

THE USE OF THE MANAGEMENT METHODS ON THE FACULTY OF ENGINEERING OF THE UNIVERSITY OF DEBRECEN

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Abstract: In recent years there were significant changes in higher education. Because of the demographic changes the higher education institutions become in a competitive situation. For institutions was a challenge to introduce the Bologna system. During the training should be placed greater emphasis for the usefulness of the accumulated knowledge during the studies, in order to graduate students achieves successes in the labor market. In many countries are various measurement systems among graduate students and labor market in order to optimize the quality of trainings. The institutions of the higher education institutions had become in a competitive situation, and the concept of competitiveness has entered in the higher education as well, because one of the key figures of the knowledge-based economy are the engineers, as they provide the competitiveness.

INTRODUCTION

The Faculty of Engineering is one of the most dynamically developing institution of technical higher education in Hungary. There are nearly 3,000 students studying with the aid of 76 teachers and researchers in six departments at the level of Bachelor of Sciences and three at the Master of Sciences. In the recent years, many of our students took part in prestigious competitions and have achieved high rankings, while our carried out several national and international research projects. All of these results contributed significantly to the development of the quality of the education however, we attempt to modernize the infrastructure of the institution as well. Of certainly, the training in the field of the technical and engineering sciences, so we cooperate as closely and intensively with the actors and key factors of the region's labor market, local governments and companies as it is possible. Our main goal is that our graduated engineers and other professionals enter into the world of the labor and workforce, and with their knowledge and technical expertise to take part in the economical life of the region.

The Faculty of Engineering offers a number of technical qualifications and trainings: Bachelor of Science in Mechanical Engineering (HVAC and automotive specializations), BSc of Architectural Engineering, BSc of Civil Engineering, BSc of Environmental Engineering, BSc of Technical Manager (industrial and building industrial specialization) and BSc of Mechatronical Engineering. The MSc qualifications are as follows: Design Architectural Engineering, Facility Engineering and Environmental Engineering. The management of the Faculty has the priority to start trainings and qualifications, which are unique in the east of the Danube. The departments of the Faculty are: Department of Architecture, Department of Civil Engineering, Department of Facility Engineering, Department of Mechanical Engineering, Department of Environmental and Chemical Engineering, Department of Technical Basic Subject, Department of Management and Economics, Department of Electrical Engineering and Mechatronics.

The Faculty of Engineering of the University of Debrecen, like the other faculties of the university, had to perform its tasks amongst constantly changing internal and external conditions. However, in the next the national economic and demographic trends are expected to develop negatively, it is the for the development of the technical education. The decline of the prestige and popularity of the technical and engineering career experienced in the last 10 and 15 years is stopped, and even has reversed the process of

change, the increase of the interest for the economical important engineering training raises year by year. The Hungarian and international actors of the economy has already indicated their increased demand for the students of the engineering. So the Faculty of the Engineering is needed to make the conditions of the course of development.

The aim of the Faculty of Engineering is to turn into a "Faculty of Engineering Sciences", which will be able to become the technical center of the Northern Plains region, that is characterized by its value, quality, reliability, and activity. This present study is aimed to show the system and the management methods, which has the mission, that the Faculty may be capable to achieve the objectives.

1. THE QUALITY MANAGEMENT SYSTEM OF THE FACULTY OF ENGINEERING

The quality management model of the Faculty is based on the organizational self-assessment and it fits itself to the system of the University of Debrecen. The principle of the self-evaluation is the European Quality Award. The university has created and operated its quality assurance system since July 2004. The Faculty of Engineering has already begun to build its own system.

The aim of the development of the Faculty's quality management system:

- to keep the level of the education / training high, and its possible increasing,
- the effective and high quality performance of the research,
- the high-quality care of the social obligations of the Faculty of Engineering,
- the enhance of the operation's the efficiency,
- the increase the satisfaction of students, teachers, researchers, staff, employers of the graduates, the organizations, institution and partners associated with the Faculty, the maximal satisfaction of the demands.

The Faculty takes at the operation of its quality management system the following into account:

- the provisions of the always applicable of the Higher Education Act,
- the resolutions of the Hungarian Accreditation Committee, and its proposed criteria,
- the guidelines of the Ministry of National Resources to the quality management of the higher education,
- the mission of the Faculty of Engineering,
- international recommendations concerning the quality system, in particular with regard to the European standards of quality assurance in higher education, the document adopted in 2005 in Bergen, the „Standards and Guidelines for Quality Assurance in the European Higher Education Area” (hereinafter referred as ESG).

During the operation of the system of the Faculty the 21. § (2) of the Higher Education Act is taken into account.

The quality management system of the Faculty is built in three methodologies

- both the self-assessment model of the EFQM, that can appreciate the capabilities and achievements of the Faculty, identifies the areas in which development measures shall be established ;
- secondly, the Balanced ScoreCard is was used, which breaks down the mission and the strategy into specific objectives and indicators, and it sorts these in four different points: financial performance, customers, operational processes, learning and development;

- we plan, organize, monitor and evaluate our quality improvement projects in accordance with the PDCA cycle.

The Faculty conducts an organizational self-assessment twice a year, and the results shall designate the areas for improvement and with the aid of the Balanced ScoreCard (BSC) the, and these shall be arranged in accordance with the four different aspects of the BSC (Figure 1), and then starts its quality improvement projects according to the PDCA cycle.

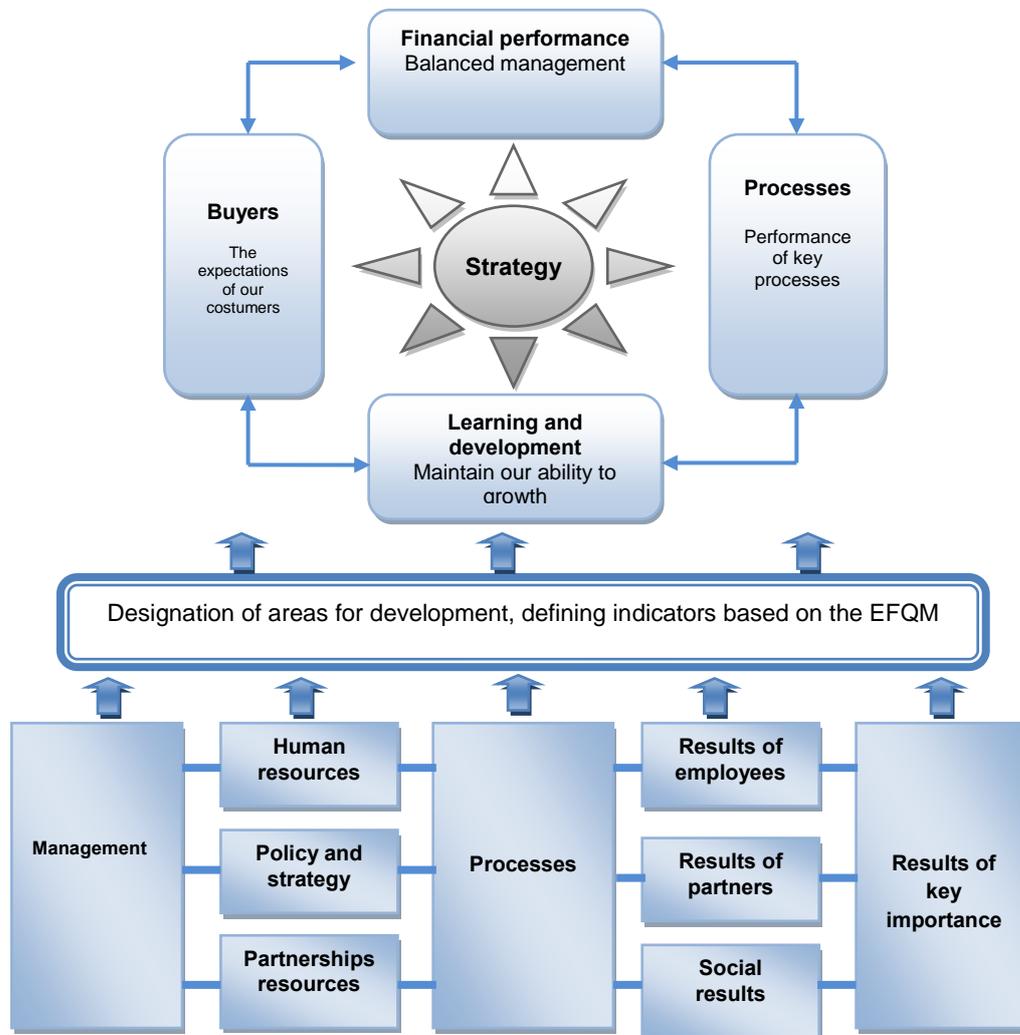


Figure 1. The model for the organizational development of the Faculty of Engineering

2. THE ROLE OF THE BALANCED SCORECARD IN THE SHAPING OF THE STRATEGY

The role of the Balanced ScoreCard:

- assist in clarifying, the formulation and measure of the vision and strategy;
- the BSC is a strategic performance measurement system, that links the strategic goals and indicators, and helps to communicate it them, making the strategy accessible for the colleagues;
- with the assessment of the allows a feedback about the operation of the certain departments;
- it makes for the Faculty possible for the examination of the reality of expectations;

- it can be connected to the EFQM and with its help may be the process of achieving excellence trackable.

Financial point of view: the use of the Balanced ScoreCard encourages us to coordinate our financial goals with the strategy. The financial goals are in the center of the objectives and indicators of the other perspectives. All of the indicators are the part of a causal chain that will eventually culminate in the improving of the financial performance. The Balanced ScoreCard should reflect the faculty strategy: starting with the financial goals, which are combined with the power necessary to achieve the desired long series of action in the field of the financial processes, customers, operational systems and employees. [2]

Customer perspective: as the result of the shaping of the BSC's customer perspective, the Faculty should see clearly the target customers (partners) and market segments, and their selected key performance records, in relation with the retention, acquisition and satisfaction of the customers. They determine the goals to be achieved. These indicators are post indicators, so the staff can only be informed about how to perform in the field of the customer satisfaction or customer behavior, when it is too late to influence the result.

Operational processes perspective: in this perspective, the leaders identify those crucial processes, in which the institution must provide superior performance to meet the objectives imposed by the maintainer and partners. The traditional performance evaluation systems put the emphasis to monitor and improve the costs, quality and time-based metrics of the existing operational processes. In contrast, the approach of the Balanced ScoreCard allows, that the needs for the performance of processes are derived by the Faculty from the expectations of the external stakeholders.

Due to the highlighted role of the educational and research process should the Faculty determine the cost, quality, time and performance, enabling the Faculty to provide excellent services.

Learning and development perspective: the Balanced ScoreCard is the fourth and last perspective contains such indicators that linked to the organizational learning and development. The financial performance determines according to the perspectives of the customer and operational processes, in which areas should the organization achievement a breakthrough to improve the performance. The goals of the learning and development perspective create the background, which allows the achievement of the targets in the other three perspectives. The objectives of the learning and development perspective promote the higher education institute, to achieve excellent results in the other three dimensions of the Balanced ScoreCard.

In the perspectives of learning and development are three basic categories:

- the skills of the staff;
- information systems;
- the motivation, the authorization and the conformity.

3. ORGANIZATIONAL SELF-ASSESSMENT BASED ON THE EFQM EXCELLENCE MODEL

Table 1. Leadership assessment:

Leadership	2009	2010	2011	University	Target value	Remedial action required y/n
The future trend	3,7	4,2	4,1	3,6	4	n
Example of the leadership	3,6	3,9	4	3,7	4	n
Knowledge of organizational operation	3,8	4,2	4,2	3,8	4	n
Taking into account the ideas of others	3,8	4,1	4,1	3,8	4	n
Relationships with colleagues	3,8	4,3	3,9	3,5	4	y
Representation of the Faculty	4,0	4,6	4,2	3,8	4	n
Flexible adaptation to the environment	3,9	4,1	4,1	3,6	4	n

Strengths:

- management defines clearly announced guidelines for the future;
- the managers show an example of the enforcement of the specific moral elements of the education;
- they make every effort to the recognition of the operation of the Faculty;
- they listen the ideas of others and help their realization;
- the management operates its network adequately, representing the interests of the Faculty;
- the leadership is able to adapt the future vision of the Faculty to the external changes.

Further improvement:

- development of a more effective relationship with the staff.

Overall, the leadership of the faculty received a significantly higher value to the assessment of the management than the university average. The management considers the principle of the collective decision-preparation and decision, the individual responsibility and performance evaluation.

Table 2. Strategy assessment:

Strategy	2009	2010	2011	University	Target value	Remedial action required y/n
Strategic planning	3,5	3,9	4	3,6	3,8	n
Specific task plan	3,6	3,9	3,9	3,3	3,8	n
Balance of objectives	3,1	4	3,8	3,2	3,8	n
Information provision	3,4	3,9	3,6	3,3	3,8	y
Flexible adaptation to the environment	3,6	4	3,9	3,5	3,8	n

Strengths:

- the process of the formulation of the strategy;
- the leaders ensure for the organization the specific terms of reference, which must be accomplished;
- the management makes the appropriate balance between the long- and short-term objectives, tasks and available resources;
- the management observes the internal and external changes and the will introduce the appropriate measurements.

Further improvement:

- a more detailed disclosure is necessary.

Overall, the Faculty received a significantly higher value to the assessment of the strategy than the university average.

Table 3. The indicators of the human resource management evaluation:

Human resources (HR)	2009	2010	2011	University	Target value	Remedial action required y/n
Performance expectations	3,6	4,1	4	3,7	3,9	n
Analysis of the needs of HR	3,3	3,7	3,6	3,3	3,9	y
Specific tasks	3,8	4	3,9	3,6	3,9	n
Career plan	2,5	3,3	3,4	2,8	3,9	y
Information provision/two-way communication	3,6	3,8	3,4	3,1	3,9	y

Strengths:

- support of the PhD students;
- the leadership defines the expectations against the Faculty and the staff;
- the management specifies the function, competence, and responsibility of the colleagues.

Further improvement:

- the faculty career planning system;
- clarifying the performance expectations;
- the two-way communication.

In summary, the implementation of the tasks of the Faculty is already started in the field of the workforce-management, are the following: the support of the doctoral students, the increase of the number of exchange programs, publication of the research results which are made by the involvement of the industry and the building-trade.

Partner relationship management: the partners are identified by their role in the implementation of the education and research, as well the operation of the Faculty. All of the players are regarded as partners, who determine the development of the Faculty. The co-operations in the framework of the partnerships are always are regulated by the contract. Our partners play a role in the everyday life of the Faculty.

Strengths:

- regulation of processes;
- the comparison of the Faculty's performance with other organizations;
- level of theoretical training;
- level of the organization of education;
- the activity of the students in the several research programs and its support.

Further improvement:

- allocation of resources to the processes;
- further development of practical training.

Table 4. Evaluation of processes

Processes	2009	2010	2011	University	Target value	Remedial action required y/n
Regulated processes	3,3	3,8	4	3,3	3,8	n
Controlled processes	2,9	3,5	3,7	3,4	3,8	y
Assignment of resources to the processes	3,4	3,4	3,7	3,3	3,8	y
Benchmarking	2,9	3,6	3,9	3,3	3,8	n
Tracking changes	2,8	3,4	3,5	2,9	3,8	y
Level of theoretical training	3,7	3,8	3,9	4	3,8	n
Level of practical training	3,3	3,5	3,7	3,4	3,8	y
Level of the organization of education	3,0	3,5	3,8	3,6	3,8	n
Activity in the student research programs	2,4	3,6	3,9	3,5	3,8	n
Publication activity	2,9	3,1	3,6	3,5	3,8	y
R+D (research and development)	2,8	3,5	3,8	3	3,8	n

4. THE SATISFACTION OF THE LABOUR-MARKET

The Department recognizes that the satisfaction of the labor market is one of the most important measurement tools of our educational programs. The Faculty in accord with the University has began to develop its Graduate Career Monitoring System. The Faculty of Engineering is in competition due to the demographic changes as well. Beside the process of training should be given a greater emphasis that the the knowledge received by the Faculty would be successful in the qualified attainment of the work and the career starting of the graduates. In several European countries various instruments were carried out amongst the graduates and the players of the labor market in order to improve by the feedbacks the quality of the education processes.

Table 5. The opinion of the participants of the labor-market

Labour-market	2009	2010	2011	University	Target value	Remedial action required y/n
Theoretical training	4	4	3,9	4,3	4,3	y
Practical training	3,7	3,9	3	3,5	3,5	y
Language skills	3,1	3,3	3,2	3,3	3,3	y
Computer skills	3,8	4	4,2	3,7	3,8	n
Self-employment	3,3	3,3	3,4	3,6	3,6	y
Organization ability	3,4	3,8	3,4	3,5	3,5	y
Communication	3,6	3,7	3,6	3,9	3,9	y
Problem solving skills	3,7	3,7	3,5	3,8	3,8	y
Treatment with people	3,4	3,8	3,4	3,7	3,7	y
Level of training	4	4,2	3,6	4	4	y

The Faculty of Engineering examined also in the framework the TUNING project specific competencies. In the TUNING project are three general competencies

distinguished: instrumental skills (cognitive, methodological, technological and language skills); interpersonal skills (self-expression, cooperation and other social skills); system skills (ability of combination, abilities regarding to the transformation of the whole system) [1]. The project is setting ten instrumental, eight interpersonal and twelve system competencies.

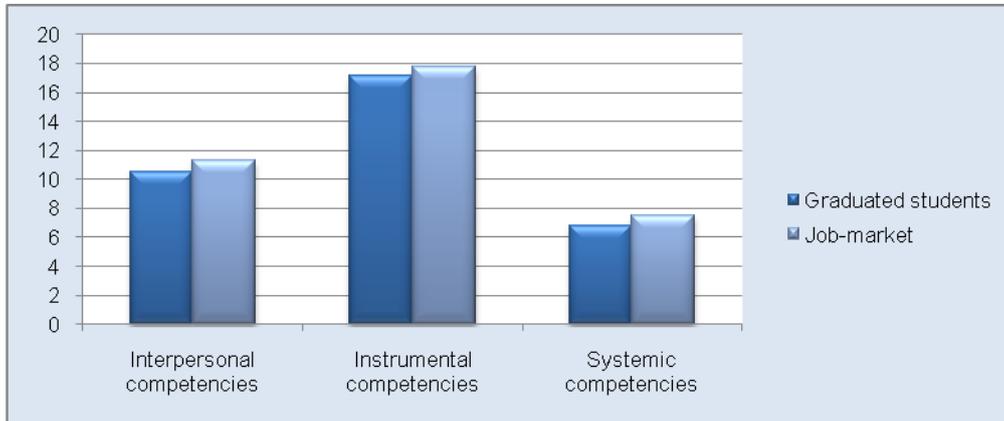
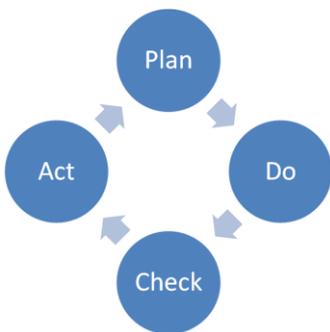


Figure 2. The comparison of the reached scores on the IT-, IN-, R-dimensions in the labour-market (and amongst the graduate students)

The actors of the labor market in all related factors are more satisfied than graduates, there are particularly significant differences in the assessment of the computer science and computational problems. There is also another significant difference in the S factor (system competencies) between the two groups using the Mann-Whitney test ($p = 0.037$).

The Faculty of Engineering of the University of Debrecen implements its quality improvement projects according to the principle of the PDCA.



The PDCA is a closed effect-chained, permanently continuous cycle-process principle, which may be applied on any activity, process, system, operation, conception, idea. In the international literature it is called as Deming's Cycle, PDCA Wheel, PDCA Cycle or PDCA Loop.

Figure 3. PDCA cycle

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