Analysis of the Application of a Methodology for Solving Problems in the View of the PDCA Cycle in a Public Agency

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Abstract

The article discusses the results obtained from the application of the methodology for analyzing and solving problems with relevance to the processes existing at the 56th Military Police Battalion of Minas Gerais, located in the city of Itajuba by means of data processing from the perspective of PDCA cycle. This study had two main objectives of rationalizing processes, making them capable of generating efficient measures to combat crime in their area. The method in question allows the identification of the root cause of problems, and correcting flaws and implementing preventive actions.

Due to the positive results of the methodology used in this study is intended to describe it to generate discussion and possible fixes and enhancements.

It is an empirical social research with qualitative approach or an action research, which includes data collection, feedback of data to those related to design, data analysis, planning and taking action, evaluation, and a new collection data on continual improvement.

Keywords: public management; methodology for analyzing and solving problems; action research.

1 Introduction

The development of this project was based on the application of the Methodology for Analyzing and Solving Problems (MASP) aligned to the PDCA Cycle on the 56th Battalion of Military Police of Minas Gerais, located in Itajubá in order to streamline existing processes in this organization, resolve the problems previously identified, as well as making these processes capable of generating efficient measures to combat crime in this city. Thus, it is expected to improve quality management in public bodies, to ensure that public administration is to strengthen and improve its performance for the benefit of the population. This public agency participates in a project created by Institute of Industrial Engineering and Management in partnership with the Federal University of Itajubá (UNIFEI).

This is an empirically based social research of qualitative approach, namely an action research. This study was operationalized through meetings between researchers and participants of the organization and have centralized all the information collected, and generate discussion of interpretations. The results were recorded to ensure the knowledge management.

Due to the implementation of the Pact of Targets between the Government of Minas Gerais and the Military Police, aiming to reduce crime in the State in accordance with the targets set, the unit should show decreased rates of violent crime, violent crimes against property and consummated homicides, besides the increase in the number of firearms seized and triggered operations. Because of this, the need to streamline the processes of the organization is justified, making them capable of generating efficient measures to combat crime.

Considering that the excellent performance of the Corporation is fundamental to the existence of Military Police of Minas Gerais (MPMG) in the social environment in which it operates a results-oriented public management, and also bearing in mind that quality control is exercised by all members of the Corporation through the Activities Coordination and Control in order to improve the quality of the service to the

community is desirable that the Officers Policing Unit Commanders monitor and supervise the recommendations and guidelines of the Command, and with that experience changes from day by day operations of Unit and Operating Room.

This excellence is closely linked to the presentation of results, which seek to achieve the goals set, these arising from a strategic planning and that depend on the establishment and use of performance indicators. Understood as a process that allows management to guide the direction being followed by the organization, the Strategic Planning (SP) aims to achieve better results in the relationship between the institution and its environment. It translates the formulation of goals for the best programs of action and its achievement, considering the conditions internal and external environment that permeates the institution Military Police and its evolution projected on expected scenarios. According to Kotler (1991), SP is a process that allows management to develop and maintain the fit between objectives and resources of the company and the market changes. Its purpose is to guide and refocus the business from I-mission of the company; II-analysis of opportunities and threats of internal and external environment; -III of the strengths and weaknesses of the organization;-IV definition of objectives, goals and action plans;-V implementation, feedback and control, thus aligns itself well to the goal of this project.

The System Performance Measurement and Evaluation arises, then, as a natural sequence of the Strategic Planning process, with the purpose replenish this process through data collection and construction of performance indicators. It is by analyzing the performance results obtained, measured by performance indicators; the organization seeks to put into practice effectively its strategic planning. Given the importance of evaluating the performance of organizations, care should be taken regarding the development of performance measures, as indicators inappropriate behavior may result in non-functional. Therefore, the development of performance measures involves much more than the specification of formulas should be taken into consideration and measures of frequency and source of data. It is noteworthy that the performance measurement, when performed in a structured and systematic, makes a difference in the ability of an organization deliver results, while sustainable. On the other hand, when done on an ad hoc and unstructured management can lead to the poor results of credibility.

Was observed a need to propose an administrative program further rationalized, because although government organizations have to follow a set of rules and laws that make the activities more burocratized, in this case there was a series of opportunities for rationalization and simplification of administrative procedures. Thus, this plan outlines the strategic objectives and sets the standards to be adopted by the 56th Military Police Battalion through the Organ of Direction, Support and Implementation, contemplating the challenge goals for each of the processes. In this work the focus will be in the process control and continuous quality improvement and customer satisfaction (society) by applying the method MASP aligned to the PDCA cycle. According to Shiba (1997), due to the fact that every product or service is the result of a process, the effective means to raise the quality is improving its design. The consequence of this approach is that the emphasis not just hold the results, these are the dependent variables.

After planning the methodology to be used in this study, have been defined the steps to be performed and the strategy driving the project. The generation of data for such planning came through monitoring of processes performed in the routine of this organization.

2 Theoretical basis

2.1 PDCA Cycle

The PDCA is a Method of Quality Management that was proposed by TQC (Total Quality Control) and consists of four basic sequential steps: plan, execute, check and act correctively. These steps form a closed loop, as can be seen in Figure 1:

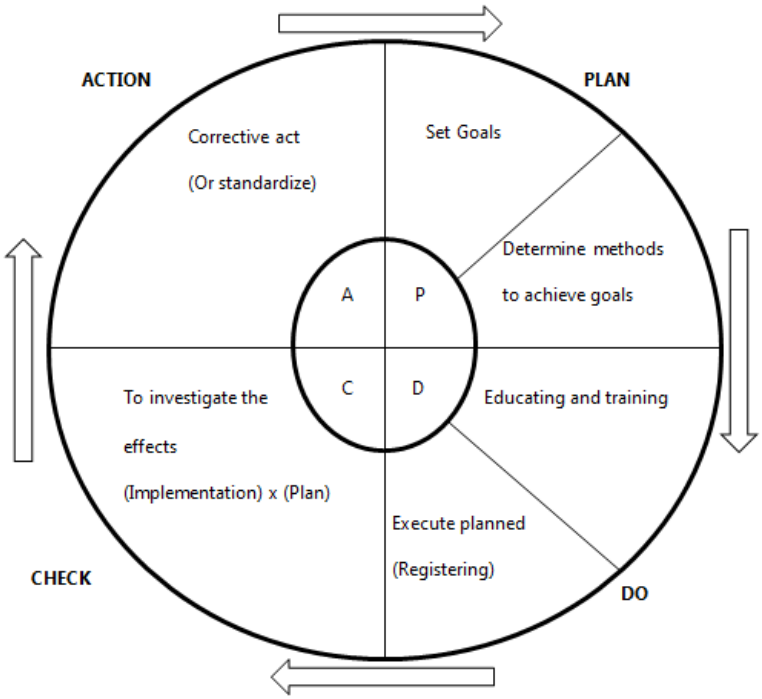


Figure 1. PDCA Cycle of Process Control. (CAMPOS, 2004).

At the planning stage is established goals, the targets items in process control, it is also at this stage that decides on the methods to be employed to meet the initial objectives. In the second stage of the cycle, the performance begins the stage of education and training, according to the procedures - defined standards, the people who will actually perform the work, it includes training in data collection. Once performed the data collection, begins the third stage of the cycle, the scan. Then it compares the results with the standards established control, if there are no problems to work routine is maintained, the emergence of any deviations, passes to the fourth step of the cycle. The goal of this last step is to permanently eliminate the problem and its action takes place in two stages: the result of the problem, aiming to put the process back into operation, and on the fundamental causes that led to this, in order to avoid a repeat.

Werkema (1995) defines the PDCA cycle as "a method of management decision-making to ensure the achievement of goals necessary for the survival of an organization." Considering the definition of a problem is an undesirable result of a process, the PDCA can be seen as a method of making decisions to solve organizational problems. Thus, the PDCA indicates the path to be followed so that the targets set can be achieved. Techniques (or tools) are used for obtaining, processing and disposal of information needed to conduct the steps of PDCA. Aguiar (2002) performs the integration of quality tools to the PDCA cycle maintenance, improvement and innovation. In this sense Tubino (2000) points out that each time a problem is identified and solved, the production system moves to a higher level of quality, always working with the logic of continuous improvement, ie problems are seen as opportunities to improve the process . The use of the PDCA cycle promotes continuous learning process and it reflects positively on decision making by the manager, since it favors obtaining timely and reliable information during project execution.

2.2 Methodology for analyzing and solving problems (MASP)

According to Campos (1992), a problem is nothing more than an undesirable outcome of a job. The solution of a problem is possible through the analysis of relations between the characteristics and causes of a problem by performing appropriate corrective actions. However, this process of strategic solutions of problem can be approached from many angles. Consequently, when using a poor methodology applied, do not get the improvement actions. Therefore, it is important to understand the relationship between the current causes and characteristics of the problem or effect.

The MASP is a dynamic process in seeking solutions to a given situation, is not a rigid process, but rather a flexible process, able to fit each case with which to contend.

This method is an efficient tool able to analyze and prioritize problems, identify situations that require attention and which sometimes are not clear, and establish control quickly in certain situations. Applied correctly, this method enables one to plan the work to be done, prioritize the problem, break it into parts that can be analyzable as well as check situations that need attention.

2.3 Relation between the MASP and the PDCA Cycle

The problem solving is a process that follows a logical sequence, starting with problem identification, continuing by the analysis and ending with the decision. Each step describes the objectives, activities to be developed, the people involved and the most frequently used tools, to ensure that the researcher understands and knows how to apply them in their work. He must be informed of all situations, and process all this data about the problem you may encounter. The analysis of the problem is a logical process of narrowing a body of information during the search for a solution. At each stage, information will emerge, as the process moves to what is wrong, going to the problem being treated and followed for the possible causes that the problem did arise, and finally to the most likely cause with a corrective action specific to the problem.

The researcher needs to organize the system to the steps follow a particular order, and must also follow the steps as outlined in the roadmap, so that work can be executed in the best way possible. Several authors present a methodology based on a proper sequence. The sequences of activities are many and each case is based on reasoning and logic. The sequence of MASP will be presented below is based on the fundamentals of the PDCA cycle, so it is used by two renowned authors:

MASP IN ACCORDANCE WITH THE METHODOLOGY OF HISTOSHI KUME OR CQ STORY

RELATIONSHIP BETWEEN MASP AND PDCA CYCLE

PDCA	FLOW	STAGE	PURPOSE
P	1	Problem identification	Define the problem and recognize its importance
	2	Observation	Investigate the specific features of the problem with a broad vision and under various points of views
	3	Analysis	Discover the root causes.
	4	Action plan	Conceive a plan to block the root causes.
D	5	Action	Block the root causes.
C	6	Verification	Verify that the blockade was effective.
	?	(Was block effective?)	
A	7	Standardization	Prevent the recurrence of the problem.
	8	Completion	Recap the whole process of solving the problem for future work.

Figure 2. Relation between the MASP and the PDCA cycle. Source: Campos, 1992.

The method has basically eight steps, each of which consists in performing certain tasks, which are described below:

Step 1 - Identifying the Problem: choosing the problem, analyze the history of the problem, view current losses and gains viable, perform Pareto analysis, and finally, to appoint guardians.

Step 2 - Note: to discover the characteristics of the problem by collecting data as well as through the observation site, and set schedule, budget and goal.

Step 3 - Analysis: defining the influencing causes, choose the most likely causes (hypotheses), and analyze it (verification of hypotheses).

Step 4 - Plan of Action: develop a strategy for action, the action plan to lock and revise the schedule and the final budget.

Step 5 - Action: carry out the necessary training and implement the planned actions.

Step 6 - Verification: To compare the results, listing the side effects and check the continuity of the problem or not.

Step 7 - Standardization: to establish or amend the standard, facilitate communication, promote education and training, and follow up the use of the standard;

Step 8 - Conclusion: to relate the remaining problems, planning corrective actions, generate reflection on what was learned.

As the steps are placed sequentially, it is important that followed each task mentioned. By doing this, there is a greater likelihood that the problem has correctly identified its cause, blocked and corrected.

2.4 Quality Tools

2.4.1 Stratification

According to Campos (2004), Stratify is to divide a problem into layers of problems from different sources, it is a process analysis by a method that seeks the source of the problem and should be conducted in a participatory way (must include all people that can assist in the analysis).

With the stratification of the data, the objective is to identify how the variation of each factor affects the outcome of the case or problem you wish to investigate. This technique facilitates the investigation and analysis of the problem for later search for a solution, there is no one standard model.

2.4.2 Cause and Effect Diagram

The cause and effect diagram was developed with the goal of representing the relationships between a problem or an undesirable effect and all possible causes of this problem. The structure of cause and effect diagram resembles the skeleton of a fish, so it is also known as a fishbone diagram. A third name is Ishikawa diagram, in honor of Professor Kaoru Ishikawa who created the diagram cause and effect in Japan is used to separate a big problem into smaller problems are easier to manage. The problem (effect) must be clearly identified on the right side of the diagram and the potential causes should be distributed on the left side.

2.4.3 Pareto Diagram

According to Campos (2004), the Pareto diagram is a simple picture that aims to give a graphical representation of the stratification. The Pareto principle was adapted to the problems of quality by Juran, from the theory developed by the Italian sociologist and economist Vilfredo Pareto, and establishes that most of the losses resulting from problems related to quality stems from a few, but vital problems. Of the total problems, between 20% and 30% should comprise 70% to 80% of losses (few cases are actually conditioning the effect). This can provide information to make evident the prioritization and visual problems and projects, and to allow the concentration of efforts to improve the areas where the greatest benefits can be obtained (WERKEMA, 1995).

3 Conduction strategy of the project

The work followed the lines suggested by Campos (1992), as discussed in Section 2.1 of this document. We prepared a database that concentrated all types of events / transactions made during the year, to facilitate their analysis, using advanced features of Excel.

Thereafter, with the treatment of the data from the weekly meetings between the team of UNIFEI and the team of the Military Police Officers composed by Policing Unit Commanders, analyzes were conducted in real time, as new cases emerge, thus allowing to take repressive measures against crime, as well as development of specific operations required. Thus, through weekly visits to the control of activities is made and the data that demonstrate progress are recorded.

The project members work towards developing content for the study and implementation of the proposed unit. The researchers assume the defined objectives and guide research on the different means available, taking an active role in monitoring the actions taken in the light of the problems encountered, in order to match the quality criteria Battalion longed.

The reports are prepared each month control, are reported in which the activities performed by the teams as well as the development of operations and the impact generated by these to the reality of policing the city. This report is forwarded to the Commander of Military Police Battalion, responsible for the project in this organization and fit it charges about the necessary activities that occasionally no longer fulfilled.

The creation of organizational knowledge is a process that requires an intensive and laborious interaction among members of the organization. It should enhance the mutual learning from each other or acquiring

external knowledge (NONAKA and TAKEUCHI, 1997).Therefore, during this research, training about concepts in the area of quality management is made and it should provide mutual learning involved. Thus, the lecturer will be collecting data needed for research, while the servers will be getting this external knowledge.

4 General Analysis

From meetings among the command of the Military Police and the researchers involved was defined the key indicators for each department. In this study it is only one of the problems defined for purposes of example. The brainstorming led to the definition of the effect observed by the police as well as its analysis. Created by Osborn in 1963, a brainstorming session can last from a few minutes to several hours, people consonants and the difficulty of the subject (ARANTES, 2011).

Once determined the problem in the department, it was used a template diagram, also called Ishikawa or Cause and Effect Diagram, to link the primary causes that affect the problem defined and, if necessary, secondary causes that influence the primaries.

Thus, it was constructed the diagram represented in figure 3.

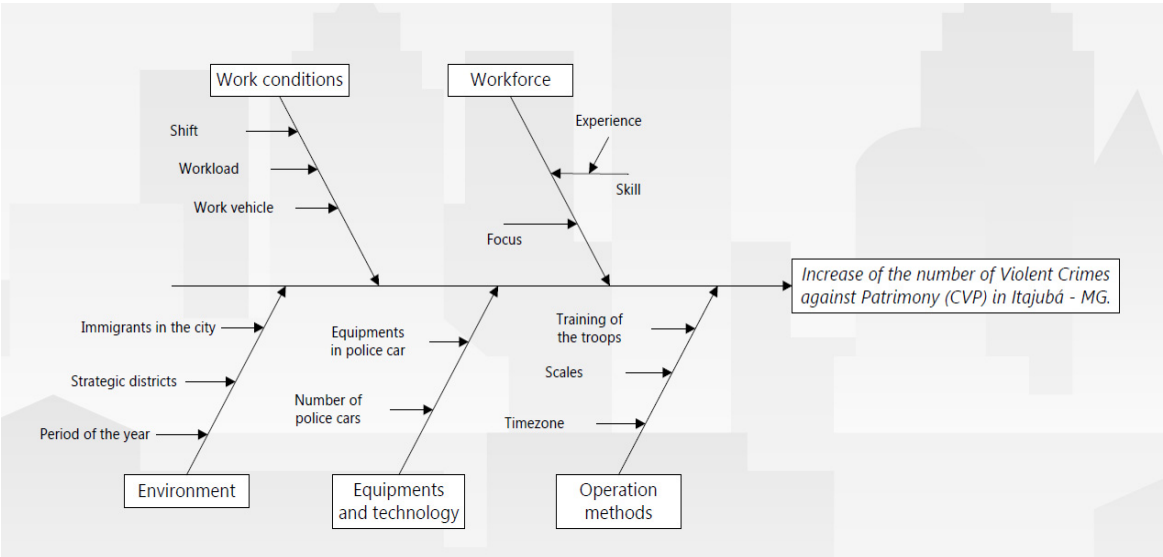


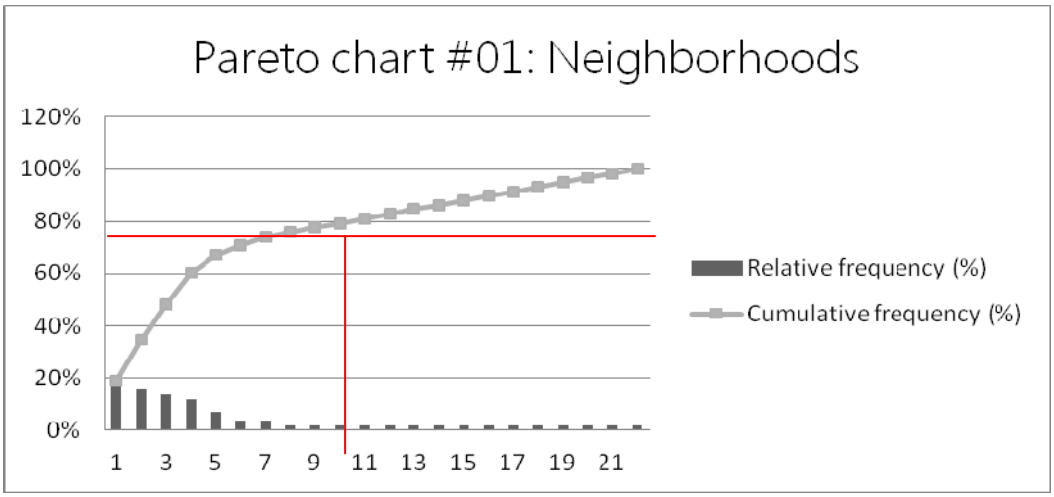
Figure 3. Diagram Cause and Effect (or Ishikawa Diagram): initial analysis of the key problem.

It was carried out a careful analysis on the diagram, going back over the causal chain, in order to seek the root causes of the problem. It is known that the principal cause of a problem can be directly controllable by the command, and objectively be related to the effect studied. It is believed as the main cause when its elimination will result in the disappearance or reduction of the effect or problem.

Two causes were classified as major, strategic neighborhood and scales, and further processed according to the model proposed by Pareto chart. The Pareto chart provides information to make clear and visual problems and the prioritization of projects, and to allow the concentration of efforts to improve in areas where the greatest gains can be obtained (WERKEMA, 1995).

Face of this context, to classify neighborhoods and scales with the most significant problems for the effect in question, the tool of the Pareto chart was used, which is configured as a bar graph that orders the frequencies of occurrences, from largest to smaller, allowing prioritization of problems. This also depicts the curve of cumulative percentages. Its greatest utility is to permit easy viewing and identification of causes or major problems, enabling the concentration of efforts on them. The data required for analysis were provided by the organization and should be kept confidential for security. Therefore, the names of neighborhoods and the timezone (or time tracks) are not revealed, only expressed numerically. The initial database contains the data corresponding to the year 2010 and first half of 2011.

Graph 1 provides the results of analysis of the database about the districts most affected by crime (violent crimes against the patrimony).



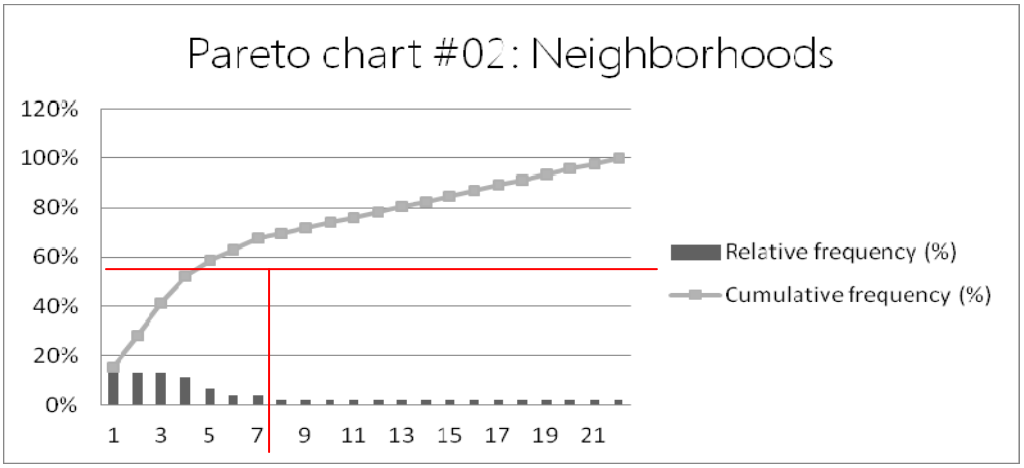
Graph 1. Pareto Chart #01: Survey of the number of violent crimes in neighborhoods 1-22.

Neighborhoods 1-10 were prioritized in comparison with the time factor range, once defined a cumulative frequency of stop 80%. For this analysis, it is noteworthy that the intrinsic aspects of the organization were considered according to the professional experience of the Police Department.

Based on the scales, it was observed that adjustments could facilitate analysis of the problem and to impact positively on the results. The time zones corresponds to the time scales of the officers on the streets and outskirts of the city. Have been defined twelve time tracks, and it was classified as critical periods of the tracks called 9 to 12.

From there, it was possible to draw a plan of action that generated some basic operations focused on combat approximately 68% of cases of occurrence of crime in the city (common causes). Thereafter, for the system to stabilize over the coming months, it was decided that the basic plan of action put in place will remain during the daily planning of policing was carried out at through strict adherence to the guidelines contained in the Cards Programme. These cards are used by managers to guide his troops, with care to keep them updated and consistent with the analyzes. In this period of searching for stability, will be treated differently only those special causes that could possibly result in significant variations in the number of occurrences.

By applying this method of continuous evaluation of management, as proposed by the PDCA cycle, was turned to positive results, as shown in Graph 2.



Graph 2. Pareto Chart #02: Survey of the number of violent crimes in districts 1 to 22, after study and strategic orientation.

As another measure, it was decided that the police officers would be subject to periodic reviews in accordance with a valuation model, which allows the establishment of goals between the police and their immediate superior, whose performance will be evaluated in the subsequent period. In September 2011 was realized the first assessment of the police teams, since it is the end of the first two months of implementation of this measure. Two teams, composed by three police officers each one, were awarded with a weekend off, and the clearances commonly practiced by the work schedule, in order to encourage and motivate the officers to will be always committed to seeking compliance with the targets set by the Pact targets for the year 2011. Every two months is intended to reevaluate this model in order to reach an ideal model of evaluation that should be standardized for the entire battalion, including the neighboring cities. Note that these performance indicators have been defined trying to satisfy the need of quality control on the main goals daily work of each of these teams, and should be monitored so that they can portray the best possible way to reality practiced by these police officers.

5 Final Considerations

MASP can be considered as a method simple and effective, easy viewing of the organization in general (SILVA *et al*, 2008). Routinely monitor the results of changes gives greater assurance of the successful implementation, as suggested by the PDCA cycle, which emphasizes the control phase.

From the database prepared by the team, it has been possible to compare 2011 data with data from previous years, carrying out the study and analysis. Analyses are made in real time, as new events occur, thus allowing to take repressive measures against crime, as well as development of specific operations that may be necessary.

It should be remembered that there is a confidential relationship between this study and the database developed, using information recorded by the unit that compose the crime in the city, and because of this, it is not possible to detail specific information.

At present, the initial results obtained with the recent implementation of the action plan are being examined with criteria, and it is necessary to wait for the records to achieve some stability in the coming months, until it is possible to quantitatively assess the impact generated by these actions. It can be affirmed also that after the implementation of the action plan initially, there was an immediate impact in the sense of feeling of policing in the city.

As future goals in this study, it may be mentioned that it aims to eliminate some requirements found in this organization, such as: centralized control of police reports highlighted to avoid losses and damages; standardize procedures by the coordinators of Police Unit; enable proper analysis and decision making by the Command and standardize procedures for operational supervision; expedite the resolution of problems identified during the service and make the unit able to reach the targets set by the Pact Goals, making use of the quality management tools and models for analyzing and solving problems that are developed in this study.

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