

Functioning of the university focused on the quality and continuous improvement

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ABSTRACT

Purpose: A new approach to the functioning of quality management system at university focused on the quality has been presented.

Design/methodology/approach: The profits resulting from possessing of Quality Management System certificate in higher education has been proposed.

Findings: At the present time the educational organizations should implement Quality Management Systems, and next they should try to find a possibility of estimation of this System, and the same acting according to Deming's principles introduce philosophy of total quality management.

Research limitations/implications: Generally definitions of quality educational has been described. Quality of university should implement to integrate aspects based on the quality criterion which will allow the entire organizational system of university to achieve the optimum level of the quality, of the high effectiveness and the innovation, and proquality action should include the entire organization.

Practical implications: The possibility of implementing Method of Averaging Quality Groups of Rating as a factor of improving of university functioning has been shown.

Originality/value: Implementing the Method of Averaging Quality Groups of Rating has been a new approach for estimating quality of university. Design the quality pattern of Criterial Model of the Evaluation of Quality University and calculate the index of quality of scientific organization become the kind of monitoring the entire university oriented on the quality.

Keywords: Quality management; Quality of university; Educational quality; Method of Averaging Quality Groups of Rating; Pattern of Criterial Model of the Evaluation of Quality University

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1. Introduction

Implementation, maintenance and improving the efficiently functioning Quality Management System in the organization doesn't constitute the exclusive domain large industrial enterprises at present, but is a standard amongst of large number of

organizations representing almost all industries of the economy [1-3].

In occurring conditions of transformations on the educational market and the intensifying competition, universities are subject to many transformations. These transformations are caused by constant adaptation to existing and changing conditions, and above all to the labour market.

At the same time intense desire for achieving planned – purposes of the success - is possible only at such a university, which cares for its continuous improvement and the same time fulfilling increasing expectations and requirements of own customers [4-6].

At present one of crucial elements of the strategy of managing the university, its monitoring, and assessing its quality is implementation, certificating and supporting the efficiently functioning Quality System Management in accordance with the standard PN-EN ISO 9001:2009.

Awareness of improving the implemented and certificated Quality System Management at universities enables providing didactic activities on high level of teaching thanks to: employing the appropriately qualified scientific staff, exploiting the modern infrastructure, and in it appropriate quantity of equipped laboratories and didactic rooms.

Increasing the attention paid to didactic activities, such as intellectual background and the infrastructure give the chance of verifying the theoretical knowledge of the student with the practical knowledge, on increase the speed of acclimatizing of university graduate to work conditions on the market.

2. Quality of the university

At present there is no formal definition of the quality of education, so in many studies this aspect is determined as quality management, quality assurance, the culture of the quality of university [7-9].

However, in the literature there exist many proposals of this definition.

For example:

- „the quality should be understood as the result of the awareness of surrounding reality, but what is more essential, awareness of the future. Accepting of such a concept the quality is gaining the special significance in case of higher education institutions. The university is obliged today to offer such syllabuses which tomorrow will have a positive effect on the quality of the life of its graduates and the quality of the life of the society at all” [10];
- „the quality in the educational process is achieving state in accordance with aims put on in the context of requirements of educational programme and social expectations. Quality in the general sense however is to correct what can be corrected. Every institution is supposed in the deliberate and organised way to act for the quality, as the constantly present value in the sphere of the education. (.). Quality of the education is an skill of building the ability to assimilate knowledge in the area of educational needs and the implementation of this knowledge for creating mechanisms allowing for meeting expectations of recipients and of educational services. Amongst people interested in quality of the education we should distinguish students, the scientific staff and employers” [11];
- „the quality of the university is a level, in which a set of technical and functional factors being characteristic for universities and processes carried out in it administrative, organizational, research, didactic and education, influences

satisfying of needs and the development of the student (doctoral student, listener), as well as of the entire academic community, in all possible ways (intellectual, public, psychological and moral), according to requirements and expectations of everyone interested in this” [12].

Taking mentioned above definitions into consideration, the quality of university should implement aspects based on the quality criterion which will let the entire organizational system of university to integrate on getting the optimum level of the quality, of the high effectiveness and the innovation, and proquality action should include the entire organization [13-14].

So a fact is being confirmed, that for the accomplishment of pro-quality tasks the quality management system in accordance with the series PN-EN ISO 9000:2008 standards should become known in the given educational organization [15].

Implementing this system will enable to provide didactic activities of the highest level and therefore will meet expectations of its customers defined as: current and potential students and potential employers.

The Quality Management System is also a confirmation that processes carried out are proceeding in the constantly supervised and improving conditions.

Appropriate level of the quality of the education of certificated university can be obtained on the completion of outside and internal actions (Fig. 1), and these action thanks to the Quality Management System can be characterized by a larger added value resulting from their realization [16-18].

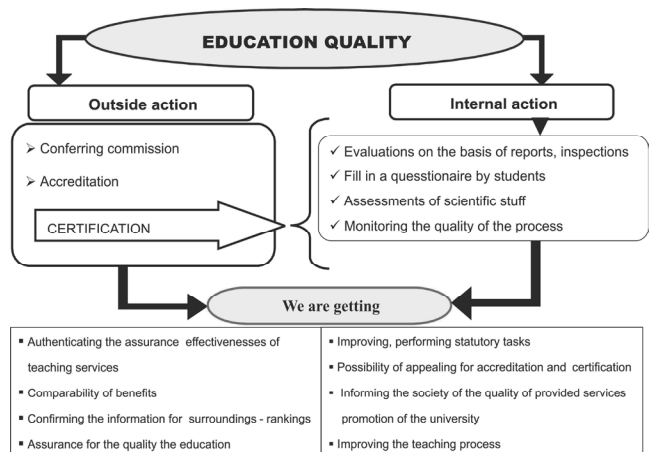


Fig. 1. Activities aimed at ensuring the quality of education [17]

3. Benefits for university resulting from possession of the implemented and certified Quality Management System

Possession of implemented and certificate Quality Management System by the university is objective proof of involvement of the organization into quality management.

Additionally it is a proof of the positive evaluation by the independent certificating organization and it is in accordance with requirements of the PN-EN ISO 9001:2009 standard.

The benefits from functioning and improved Quality Management System of the university are both visible for employees of the university as well as their customers i.e. students and employers. Above all they are [4, 16, 17]:

- Streamlining functioning of the university and its management;
- The transparency, the legibility of the division of the responsibility and entitlements;
- Rise motivation and engagement of employees, in the same process of raising the awareness based on the quality amongst employees. Shaping the attitude amongst employees: of regularity, reliability, planning, improving, team action, cooperation and mutually good of relation among oneself;
- Documentation of processes - elaboration the map of processes;
- Formalizing quality purposes, elaboration the quality policy and the quality mission;
- Increasing the flexibility of the flow of information;
- Paying special attention for the purposes of the customer, fulfilment of their requirements and expectations;
- Increasing the competitiveness;
- Continuous improving processes;
- Preventing of appearing of mistakes.

Changing environment and the demand for the knowledge are confirming the need to implement and certificating Quality Management System by university, additionally the resulting benefits are confirming in the belief for rightness of the change of the management style with university directed to the quality.

4. Evaluation of the quality of the organization – university - having Quality Management System

The organization as the system of well-defined actions, from a quality point of view can be better or worse. In determined conditions there exists a possibility of designing such an organizational system which could become standard [18-20].

So in such circumstances there exists urgent social demand for methods, which enable objective determination of the level of the quality of the organizational structure and the activity of enterprises [21].

On the usefulness of that kind of methods decide: their objectivity, the versatility, the complexity, the simplicity, the communicativeness and the efficiency [18-19].

Taking into consideration the influence of the university on the quality of the education and the level of intellectual capital of students and graduates, we can exploit Method of Averaging Quality Groups of Rating (UZJ) [13, 19-21].

This method is intended for analysis of the level of the quality of the organization.

Depending on the need, different criteria of the quality can be applied in individual rating groups.

For the university the following groups of quality criteria were defined:

A Group - The Customer requirement:

- experienced scientific staff,
- availability of the accommodation,
- adaptive a timetable,
- wide selection of courses,
- status of the university,
- possibility of getting scholarships,
- possibility of developing one's interests,
- possibility of trips abroad,
- good training for entering the labour market.

B Group - Parameters of the Didactic and Scientific Process:

- number of lecturers/professors,
- equipment of laboratories and didactic rooms,
- number of cooperating foreign universities,
- number of industrial partners,
- number of places in hostels,
- allocated funds for scholarships,
- per cent of graduates which are working in the profession,
- number of objects and sports clubs,
- number of student scientific group,
- number of lecture halls,
- number of laboratory and didactic rooms.

C Group - Realization of Quality Purposes:

- number of candidates per place at the university,
- questionnaire form amongst students concerning defining reasons of choice of the university,
- systematic control of the amount of received scholarships,
- ranking of the university,
- research activity of scientific staff,
- number of an academic titles obtained the university,
- results of questionnaire surveys conducted at the university,
- possibility of email contact with authorities for students.

D Group – Human-factors and ergonomic:

- cleanness of rooms,
- quality of interiors,
- work hygiene,
- external appearance,

- safety of the work,
 - well equipped lecture halls and laboratories,
 - applying principles of the ergonomics.
- These groups constitute the base of Criterial Model of the Evaluation of Quality of University having implemented and certified the Quality Management System.
- The essence of analysis of the quality of university according to the proposed method is getting to [20-21]:
- designing quality pattern of Criterial Model of the Evaluation of Quality of University,
 - using quality universal scale of relative states (Fig. 2),
 - calculating of dominated discriminant rated $X = A$ (or B,C,D,E) (1) – this discriminant allows for significance dominance of individual criterions,
 - calculating total significance index ZX ,
 - determining maximum and minimum of value of total significance index,
 - calculating modulus of individual significance ratings,
 - calculating quality index of scientific unit.

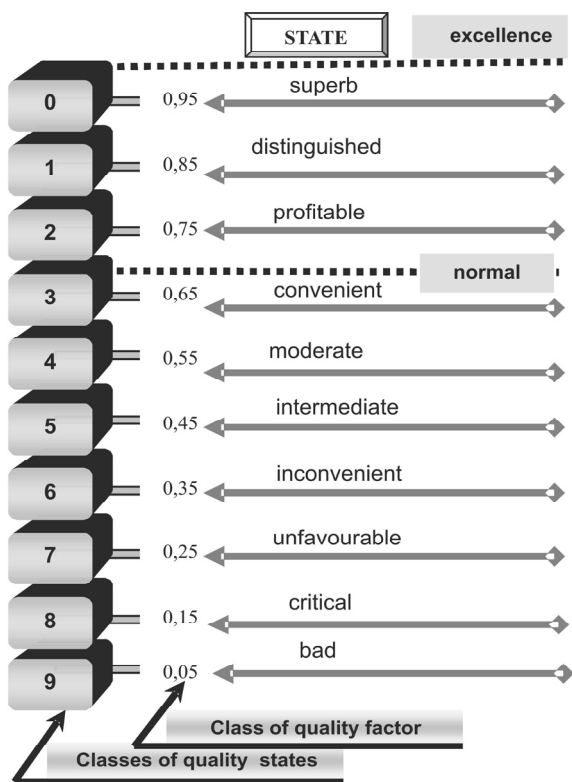


Fig. 2. Quality universal scale of relative states [20, 21]

Individual stages of the realization of Criterial Model of the Evaluation of Quality of University were described in Figure 3.

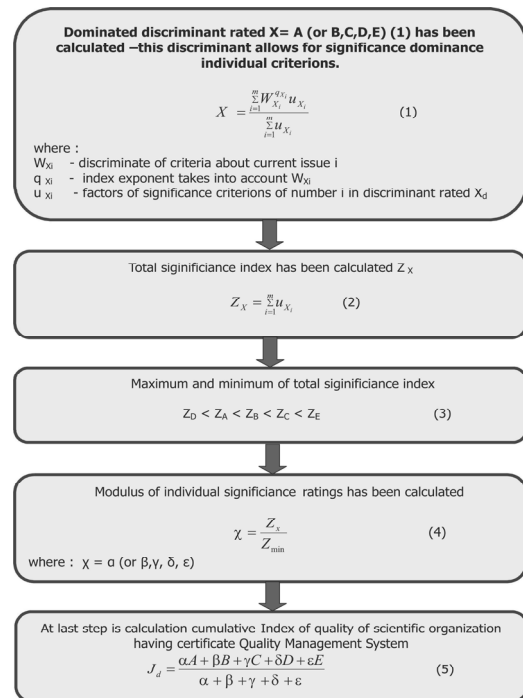


Fig. 3. Stages of the realization of Criterial Model of the Evaluation of Quality of University

After making analytical action streamlining the organization consists in seeking the optimum level of it quality.

5. The example of the quality evaluation of the scientific unit – university with the application of the Method of Averaging Quality Groups of Rating (UZJ) and the designed pattern of criteria

For the evaluation of the quality of the scientific organization at the university Method of Averaging Quality Groups of Rating (UZJ) was used. According to suggested above groups of criteria, the pattern of criteria for the scientific organization consists of four groups: *A Group - The Customer requirement, B Group - Parameters of the Didactic and Scientific Process, C Group - Realization of Quality Purposes, D Group - Experiential and Functional Structure.*

Criteria along with discriminate of criteria / Wx_i / and discriminant rated / $X =$ and (or appropriately B, C, D) / and factors of significance criterions of number / u_i / have been presented in Table 1.

Table 1.

Criteria along with discriminate of criteria / Wx_i / and discriminant rated / $X = A$ (or appropriately B, C, D) / and factors of significance criteria of number / u_i /

CRITERIA	Wx_i					u_i					
	I	II	III	IV	V	I	II	III	IV	V	
<i>A Group - The Customer requirement</i>											
Availability of the accommodation	0.8	0.9	0.9	0.9	0.9	1.25	1.11	1.11	1.11	1.11	
Adaptive a timetable	0.85	0.85	0.85	0.85	0.85	1.18	1.18	1.18	1.18	1.18	
Wide selection of courses of study	0.45	0.55	0.65	0.65	0.65	2.22	1.82	1.54	1.54	1.54	
Status of the university	0.55	0.65	0.7	0.7	0.7	1.82	1.54	1.43	1.43	1.43	
Possibility of getting scholarships	0.75	0.8	0.8	0.85	0.9	1.33	1.25	1.25	1.18	1.11	
Possibility of developing one's interests	0.8	0.8	0.8	0.8	0.8	1.25	1.25	1.25	1.25	1.25	
Possibility of trips abroad	0.9	0.9	0.9	0.9	0.9	1.11	1.11	1.11	1.11	1.11	
Good training for entering the labour market	0.95	0.95	0.95	0.95	0.95	1.05	1.05	1.05	1.05	1.05	
Experienced the scientific stuff	0.78	0.8	0.85	0.85	0.85	1.28	1.25	1.18	1.18	1.18	
						sum u_i	12.50	11.56	11.09	11.02	10.96
<i>B Group - Parameters of the Didactic and Scientific Process</i>											
	I	II	III	IV	V	I	II	III	IV	V	
Number of lecturers/professors	0.85	0.85	0.85	0.85	0.85	1.18	1.18	1.18	1.18	1.18	
Equipment of laboratories and didactic rooms	0.65	0.65	0.7	0.76	0.8	1.54	1.54	1.43	1.32	1.25	
Number of cooperating foreign universities	0.7	0.75	0.8	0.8	0.8	1.43	1.33	1.25	1.25	1.25	
Number of industrial partners	0.3	0.45	0.55	0.55	0.55	3.33	2.22	1.82	1.82	1.82	
Number of places in hostels	0.9	0.9	0.9	0.9	0.9	1.11	1.11	1.11	1.11	1.11	
Allocated funds for scholarships	0.6	0.6	0.6	0.6	0.6	1.67	1.67	1.67	1.67	1.67	
Per cent of graduates which are working in the profession	0.6	0.7	0.8	0.8	0.84	1.67	1.43	1.25	1.25	1.19	
Number of objects and sports clubs	0.75	0.75	0.75	0.75	0.75	1.33	1.33	1.33	1.33	1.33	
Number of student scientific group	0.6	0.67	0.8	0.85	0.87	1.67	1.49	1.25	1.18	1.15	
Number of lecture halls	0.6	0.65	0.7	0.7	0.75	1.67	1.54	1.43	1.43	1.33	
Number of laboratory and didactic rooms	0.6	0.6	0.7	0.7	0.75	1.67	1.67	1.43	1.43	1.33	
						sum u_i	18.25	16.51	15.14	14.96	14.61
<i>C Group - Realization of Quality Purposes</i>											
	I	II	III	IV	V	I	II	III	IV	V	
Number of candidates per place at the university	0.6	0.6	0.67	0.6	0.6	1.67	1.67	1.49	1.67	1.67	
Questionnaire form amongst students concerning defining reasons of choice of the university	0.6	0.7	0.7	0.74	0.75	1.67	1.43	1.43	1.35	1.33	
Systematic control of the amount of received scholarships	0.68	0.68	0.7	0.72	0.73	1.47	1.47	1.43	1.39	1.37	
Place in the Ranking of the university	0.75	0.8	0.8	0.8	0.85	1.33	1.25	1.25	1.25	1.18	
Research activity of scientific staff	0.6	0.65	0.67	0.7	0.78	1.67	1.54	1.49	1.43	1.28	
Number of an academic titles obtained the university	0.6	0.67	0.67	0.67	0.67	1.67	1.49	1.49	1.49	1.49	
Results of questionnaire surveys conducted at the university	0.7	0.73	0.78	0.8	0.8	1.43	1.37	1.28	1.25	1.25	
Possibility of email contact with authorities for students	0.6	0.7	0.8	0.84	0.88	1.67	1.43	1.25	1.19	1.14	
						sum u_i	12.57	11.65	11.12	11.02	10.71
<i>D Group - Human-factors and ergonomics</i>											
	I	II	III	IV	V	I	II	III	IV	V	
Cleanness of rooms	0.65	0.7	0.7	0.85	0.85	1.54	1.43	1.43	1.18	1.18	
Quality of interiors	0.7	0.7	0.7	0.7	0.9	1.43	1.43	1.43	1.43	1.11	
Work Hygiene	0.75	0.75	0.8	0.8	0.81	1.33	1.33	1.25	1.25	1.23	
External appearance	0.75	0.75	0.75	0.8	0.8	1.33	1.33	1.33	1.25	1.25	
Safety of the work	0.8	0.8	0.8	0.8	0.8	1.25	1.25	1.25	1.25	1.25	
Well equipped lecture halls and laboratories	0.7	0.75	0.8	0.8	0.8	1.43	1.33	1.25	1.25	1.25	
Applying principles of the ergonomics	0.75	0.75	0.75	0.75	0.75	1.33	1.33	1.33	1.33	1.33	
						sum u_i	9.65	9.44	9.27	8.94	8.61

The numbers I, II, III, IV, V, considered individual variants were indicated. I –indicates the individual before implementation the Quality Management System, II- V means the individual estimation after implementation the Quality Management System, one by one: the 6 months - II variant, the one year - III variant, the two years - IV variant, the three years - variant V.

Having collected above data, discriminant rated / X = A (or appropriately B, C, D) characteristics were counted one by one for: A Group - The Customer requirement, B Group - Parameters of the Didactic and Scientific Process, C Group - Realization of Quality Purposes, D Group - Experiential and Functional Structure (Table 2)

Table 2.
Discriminant rated for individual criteria

Group	CRITERIA	NOMINAL- DISCRIMINANT RATED				
		X = A (or appropriately B, C, D)				
		I	II	III	IV	V
A	The Customer requirement	0.72	0.78	0.81	0.82	0.82
B	Parameters of the Didactic and Scientific Process	0.55	0.61	0.66	0.67	0.68
C	Realization of Quality Purposes	0.64	0.69	0.72	0.73	0.75
D	Experiential and Functional Structure	0.52	0.53	0.54	0.56	0.58

In analysis nominal- discriminant rated were taken into account: A, in addition the importance of criteria was B, C, D diversified, therefore total significance index of Z_X has been calculated according to the pattern 2 (Table 3).

Table 3.
Total significance index Z_X

Group	CRITERIA	Total significance Index Z_X X = A (or appropriately B, C, D)				
		I	II	III	IV	V
A	The Customer requirement	12.50	11.56	11.09	11.02	10.96
B	Parameters of the Didactic and Scientific Process	18.25	16.51	15.14	14.96	14.61
C	Realization of Quality Purposes	12.57	11.65	11.12	11.02	10.71
D	Experiential and Functional Structure	9.65	9.44	9.27	8.94	8.61

Assuming that Indexes of totals significance Z_X will create the numerical sequence, with ease we will determine the maximum and minimal rate of Indexes of totals significance Z_X for the given case.

Calculated total significance Index Z_X is shown in Table 4 (pattern 3).

Table 4.
Rates of the importance of individual hallmarks

I	$Z_D < Z_A < Z_C < Z_B$				
	$Z_D = Z_{min} = 9.65$	$Z_B = Z_{max} = 18.25$			
	$\delta = 1$	$\alpha = 1.29$	$\gamma = 1.3$	$\beta = 1.89$	
II	$Z_D < Z_A < Z_C < Z_B$				
	$Z_D = Z_{min} = 9.44$	$Z_B = Z_{max} = 16.51$			
	$\delta = 1$	$\alpha = 1.22$	$\gamma = 1.23$	$\beta = 1.75$	
III	$Z_D < Z_A < Z_C < Z_B$				
	$Z_D = Z_{min} = 9.27$	$Z_B = Z_{max} = 15.14$			
	$\delta = 1$	$\alpha = 1.12$	$\gamma = 1.19$	$\beta = 1.63$	
IV	$Z_D < Z_A = Z_C < Z_B$				
	$Z_D = Z_{min} = 8.94$	$Z_B = Z_{max} = 14.96$			
	$\delta = 1$	$\alpha = 1.23$	$\gamma = 1.23$	$\beta = 1.67$	
V	$Z_D < Z_C < Z_A < Z_B$				
	$Z_D = Z_{min} = 8.61$	$Z_B = Z_{max} = 14.61$			
	$\delta = 1$	$\gamma = 1.24$	$\alpha = 1.27$	$\beta = 1.69$	

After calculating index of totals significance, they proceeded for calculating modulus of significance individual ratings of the quality about the third step moving closer in reconstructing the state collective, applied in the case of different importance of the criterion of the quality and determining cumulative quality index of scientific organization J_D according to the pattern (4).

After making analytical action, achieved results were calculated in percentage terms and they were put together in the following table and on the graph (Table 5; Fig. 4).

Table 5. The value of Index of quality of scientific organization having certificate Quality Management System

Index of quality of scientific organization having certificate Quality Management System	I	II	III	IV	V
J_D [0.00....]	0.61	0.65	0.68	0.7	0.71
J_D [%]	61%	65%	68%	70%	71%

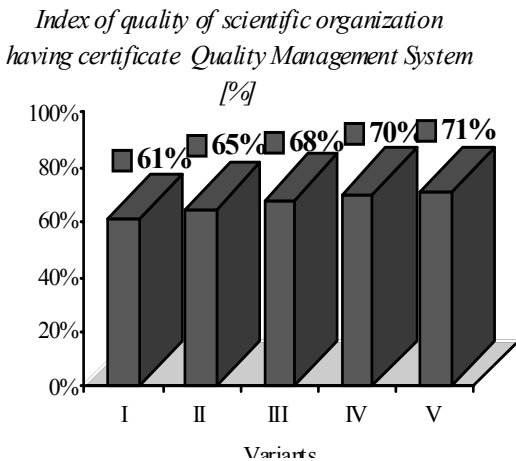


Fig. 4. Percentage value of five variants of Index of quality of scientific organization having certificate Quality Management System

6. Summary

Implemented and certificated Quality Management System at the university is becoming a form of expressing and fulfilling the management system. Above all it includes action from the general scope of the management which are deciding on the quality policy, quality aims and tasks for individual departments of the university.

Implementing the Quality Management System should be treated as the undertaking, allowing for conducting works independently of the organizational structure.

The System should be appropriately planned, organised, directed, controlled.

Today students, having a lot of universities to choose from perform thorough evaluation - through analysis of individual aspects of managing the university.

Therefore it is very important for the university to have a certified Quality Management System in accordance with requirements PN-EN of ISO 9001:2009 standard. This standard provides competent and rational managing processes, with accessible resources.

The university being an element of many different systems, requires the constant quality improvement of its managerial functions based on the criterion of the quality. Effective model of evaluation of current situation will allow future improvement of internal processes.

In the presented article an innovative evaluation of university having certificated Quality Management System has been presented. This approach exploiting the individual defined pattern of Criterial Model of the Evaluation of Quality University.

It was found that in the analysed scientific organization out of five considered variants of the quality evaluation for its, calculated index of the quality - amounted appropriately to 61%, 65%, 68%, 70%, 71%. Achieved values of the quality index prove constant improving the organization mentioned above.

Correctly functioning Quality Management System and its individual elements, often constitute the factor deciding on the success of the university on the domestic, as well as international educational market.

In accordance with new edition of standards ISO 9000:2000, ISO 9001:2008, ISO 9004:2000 is based on the process approach during preparation, implementation and improvement of effectiveness of quality system management aiming at increase of the customer's satisfaction by fulfillment of requirements [3-5].

And the same, such approach show a level of fulfilling needs and requirements of it customers – students and employees. Understanding and satisfying needs of the customer have the most important effort for reaching optimum level of quality education, which offered to the customer. As well as it will have great influence on the quality of the life of the student.

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