DOI https://doi.org/10.35219/rce2067053293

Use of the Six Sigma Model for Improvement and Management of top Performance of Public Administration and Training Institutions

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In many Member States the recruitment procedures and career systems for the specific target group of top public managers differ from the general or main employment system. To improve their TPM, the Member States with a career-based employment system are moving in the direction of a position-based system for TPM positions. This would allow them to select candidates for short-term appointments on the basis of merit and performance and from outside the own organisation, corps or pool. Member States with position-based systems for TPM are tending to move elements of the system towards the career-based system, so as to ensure some kind of career path for their best employees and to strengthen the corporate identity of the group. Educational institutions were forced to give up traditional systems, focusing on certain ages and models of training, and to think of alternative methods of providing educational products and services, technologies that could facilitate their access to new market segments. These changes determined the orientation of the training providers to the special needs of the beneficiaries, the identification of the unmet needs, but also to the creation of other needs, in the idea of developing the long term activity. Starting from the necessity of perfecting the means by which the education system can contribute to the formation, influence and development of the human society, educational marketing has gradually been structured as a new conception of approaching the educational activities.

Keywords: Strategy training, service management, Total Quality Management; Performance;

JEL classification: I25, I28, M31, M53, Z18

1. Introduction

Romania has to quickly reappraise the approach of the training services, to identify the real needs of the employers, of its population, and to elaborate short, medium and long term action programmes, based on the employment demand and offert, on the resources available in order to enhance the accessibility, acceptability and equity conditions. Education, the prioritary domain of the social life, on which the trained-by-studies man depends, must not encounter failures. Therefore, it is imperious that the management and the efficiency of the education system be based on the knowledge of the the educational management. The issue of the preuniversitary education management has become significant for the nowadays social media, in which all the aspects of education have as starting points the quality and efficiency of the educational systems and activities. The European framework of reference for the ensurance of the quality of the professional training must be taken into consideration on the level of the system of education and professional training, of the education and professional

training providers, as well as of the qualifications acknowledgement. The focus appers to be on the quality monitorisation and emprovement by combining the internal and external evaluation, the evaluation and the improvement processes. The monitorisation and the improvement of the quality are to be stressed on, by combining both the internal and external evaluation, and the evaluation process and the processes of improvement, each of them being sustained by a quantitative and qualitative analysis. Finally, it is imperious necessary the elaboration of a complex method of evaluation of the performances of the total quality management on the field of the education/ continuous training system, thus leading to the establishment of the directions of emprovement of the performnaces as well as their implementation throughout the education institutions.

The problems appeared in the education management are mostly due to the multiple changes and the educational actors' incapacity to adapt to and accept these changes. In what concerns the development of the preuniverstarin education both on national and European levels the most important issue is the one regarding the typology of the managerial framework adequate to this domain. Upto nowadays, the researche as well as the studies of speciality are pretty low quantatively speaking, whereas the existent ones are mostly based on the characteristics of the educational process than on the director's behavior and managerial activity. School managers must know the specific management methods and the technics, in order to be able to resolve the vast problems they have to face that require for certain knowledge. An interdisciplinary approach can surpass the argumentation limits in order to convince the educational rulers that a management based on the correct use of the specific methods and technics will lead to progress and performance in education. The objectives have in view the phenomenon understanding, analysis, explication and optimization in the scholar management, and at the same time, the improvement of the intervention technics, the increase of the quality and performance during the managerial process. The total quality management is an important instrument, still understudied by innovative and avant-garde strategies.

2. Literature Review

TQM is a way to improve the performance continuously at each level of operation or process of each functional area of the organization using available resources and capital (Gaspersz, 2001). The benefits of TQM are for improvement: quality, employee participation, teamwork, employment relationships, customer satisfaction, employee satisfaction, productivity, communication, and market share (Besterfield, 2009). The significant components in the implementation of TQM planning model are: a quality assurance instrument and the implementation of quality management actors, an understanding of quality management by all parties in higher education, benchmarking, education and training in quality management, leadership, reward and punishment, evaluation process, and an Integrated Management Information System. These measurements are carried out continuously at each level of operation or process of each functional area in an organization using available resources and capital. Good quality management can make a real contribution to the continuous improvement of all activities with Plan, Do, Check and Action (PDCA) methods at every level of management. Six Sigma is a set of statistical tools adopted within the quality management to construct a framework for process improvement. (Goh and Xie, 2004; McAdam and Evans, 2004) Six Sigma has evolved to become an extension to Total Quality Management (TQM). (Green, 2006) General Electric defines Six Sigma as a highly disciplined process that helps them focus on developing and delivering near-perfect products and services.

In many organizations, Six Sigma means a measure of quality that tends to perfection. Six Sigma is a methodology meant to administrate the variations of the processes, defined as being the unacceptable deviation from the target goal or from the established medium value; the goal is the systematic keeping under control of the process variation, so that the defects

produced by this variation can be eliminated. Six Sigma represents a rigorous and systematic methodology that uses the information (Mangement through facts) together with the statistic analysis in order to measure and improve the operational performance, the practices and the systems of the organization by means of the identification and prevention of the defects appearance during the production or provision of a piece of service processes. So as to achieve the Six Sigma level, a process must produce less than 3.4 defects per 1 million of opportunities (DPMO). A Six Sigma defect is defined as being whatever value that is beyond the client's specification, whereas a Six Sigma opportunity represents the total number of possibilities of a defect appearance. Six Sigma represents a Motorola Inc. Company registered trademark. This company has reported a 17 billiard dollars economy since the starting moment of the implementation upto the present time. The objective of the Six Sigma methodology is the obtainance of a high performance, fiability and added value for the client.

3. Methods

TQM is a philosophy of continuous improvement that can provide a set of practical tools to every educational institution to meet the needs, wishes, and expectations of its current and future customers (Sallis, 2012). In fact, TQM's basic philosophy applies to all types of organizations. However, the successful implementation of TQM relies on organizational culture, as the practice and application of TQM often requires long-term effort and a lot of energy, money, patience, and management attention. Improvements to the quality of education are based on the three pillars of the National Education Department Strategic Plan: (1) Equity and expansion of educational access. (2) Quality improvement, relevance, competitiveness. (3) Strengthening governance, accountability, and public image. It also refers to the Long-Term Strategy of Education by establishing 3 (three) strategic steps, namely: (1) autonomy of Education (2) organizational health, and (3) competitiveness. Based on the description, it is necessary to research TQM model design to realize the competitiveness of education. The problem of this research is how to develop TQM model that can improve the performance and competitiveness of education in the soud-est region. The purpose of research is to design a quality management system using a total quality management model is expected to improve performance and realize the competitiveness of education.

The TQM conceptual model and organizational performance help managers to decision makers, improve understanding of TQM practices, and focus on TQM practices in companies.

Six steps in applying Six Sigma:

1. Identification of the product realized or the service provised (What must be done?)

Six Sigma requires that processes operate such that the nearest engineering requirement is at least plus or minus Six Sigma from the process mean. This requires considerable scientific and testing actions. Often, thousands of tests are run on multiple variables to get an understanding of what is going on. Once you determine the process variables, using the other process analysis techniques, you need to consider the ones causing the major losses and work on making them more capable.

2. Identification of the customers for the specific product or service and the determination of whatever they consider being important (Who uses our products and services?)

Understand who your consumers are and what your product/service is.

- Review consumer surveys, concession reports and other data,
- Screen and prioritize issues by severity, frequency/ likelihood of occurrence etc.,
- Determine the internal processes causing most of the pain,
- Find out why and where the defects are occurring,

- Devise ways to address these defects effectively,
- Setup a good metrics (Six Sigma places a lot of emphasis on measurement).

3. Identification of the organization's needs so that you could achieve the product or the service that has to satisfy the customers (What is it necessary for the achievement of the product/ service according to the requirments?)

Six Sigma champions are high-level individuals who understand Six Sigma and are committed to its success. In larger organizations, Six Sigma will be led by a full time, high-level champion, such as an executive vice-president. In all organizations, champions also include informal leaders who use Six Sigma in their day-to-day work and communicate the Six Sigma message at every opportunity. Sponsors are owners of processes and systems that help initiate and coordinate Six Sigma improvement activities in their areas of responsibilities.

A person who is part of the leadership structure for process improvement teams is called "black belt" (just as a total quality utilized "quality improvement team leader" to provide structure). *Black belt* is a highly-regarded, technically-oriented product or line personnel who has the ability to lead teams as well as to advise management.

Candidates for the *black belt* status are technically oriented individuals held in high regard by their peers. They should be actively involved in the process of organizational change and development. Candidates may come from a wide range of disciplines and need not be formally trained statisticians or engineers. However, because they are expected to master a wide variety of technical tools in a relatively short period of time, *black belt* candidates will probably possess a background including college-level mathematics and the basic tools of quantitative analysis.

Coursework in statistical methods may be considered a strong plus or even a prerequisite. As part of their training, *Black Belts* receive 160 hours of classroom instruction, plus one-on-one project coaching from *Master Black Belts* or consultants. Successful candidates will be comfortable with computers. At a minimum, they should understand one or more operating systems, spreadsheets, database managers, presentation programs and word processors.

As part of their training, they will be required to become proficient in the use of one or more advanced statistical analysis software packages. Six Sigma *Black Belts* work to extract actionable knowledge from an organization's information warehouse. To ensure access to the needed information, Six Sigma activities should be closely integrated with the information systems (IS) of the organization. Obviously, the skills and training of Six Sigma *Black Belts* must be enabled by an investment in software and hardware. It makes no sense to hamstring these experts by saving a few dollars on computers or software.

4. Defining the processes needed for achieving the product/ service (How is the achievement process accomplished?)

This is the highest level of technical and organizational proficiency. *Master Black Belts* provide technical leadership of the Six Sigma program. Thus, they must know everything the *Black Belts* know, as well as understand the mathematical theory on which the statistical methods are based. Master Black Belts must be able to assist *Black Belts* in applying the methods correctly in unusual situations. Whenever possible, statistical training should be conducted only by Master Black Belts. Otherwise, the familiar "propagation of error" phenomenon will occur, i.e. *Black Belts* pass on errors to *Green Beltss*, who pass on greater errors to team members. If it becomes necessary for *Black Belts* and *Green Beltss* to provide training, they should do so only under the guidance of Master Black Belts. For example, *Black Belts* may be asked to provide assistance to the master during class discussions and exercises. Because of the nature of the master's duties, communications and teaching skills are as important as technical competence.

Green Beltss are Six Sigma project leaders capable of forming and facilitating Six Sigma teams and managing Six Sigma projects from concept to completion. *Green Beltss* training consists of five days of classroom training and is conducted in conjunction with Six Sigma projects. Training covers project management, quality management tools, quality control tools, problem solving and descriptive data analysis. Six Sigma champions should attend *Green Belts* training. Usually, Six Sigma *Black Belts* help *Green Belts* define their projects prior to the training, attend training with their *Green Belts* and assist them with their projects after the training.

5. Optimizing the achievement process (How can it be better accomplished?)

Usually a top executive or senior manager who "talks the talk" and "walks the walk" of Six Sigma drives it. This person is the sponsor, a catalyst and the driving force behind the organization's Six Sigma implementation. Six Sigma takes a handful of proven methods and trains a small cadre of in-house technical leaders known as Six Sigma *Black Belts* to a high level of proficiency in the application of these techniques. To be sure, some of the methods used by Black Belts are highly advanced, including the use of up-to-date computer technology.

6. Ensuring the continuous improvement by measuring, analyzing and controlling the improved process by means of DMAIC (In what amount are the customer oriented processes achieved?)

We learn the following from the successes and failures of Six Sigma:

1. A strong, committed management infrastructure and leadership is still required for a successful business.
2. Personnel employed full-time performing improvement activity can be effective.
3. Advanced statistical methods offer more possibilities for improvement.
4. Documentation of financial benefit is the reality for quality program survival.
5. Business fundamentals should still be addressed.

But the tools are applied within a simple performance improvement model known as DMAIC, or Define-Measure-Analyze-Improve-Control. DMAIC can be described as follows:

D	Define the goals of improvement activity. At the top level, the goals will be the strategic objectives of the organization, such as a higher ROI or market share. At the operations level, a goal might be to increase the throughput of a production department. At the project level goals might be to reduce the defect level and increase throughput. Apply data mining methods to identify potential improvement opportunities.
M	Measure the existing system. Establish valid and reliable metrics to help monitor progress toward the goal(s) defined in the previous step. Begin by determining the current baseline. Use exploratory and descriptive data analysis to help yourself understand the data.
A	Analyze the system to identify ways to eliminate the gap between the current performance of the system or process and the desired goal. Apply statistical tools to guide the analysis.
I	Improve the system. Be creative in finding new ways to do things better, cheaper or faster. Use project management and other planning and management tools to implement the new approach. Use statistical methods to validate the improvement.
C	Control the new system. Institutionalize the improved system by modifying compensation and incentive systems, policies, procedures, MRP, budgets, operating instructions and other management systems. You may wish to utilize systems such as ISO 9000 to assure that documentation is correct.

The subject of this research consists of the the preuniversitarian education institutions in the South-Eastern Region of Romania. The selection of the institutions is based on the unit of quality ensurance which has unique characteristics and can represent any type of education. There has been chosen "V. Madgearu" Economic College, in Galaţi, by using a qualitative research. The analysis of the data has been made using the interactiv model of analysis [Miles, Huberman, Saldana, 2014.] developed through three stages of reduction data reduction, data presentation and verification.

4. Results and Findings

4.1. Formulation of a Quality Management Strategy Plan

Based on National Education Law in 2011, the education institutions are encouraged to undertake authonomy or independence in what concerns their management. The system of quality ensurance is focused on three piles, i.e. an internal system of quality ensurance, implemented by each and evey institution, an external system of quality ensurance or accreditation achieved by Romanian Agency of Quality Ensurance in Preuniversitarian Education (R.A.Q.E. P.E.) and Ministry of National Education (M.N.E.).

The set of principles, according to which the whole system of management and quality ensurance in Romania has been oriented, has been announced and assumed through the Declaration of Principles of R.A.Q.E.P.E. in November, 2006. The interpretation of the achievement level is done, both during the autoevaluation and on the external evaluation, for each-and-only indicator. An excellent school gathers all the compulsory standards (of accreditation), achieves all the illustrative descriptors of the reference standards (of quality) and innovates at least one of the 43 zones measured by the performance descriptors, creating its own standard. Autoevaluation (or, as it is defined by the law, "internal evaluation") must be sincere and objective; it is the one on which any process of quality improvement is based. Autoevaluation is a perpetum process which offers, at the same time, proofs for the external quality evaluation, having in view both standard categories (of accreditation and, respectively, of reference). The evaluation results are publicly spoken by the educational establishments, schools inspectorates, R.A.Q.E.P.E. The existence of progress is an associate descriptor, implicit or explicit for all the indicators. Therefore, the inexistence of progress stands for the unachievement of the respective descriptors and in consequence it will be regarded as a quality diminishing, for the reference period taken into consideration for the evaluation.

Basic Informational Resources:

1. Governmental Decision (G.D.) no. 21/2007, regarding the approval of the Standards of Autorization for the temporary functioning of the preuniversitary educational establishments, along with the Standards of Periodic Accreditation and Evaluation of the preuniversitary educational establishments, published in the O.M. no. 38/18.01.2007,
2. G.D. no. 1534/2008, regarding the approval of the Standards of Reference toghether with the Performance Indicators for the evaluation and quality ensurance in the preuniversitary educational establishments, published in the O.M. no. 822/08.12.2008,
3. G.D. no. 22/2007, regarding the approval of the Institutional Evaluation Methodology in order to periodically accreditate and evaluate the organizations that provide education, published in O.M. no. 59/25.01.2007.

That is why, in evaluating the quality of education, incluing the appreciation of excelency, there must be considered the progress made in quality improvement (continuously, permanently and proof-based), regarding:

- the achievement level of the assumed objectives;
- the fulfillment of the direct and indirect beneficiariesţ needs of education;

• the initiative, inovation, creativity through which the provider of education defines its own personality, attracts its customers and beneficiaries and which make for examples of good practices ("benchmarks").

The concrete contribution of each educational establishment to the knowledge, abilities and skills based-repository of the individuals as well as the community shall be measured, based on the elaboration of the national map of educational risc by the R.A.Q.E.P.E. While under the external evaluation, each-and-every educational establishment has to prove the fulfilment of the requests, for each of the indicators, making (evidential) references to one or more of the suggestions of benchmarks mentioned at each descriptor or to other (reasoned) modalitites of achieving the specific requests. Accordingly, the description of the proof sources, as they are mentioned below, comes to support the educational establishment during the autoevaluation process undertaken aimimg a continuous improvement.

4.2. Formulation of Operational Plans

The Comission for Quality Evaluation and Ensurance (C.Q.E.E.) teams are generally composed of 5 to 7 members, all of them participating at the analysis process. The teams will gain points on the ground of the seven categories as follow:

1. the selectin of the project - The project must be linked on the key initiatives of the G.V.M.E.C. School Action Plan (S.A.P.) and it is supposed to use information specific for the beneficiaries.
2. teamwork - the C.Q.E.E. team must deal with the plan of Quality Improvement, since the selection upto implementation. The students and parents participation will be encouraged as all the members of the team will contribute to all stages of the project,
3. analysis - The applied analysis technics must support the analytical processes adequate for the project, lead to a main cause, identify alternative solutions and reflect the innovative use of the analytical instruments.
4. review procedures - The team must fight for its choice of the review procedures against the alternatives whereas the remedies must be consonant with the analysis. There should be noticed the creative and innovative solutions.
5. results - The results must be compared with the initial objectives and requests. The degree of achievement of these objectives is considered by the judges.
6. institutionalization - The teams should demonstrate that the improvement can be mentained in time. They are encouraged to adapt solutions borrowed from other teams and to disseminate their success among the whole company. The teams should appear like real leaders.
7. presentation - The presentations should be clear and concise, including arial graphics and diagrams which should be clear and easy-to-read. The listeners should be able to easily follow up the teamţs way of thinking throughout the entire process.

Impressive Results

The achievement level of the performance indicators has been excellent on the human resources subdomain, where, out of the 2 indicators, both 2 have got the excellent level: for the scientific research subactivity – the excellent level, for the school management – human resources – the excellent level.

Another piece of success was the promovability obtained at the Baccalaureat examination – 98% promovability. The work of the team led to an improvement of the percentage from 56% in 2013, up to 98%

The real reward

At G.V.M.E.C., all the teaching staff are considered winners. "We win because we are a team", the school manager declared. Following the R.A.Q.E.P.E. evaluation, there took place a teachers' meeting to praise all the participants. The managers were to be seen all over, mixing up in the conversation of the teaching staff. These employees' emotion and enthusiasm were obvious. "This event reflects all the important aspects of the school."

An open invitation

In order to teach them how to resolve the quality issues working asa a team, the employees are trained quality and team technics. Furthermore, the company has got Quality Textbooks in which there are described the procedures and the instruments of quality.

Never good enough

According to the phylosophy of perpetuum quality improvement implemented by the institutional management, the competition both between schools and between the teams has changed terms over the years, there has become imperious the identification of the improvement areas, the team members are, usually, asked for suggestions through the competition for granting the brownie points or during the implementation of some NEAC, RIEAC projects and school Olympiads. Some of the regional competitions have been moved to different cities so to allow to more employees to experience other organizational cultures. As the events have been improved, so as to be good for the employees, they have been conceived in such a manner to sustain the trips and the emotions.

The disemination of the richness

The employees must trust the management, as well as each other. Without trust, things would simply not work. For the C.Q.E.E. team there is an opportunity not only to get away, meet new people and learn, but also to have fun. The competitions consolidate these feelings. The experience underlines even more each individualin the company's value. The finalists say that they cherish every memory related to the competitions they took part in.

4.3. Quality Management Implementation

There are three important components in the implementation of the quality management in education that play a role in the success of a system of quality management. First of all, there is an instrument of ensuring the quality, consisting in:

(1) The implementation of the standards of investigation, of the standards of research along with the standards of work. There must be noticed the fact that the most recent European indications underline the necessity **to concentrate especially on the prosonal responasbilities**: the participation at the selection of the mecanisms of quality ensurance, of the corresponding criteria and indicators, of the autoevaluation, of the peer review, and of strangers review, etc. All these are more and more recurrent and imply a deeper and deeper and shared knowledge of the quality culture.

(2) The setting of the C.Q.E.E. team, responsible for the successful implementation of the quality management at G.V.M.E.C., a powerful team that shall overview the implementation of the systems of quality management. Secondly, there should be actors to implement the quality management that should include all levels of leadership, teaching staff, as well as the administrative staff. A good system of quality management must ensure an adequate selection of the human resources and, at the same time, the permanent update of their competences; although, there also might happen, due to historical causes, that the human resources existing in the system at present not be able to be updated according to the newly-come challenges, without intervences promoted on a larger scale (regional, national) and not only institutionally. Therefore, there must be niticed the necessity to deepen the analysis of the actual stage both of the quality culture and of the professionalism of the human resources,

etc., who, having different rolres and responsabilities, carry out key activities, on every level in the Romanian system of education; this being essential for the identification of possible needs of teaching/ updating on both aspects, as they are complementary and need to be more and more integrated.

(3) The boarding staff together with the entire school staff play a very important role in the successful implementation of a system of quality management. The success of the implementation of the systems of quality management in school consists in the understanding of the quality management by everybody: managers, teachers, administrative employees, the C.Q.E.E. team, Benchmarking, Quality Management Education and Training, Leadership, Employee Empowerment, Reward and Punishment, Leadership, Lecturer and Employee Assessment, Student Satisfaction and Integrated TQM. Over the years there has been passed over from interventions that were focussed on the infrastructure and platforms strengthening, to interventions mainly focussed on didactic aspects, giving a special attention to e-learning, which was considered not only as a product but mainly as a process, i.e. an innovative method of learning whose effects are transferred to the learning results. (ex. MOODLE, ROCT, CLASSROOM, MEET, ZOOM Platforms).

5. Conclusions

The objective of this study is to develop and propose the projection of the SIX SIGMA model in schools, especially in the South-Eastern Region. The development of this model needs the existence of a strong quality culture, starting with the formulation of the strategic planning along with the operational planning of the quality management. This conceptual model has been developed to enable the implantation of T.Q.M. and the institution's performance. The implementation of the model of quality management uses instruments and is supported at all managerial levels, highly engaged in the implementation of the C.Q.E.E. team. In order to ensure the correct development of the process of quality, there must be a control system of quality, which must carry out quality audits both internally and externally, so that the designing of a model of total quality management might improve the performance and the education competitivity in schools. The successful implementation of this strategy of quality management is fully supported by every actor involved in schools.

The contribution brought by the existance of a unit of quality ensurance in an education establishment will facilitate the implementation of the T.Q.M. practice, which is supposed to improve the performance and achieve the education competitivity, and consequently, on a long term, the implementation of a system of quality managementwill create a quality culture. Putting it in other words, every employee must do his best to mentain quality. This process needs quality knowledge from the employee's behalf, that is sustained but by continuous education and workforce's motivation. Therefore, motivation must be the Prin urmare, motivația trebuie să fie at the top of agenda for every boarding staff of an education establishment.

On referring to the quality control, schools must concentrate more on prevention and less on the detection of a quality error. The detection can be undertaken only after the activity has take place, and prevention can help the school to address the errors of the previous stages, and, thus, save time, finances and effort. In conclusion, TQM depends on the fulfillment of the customer's requests; the superior manager's actions have a direct effect upon the quality issue; prevention is more efficient than inspection and is more important for setting and following up the objectives. From its first statement, T.Q.M. has developed, evolved and acquired many other concepts, thus transforming itself into a complete philosophy of quality management.

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