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EVALUATION DEPARTMENTS AND CONTINUOUS IMPROVEMENT IN THE POLYTECHNICAL SCHOOL OF THE FEDERAL UNIVERSITY OF BAHIA

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Abstract: This article presents an initial process of evaluation (benchmarking) of the seven departments and of continuous improvement that is being implemented in the Polytechnic School of the Federal University of Bahia. Data from the seven departments was collected to disseminate information throughout the school. In addition, a list of TQM continuous improvement tools was searched to choose which ones to implement and the order in which they were implemented. Meetings with the seven departments were held to carry out a Shake Down in search of problems/opportunities for improvement. More than 600 issues were listed and more meetings were held to prioritize issues. A seminar was organized for professors, employees and some of the main student leaders to approve the methodology and choose the main problems to be worked on in 2019. Four committees were formed made up of professors, employees and some of the student leaders. A ranking was produced among the seven departments composed of 13 indicators. The prioritization of topics / problems to be worked on were: Infrastructure = 82%, Management = 55%, Financial resources = 42%, Security = 38%, Lack of laboratory technicians = 35%, Interpersonal relationships = 19%, Commitment and motivation = 9%, training = 8%, lack of teachers = 8%, communication = 7%, teaching = 5%, undergraduate and research courses = 3%, external relations - 3%. This article has practical implications for other engineering schools/polytechnics and universities as many of the findings can be shared with them. This article can start the cooperation between the 32 schools of our university, with 45,000 students, 2,500 professors in 125 courses, which can lead to a better understanding and implementation of Continuous Improvement in their units and get a better evaluation in the annual ranking of universities. The originality of this study

is that, to our knowledge, there is no other public Polytechnic School with a Continuous Improvement program like this one in Brazil. Huge involvement was realized as most of the 170 faculty and 70 staffs were present and participated in the brainstorming of problems and helped to prioritize them.

Keywords: Continuous Improvement. TQM. Management. Polytechnic School. *Lean Seis Sigma*.

INTRODUCTION AND THEORETICAL FOUNDATION

The Polytechnic School of the Federal University of Bahia (EPUFBA) is located in Salvador, Bahia, Brazil. It was founded in 1897 (122 years of existence) and has 170 professors, 70 employees, more than 5,000 students in seven departments, 11 undergraduate engineering courses, 14 graduate courses and more than 40 research groups.

In the second half of 2018, it was found that there was a large information gap. Most professors were unaware of some data from their own departments and were almost completely unaware of data and information from other departments of the polytechnic, thus existing an alienation, with no objectives and goals that could align everyone's efforts. So each tends to look after his own interests without concern for the whole. Figure 1 illustrates a current and a desirable situation. Each vector represents a teacher or staff. Even though it is not possible or even desirable to have total agreement, when an organization manages to align its vectors (people) aimed at some common objectives, the results multiply.

EPUFBA thus started a process of continuous improvement, called GESTÃO POLI (GP), aiming to engage the largest possible number of professors and staff in order to improve and develop the unit, taking advantage of the beginning of a second four-year term of the current board.

A vision of the future was established that could involve and motivate the entire body of professors, employees and students, called: "A polytechnic of excellence in the country, internationally recognized".

Management improvement processes such as Total Quality Control (ISHIKAWA, 1993) and Total Quality Management - TQM were accessed, which, as explained by IMAI (1986), are organized activities of Kaizen, or Continuous Improvement, which involve everyone in the organization in a fully integrated effort to improve performance at all levels. It is also intended to use Lean Six Sigma, which is a "systematic, highly disciplined, customer-centric and results-oriented continuous strategic improvement initiative, based on a rigorous, process-focused and data-oriented methodology" (ANTONY, 2009). and 2015).

Six Sigma relies on other previous successful strategies. It was developed mainly on the basis of Statistical Process Control and Total Quality Control / Total Quality Management (SENAPATI, 2004; MCADAM and LAFFERTY, 2004; FOLARON, 2003; TJAHJONO et al., 2010) and its strength is the major focus in achieving results.

METHODOLOGY

The methodology (GIL, 1996 and YIN, 2015) can be considered as an action research, since it intends to use an improvement process that was applied in companies, experimenting the same in the academy.

The **first step** was to tackle the problem of lack of communication and circulation of information. For this, a standardized questionnaire was developed, in a meeting of the direction with the heads of the departments, to collect information from each of them: Mechanical Engineering, Electrical and Computer Engineering, Construction and Structures, Chemical Engineering,

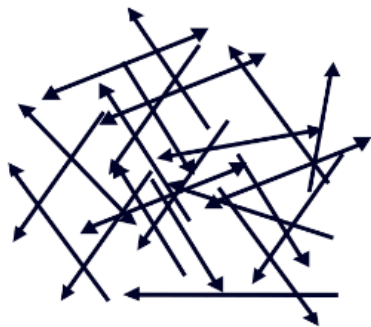
Environmental Engineering, Transport Engineering and Geodesy, Science and Technology of the materials. The information collected from the heads of departments were as follows: number of professors and employees, their workload, number of students, existing laboratories and classrooms, quantity and quality of articles published in journals in the last three years, number of articles published/presented at conferences in the last year, existing research groups, existing motivational projects formed by students, number of disciplines offered, junior companies of students, number of professors on leave in postdoctoral studies or in masters and doctorates. Based on this information, a table was created and an index number was created that allowed the elaboration of a ranking between the departments.

The **second step**, also aimed at improving communication, was the creation of a weekly newsletter called "Poli Happens". It was also decided that the progress of the Gestão Poli program will be a mandatory item on the agenda of all the monthly meetings of the Congregation, as well as of the Departments and Collegiate.

To choose the **third step**, meetings were held to define where to start the process of continuous improvement. TQM's own management tools (BERNARDINO, 2015) and Lean Six Sigma were listed. From the TQM (CAMPOS, V. F., 1989 and 1996), tools such as Daily Routine Management, Strategic Planning, Goal Deployment (AKAO, 1988), Feedback Practice, Trust Practice, Respect, Integrity and Ethics Related to the Organizational Climate, etc. (JESUS, 2015).

It was agreed that, to start, it would be better to do something faster and to reach as many teachers and staff as possible. Thus, the practice of brainstorming was chosen to survey the problems in the seven departments, in the board with its employees and with the

CURRENT STATUS OF SOME ORGANIZATIONS



ORGANIZATION FOCUSED ON CORRECT AND CONSENSUS OBJECTIVES

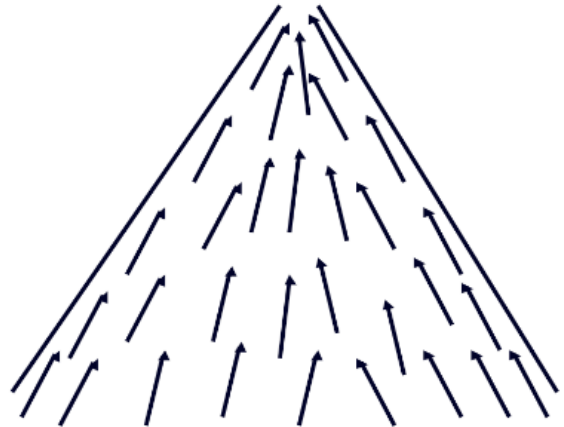
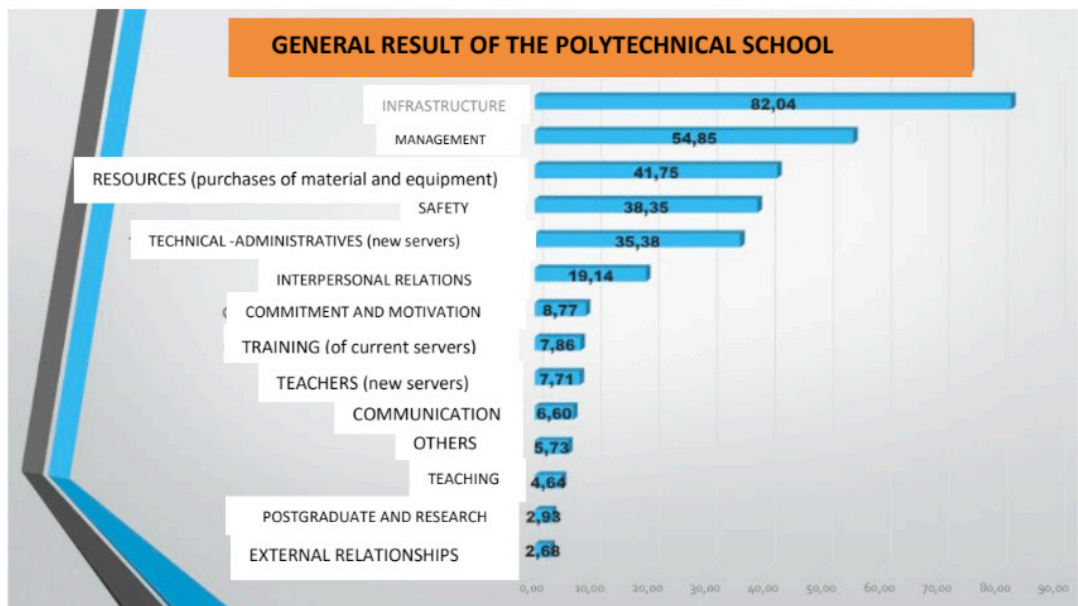


Figure 1 – Comparison of two different situations in organizations

DEPARTMENT	INDEX NUMBER
Department 1	168
Department 2	129
Department 3	123
Department 4	117
Department 5	93
Department 6	72
Department 7	69

Table 1 - Internal benchmarking among the seven departments



Graph 1- Prioritized problems of EPUFBA as a whole

Source: Polytechnic School, 2018

coordinators of the 11 collegiate courses. This practice was called “shake down”. The aim was to give people the opportunity to express their dissatisfaction, many of which had been repressed for years or even decades.

The objective was to identify the current state (CS) of EPUFBA, to later choose the desired state (DE), in the view of the servers (teachers and administrative technicians), as well as the student representatives. In this process, first, seven papers were distributed for each participant to write five problems and two strengths. For professors, this description was in relation to the department to which they are linked, while for administrative technicians, it was made in relation to EPUFBA as a whole.

The school board participated in the regular meetings of the 7 (seven) departments to collect the opinions of teachers and student representatives. A meeting was also held for the administrative technicians to explain and apply this process.

Both in the brainstorming sessions with the teachers and those with the technicians, all points of view were collected and both problems and strengths were grouped by dimensions identified by the participants. All papers were read and grouped in the presence of the participants.

The dimensions, or clusters, were as follows: training (current employees), commitment and motivation, communication, professors (new employees), teaching, management, infrastructure, others, graduate and research, resources (purchase of material and equipment), external relationships, interpersonal relationships, security and technical-administrative (new employees).

In a second step, participants were given a list of identified problems in a summarized way so that they could prioritize five problems that, in their view, would be most important to be solved in 2019. This prioritization was

done with weights as follows: weight 1 =1, weight 2=0.5, weight 3=0.33, weight 4=0.25 and weight 5=0.20.

The results of this third step appear in Graph 1, which indicated Infrastructure = 82% first, followed by Management = 55%, Financial resources = 42%, Security = 38%, Lack of laboratory technicians = 35%, Interpersonal relationships = 19%, Commitment and motivation = 9%, training = 8%, lack of teachers = 8%, communication = 7%, teaching = 5%, undergraduate and research courses = 3%, external relations - 3%.

The **fourth step** consisted of an event, held on 12/14/2018, called the 1st Poli Management Seminar, where the results of the work were presented to all those present - teachers, servers and some student leaders, having chosen the problems to be worked on in 2019.

The **fifth step** it consisted of training for the elaboration of Action Plans to solve the problems raised and prioritized. Actions were chosen according to the Pareto principle, those that involved less effort and had a greater impact on solving the chosen problems.

In order to maintain continuous improvement, a **sixth step** was the creation of a Corporate Governance formed by a structure of Committees. A central management committee was created, led by the EPUFBA board and consisting of the main stakeholders in the program. Three committees were also created to work on the three main problems that appeared in the brainstorming sessions, mentioned in the fourth step.

An advisory body was created for the Management Poli program. This advisory is also part of the central management committee, which will meet every month to monitor the actual versus expected action plans.

A committee was created in the departments to be responsible for the Poli Management

and work groups are being created, one for each problem chosen to solve, a stage that is in progress.

RESULTS AND DISCUSSION

Based on the survey of departmental indicators, step 1 of the methodology, an initial assessment of the departments was reached, an internal benchmarking, which will serve to copy/adapt good practices between them. The internal benchmarking resulted in Table 1, which considered the number of curricular components offered, the collegiate bodies served, number of rooms and laboratories, research groups, undergraduate and graduate courses, junior companies and student motivational projects, master's and doctorate. Each indicator had a weight assigned to it. The quantities of articles published in the last three years in qualified journals, as well as articles presented and published in congresses in the last year, are still being collected. Due to difficulties in surveying the number of articles, it is considered to use the H factor of teachers, from Scopus, which is recommended by CAPES. For reasons of confidentiality, we chose not to inform the name of the departments, as this ranking is not yet complete or agreed upon.

The application of the third and fourth steps, after the sum of all prioritizations, arrived at the general result of the classification of the dimensions of the Polytechnic School's problems, shown in Graph 1.

The fourth step consisted of choosing the problems to be tackled by the board. The three problems mentioned below were chosen in the seminar of 12/14/2018, which were:

1) Preparation for the federal assessment exam of the country's engineering courses (National Student Performance Exam - ENADE).

This item was not part of the problems raised, but was included as a priority since it

is a national assessment of the more than a thousand engineering courses existing in the country and is the only external assessment that the Polytechnic receives. The courses are evaluated with grades from 1 to 5 and the federal government widely publicizes the results. Based on the results of this exam, incoming students choose the best schools, thus being a great vehicle for publicity/marketing, as an important means of attracting good students, given that most courses have not completed the number of vacancies in the last years. This item was considered a priority because it is closely linked to the purpose of EPUFBA Management to be a polytechnic of excellence. In addition, the ENADE test, which would be held in November 2020, was brought forward to November 2019, which required greater focus on this item;

2) Infrastructure, management, security and communication.

This item consisted of the junction of items prioritized in 1st, 2nd, 4th and 10th places in the Graph 1. The item infrastructure was chosen first by everyone, as well as the safety in fourth place. Read security as the creation of mechanisms to protect people against the increase in crime in the city, arising from the crisis that the country is going through. Management appeared in second place and that's why it was chosen, this item being the Poli Management itself. Communication, even being in 10th place, it was added to the management, as it is an intrinsic part of it.

Financial resources.

This item is self-explanatory, as it involves a survey of available annual resources and the best application of them.

In continuation, the seven departments will choose from the listed and prioritized problems those they will work on. These Action Plans were presented at the II Poli Gestão Seminar, on 05/17/2019. At the III Poli Gestão Seminar, scheduled for 12/06/2019,

the progress of the solutions will be presented. From this date onwards, a new cycle will begin for 2020, consisting of the five steps mentioned above.

As a result of the sixth step of the methodology, the committees shown in Figure 1 were created. The Department Committees are still being formed, as shown in Figure 2.

CONCLUSION

The activities planned until then were implemented, such as the evaluation/ranking among the departments, the *brainstorming*, which generated more than 600 problems, their prioritization, the formation of committees.

Action plans are in progress. Those related

to the board are already ready, and those related to the departments are being prepared.

It is understood that the methodology can be applied in academia, and adaptations will be necessary when implementing other management tools that are intended to be implemented from the year 2020, such as a Global Panel of Indicators, a Goal Achievement Program with Recognition and Awards, the 5S, a Suggestions Program, among others.

It is also intended to prepare a Strategic Plan that will take into account the Institutional Development Plan 2018-2022 of the University, as well as a *benchmarking* survey between Polytechnic Schools of eight universities, three in Brazil, one in Portugal, one in from Italy and three from the USA.

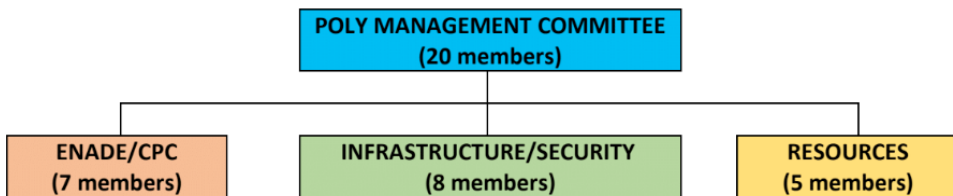


Figure 1 - Committees linked to the Executive Board

COMMITTEES OF THE 7 DEPARTMENTS

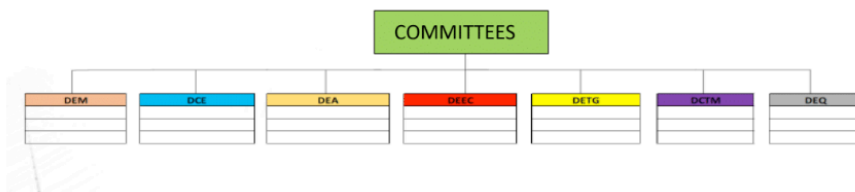


Figure 2 – Department committees, still in formation.

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