are identified and the environment to satisfy them is established. To utilise the good practices from the industry the management of VSB – Technical University of Ostrava employed a quality manager who had had long-term experience with QMS implementation and maintenance at the first class manufacturing company that was awarded the Czech Republic National Quality Award 2001.

The VSB-TUO is a huge institution with a lot of various activities. The implementation of QMS in the whole organisation simultaneously could be risky. The experience from the implementation of QMS in the industry is not fully transmitted into the university environment. There are at least two important differences:

- The cycle time of product realisation is significantly longer than in the industry.
- The members of university staff and academic freedom.

It was the reason why we split the implementation of QMS into several stages. As each faculty is a relative autonomous part of the university, the first stage (2004) was the implementation of QMS at a selected faculty as a pilot project. This stage was successfully completed and the Faculty of Electrical Engineering and Computer Science was the first faculty in the Czech Republic that received the ISO 9001 certificate. The second stage (2005–2006) was the implementation of QMS at other faculties using the experience from the first stage. The final, on-going third stage (2007) is the implementation of QMS at the administrative and executive parts of the whole university.

Benefits of Implementing QMS at the University

The time from the beginning to implementation of QMS at the VSB – TUO is rather short in comparison with the cycle time of processes at the university (3 years for bachelor degree study programs plus 2 years for a master degree and plus another 3 years for doctoral degree). It is too early to evaluate the effect of adopting the ISO 9000 approach on the quality of university products. However, we recognise the improvement of university culture in the following areas:

- **Increased level of managing processes at the university**

It is the main asset. In the past, most standard situations were solved ad-hoc. QMS defines accurate rules.

- **Better set-up of activities inside the university, accurate definition of authority and responsibility**

- The process approach enables definition of activities and their relation inside the university with correspondence to authority and responsibility in a simple way.

- **Forcing the university to identify and satisfy the actual needs and expectations of their customers**

In some situations in the past, the university offered what their staff recognised as important. Actual needs and expectations of their customers could be different. QMS forces the university to identify and satisfy the actual needs of their customers.

- **Saving operating expenses**

A proper set-up of activities inside the university together with an accurate definition of authority and responsibility leads to elimination of wasted efforts and it brings savings in operating expenses

- **Improvement of educational processes**

Identification of the actual needs and expectations of university customers, evaluation of customer satisfaction, better set-up of activities inside the university leads to an improvement of educational process.

- **Improvement of competitive ability of university**

ISO 9000 registration is a competitive advantage. It is evidence that the university is properly managed, the needs of their customers are identified and the environment to satisfy them is established.

- **Increased proactive behaviour of employees**

The existence of defined procedures for problem solving (control of non-conforming products, corrective action, and preventive action) and tools for independent assessment of any designed process or activity (internal audit) leads the employees to proactive behaviour.

The Way to the TQM

The ISO 9001 approach is focused on customer needs. The university management system has to be oriented not only on their customers but also on their stakeholders (interested parties). ISO 9004 offers guidance for performance improvements by including the needs of stakeholders. But neither standard (ISO 9001 and 9004) offers an instrument for evaluating the maturity of management system. Therefore, we were looking for some efficient instruments for university management system assessment, which can describe the university life in a more complex way. Because we were focused on management improvement from the beginning and on the use of industrial standards, it is not surprising that we chose a very complex industrial quality assessment system based on the EFQM Excellence Model [1], see Figure 1. This model was also rearranged for education institutions [2, 3].

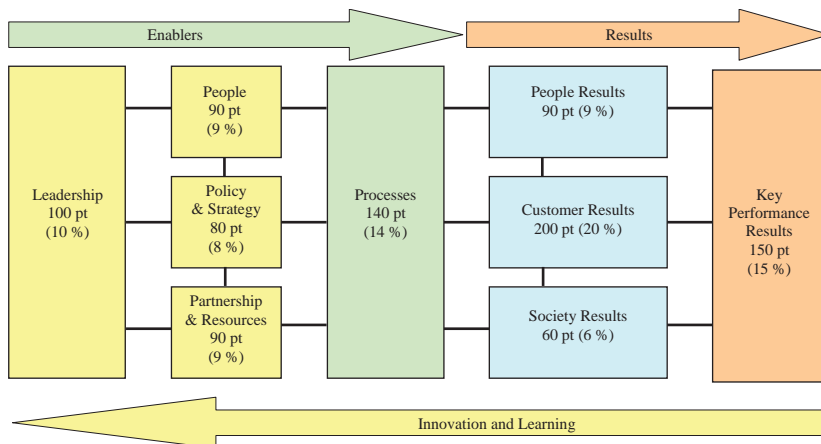


Fig. 2. EFQM Excellence Model [1]

The progress of implementing TQM at the VSB TUO is nearly the same as in the case of QMS implementation according to ISO 9000. We started at a selected faculty as a pilot project and we will continue at other faculties by utilising the experience from the pilot stage.

Significant motivation for orienting on complex quality comprehension was also represented by the Program of the Czech Republic National Quality Award, which was opened for the first time in 2006 to non-profit organizations and extended with two categories – based on the CAF Model and based on the EFQM Model Excellence.

The Faculty of Mechanical Engineering was the pilot faculty where we started the implementation of the TQM philosophy. This faculty applied for the Program of the Czech Republic National Quality Award 2006 – a partial assessment of performance of an organisation based on the EFQM Model Excellence.

The whole process of implementing the TQM approach was divided into the following steps:

1. Develop & retain commitment to faculty management.
2. Develop and deploy communication strategy.
3. Plan self-assessment.
4. Select and train people directly involved in the process of self-assessment.
5. Conduct self-assessment and write a self-assessment report.
6. Conduct an external evaluation of a self-assessment report by assessors from the Czech Republic National Quality Award followed by a site visit.
7. Consider outcomes & prioritise.
8. Establish & implement an action plan.

Many analyses were done during the self-assessment process and more than fifty interesting faculty performance and efficiency indicators were found. Ten of them were selected as a base for the benchmarking project with other technical faculties from the Czech Republic and other European Union countries.

Parallel to finishing the self-assessment report, the most significant weaknesses and threats were selected and analysed so that the activities for their quick removal could start. Many uncertainties were eliminated by new analyses of questionnaires for graduates, new students and unsuccessful students. Many external analytical projects were joined and supported, like REFLEX focused on students who had graduated in the past three years, graduate employability, students assessment projects realised by the ACSA – Academic Centre of Students Activities at the same time as at all universities in the Czech Republic.

Another important area which was omitted in the past was collaboration with suppliers; it especially means collaboration with high schools. The project called “Partnership with High Schools” was started at the end of the year 2006 by specific offers for their study support like special excursions to the faculty labs, university teacher lectures focused on actual technical problems and innovations and other real collaboration support. Based on the evaluation of self-assessment report, followed by the site visit by assessors of the Czech Republic National Quality Award, the Faculty of Mechanical Engineering was awarded as “Recognised for Excellence”.

The experience with implementing QMS in the university environment has been recognised as very interesting for all other technical universities, too.



Fig. 3. The received award

Faculty of Mechanical Engineering experience

The Faculty of Mechanical Engineering joined a project focused on applying the Quality Management System at the VSB – Technical University of Ostrava at the end of 2004 in concurrence with the pilot application of QMS at the Faculty of Electrical Engineering and Computer Science, which was the first faculty in the whole Czech Republic with a functioning QMS system. At the end of the successful certification of the QMS system at the Faculty of Mechanical Engineering in May 2005, it was clear that it would be a long way to fully implement all management instruments, especially those used by all faculty members at all management levels – these require a lot of work. The university management system is different from a typical company management system. The results obtained from the faculty QMS system have been very interesting for all other technical faculties. The main goals were presented at the International Conference on Engineering Education 2006 [4], 2007 [5], 2008 [6], 2009 [7], 2010 [8], 2011 [9] and as a part of the Excellence System faculty (best practices) [19]. It was very satisfying when representatives of two other technical faculties from the Czech Republic asked for cooperation meetings to transfer our results to their faculties. How important the quality assurance in higher education is, especially in the European Union, is described in many papers presented at previous ICEE conferences [2, 12, 17]. The use of quality management systems in higher education is more and more common, as is described in more and more papers, like [11, 14, 15, 16]. For us as a control system specialists it is also important that, thanks to process description, we are able to use modern analytical systems [10] for their analysis.

Our personal experience is that the most important thing is to change people's minds. It was very helpful to establish a special working group called “Quality

group”, joining the faculty members focused on the QMS system. The first problem for many of them was to meaningfully define the Faculty mission, vision and quality management needs. As the most important and also most helpful work, we indicated the identification and description of all processes. The UML (Uniform Modelling Language) Activity Diagrams had to be used as a suitable instrument for detailed process description. The first problem was to describe all processes according to all external rules and next to persuade all academics to work according to them. Although it was a surprise for us, many academics became accustomed to violate the hold rules as a result of “academic freedom”.

Next we were looking for other forms of developing the faculty management system, together with expanding the standard QMS instruments, such as processes risk analysis based on FMEA (Failure Mode and Effects Analysis), SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis as a background for significant decisions, the consistent utilisation of preventive and corrective measures. The QMS model based on ISO 9000 norms is oriented on suppliers and customers, but the university is complicated and depends on its academic staff, which means we at least have to focus on our employees. Then we were looking for some more complex system, which can describe the university management system more complexly. Since we were oriented towards the industrial standards from the beginning, it is not surprising that we chose the Total Quality Management system based on EFQM (European Foundations for Quality Management) Excellence Model [1]. An important aspect of the model is the detailed self-assessment methodology, usable for a faculty or university [13], which is compulsory in the Czech Republic for all state universities, according to the University Act.

Conclusion

The implemented QMS brings benefits both to customers of the university (students, employers, society) and the university itself. That is the reason why we started this process at the VSB – Technical University of Ostrava. The results of the implemented and certified Quality Management System at the VSB-TUO are very positive. The orientation on a complex quality system and the use of EFQM Excellence Model has improved the university life, their processes and efficiency. Achieving official recognition for the Faculty of Mechanical Engineering from the Program of the Czech Republic National Quality Award has been promoted by other faculties of the university. Thanks to this, we can recommend this way to all other technical faculties and universities.

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Abstract

The present paper describes the way of implementing Quality Management System (QMS) according to ISO 9001 at the VSB – Technical University of Ostrava and the experiences with its use. The implementation of QMS was executed as a four year project. The experience from the pilot project part (implementation of QMS at selected faculty) was utilised during the following application project part (implementation of QMS at the remaining of the faculties). The effect of adopting the ISO 9000 approach on the quality of products of the university has not been fully evaluated till this time, but a significant improvement of university culture has been recognised. The method used for evaluating all effects of adopting ISO 9000 at the university is a self-assessment according to the EFQM Model Excellence. The author's personal experience is also presented in the paper.

Key words: quality, excellence, higher education, EFQM

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