DIGITAL PROCESSES IN PUBLIC ADMINISTRATION

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***Abstract:** Based on European Foundation for Quality Management model to identify critical improvement areas of the integrated management system, this research has focused on automation of the internal processes in a public institution using the 6-sigma method. The digital transformation component is in line with the European Union's strategy to create connected, efficient and safe community through the implementation of innovative solutions, in conjunction with the low degree of digitization of public institutions (Romania's case study) That's why, the priority of digital solutions implementation within public institutions was considered. In the first stage, a self-assessment using EFQM model was carried out to provide an overview of potential areas for improvement. In the second stage, a technical digital solution was implemented using the 6-sigma method, to automate an internal process within the administrative institution.*

***Keywords:** automation, internal process, 6-sigma method, public institution*

1. INTRODUCTION

In the current context of public administration irrespective the level of development, the self-assessment of the integrated management system in a public administration institution appears a topical and relevant issue. To fulfill their mission of providing quality public services and managing public resources responsibly, public institutions are under increasing pressure from citizens and other stakeholders to be more efficient and effective.

The self-assessment of the integrated management system [1] is an important method for the governance evaluation and the performance improvement of organizations, including public administration institutions. Through self-assessment, the institution can identify the strengths and weaknesses of the integrated management system and propose measures for improvement. This will enable it to better achieve its objectives and provide more effective and efficient public services.

The design, set-in-place and continuous improvement of a variable internal control system are possible only if the system meets the certain conditions: the system is adapted to the organization size, complexity and specific environment, the system covers all levels of governance and all activities or operations, it is built with the same tools in all public organizations, it ensures the achievement of the organization's objectives, the costs of implementing the management internal control system are lower than the benefits derived from it.

Starting from the objectives of the National Recovery and Resilience Plan, the digital transformation component [2] connected with the low degree of processes automation of public

institutions, but the difficult management of physical documents, we identified the need to implement a document management application. The implementation of such a solution would bring with it a series of advantages, such as: reducing the paper consumption to print documents, reducing the time of assigning the document, reducing the space needed to store and archive documents, facilitating quick access to them.

The reason for this research is the need to align with European policies aimed at sustainable development objectives. Also, compared to the current statistics, this is a relevant concern in the actual context of public administration in many countries, as public system should be more and more accountable to contributors. Public institutions are under increasing pressure from citizens and other stakeholders to be more efficient and effective in fulfilling their mission of providing quality public services and managing public resources in a highly responsible and transparent manner.

2. SELF-ASSESSMENT OF THE CASE STUDY ORGANIZATION

The institution is organized and functions as a specialized body of the central public administration, a public institution with legal personality. It is a government institution in Romania, whose main responsibilities are the administration of the fiscal system and the collection of the revenues needed to finance public expenditures. Among the main tasks of the institution are the collection of fees and taxes, as well as the verification and control of compliance with tax legislation. Also, its main objective is to improve the level of taxpayers' voluntary conformance with fiscal obligations, by simplifying procedures and increasing the transparency of the administrative act. The institution is divided into several directions, each with specific duties in the fiscal field.

Thus, an evaluation of the internal managerial control system of the institution was carried out to have an overview of the procedures, means, actions and dispositions regarding the activities of the entire entity. The assessment was made possible using the EFQM (European Foundation for Quality Management) model [3], the version 2012. During the evaluation, nine main criteria were considered according to Fig. 1, and in order to reach a precise result, all the 32 sub-criteria were evaluated. At the end, the scoring of each criterion is expressed as a percentage (from the maximum of 100%) and together with an overview of the areas for improvement.

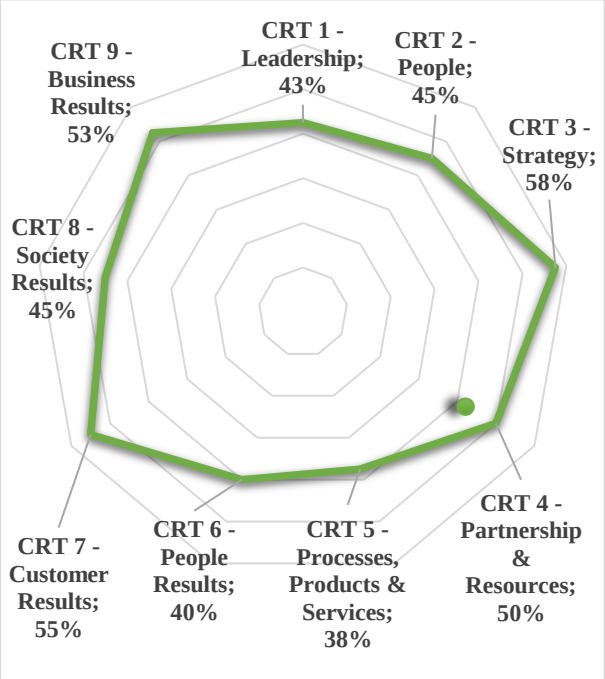


Figure 1: *Evaluation results*

As it can be observed, the 5th criterion "Processes" obtained the lowest score, that's why improvement actions were be developed for this. The organization has certain process strengths, but there is more room for improvement. These include specifying a retention period for e-mail correspondence, its' digital location and how it can be accessed. The computer application used to allocate requests for assistance should have a user manual describing its' functions and staff should be trained in its' use. Also, the process of

requesting and transferring data to and from business structures should be optimized, streamlined, and automated so that it is no longer a major resource consumer.

3. IMPLEMENTATION PROJECT

The improvement project is carried out using the 6-sigma method [4,5], this method presupposing the performance of certain steps:

1. Preparing the organization for 6-sigma through awareness, training and training of project teams;
2. Identifying the main processes and key customers;
3. Defining customer requirements, both internal and external, as well as the deliverables provided;
4. Measuring current performance;
5. Prioritization, analysis and implementation of the improvement project;
6. Extension and integration of the 6-sigma system.

Next, the project is structured in five distinct phases [6], according to Fig. 2:

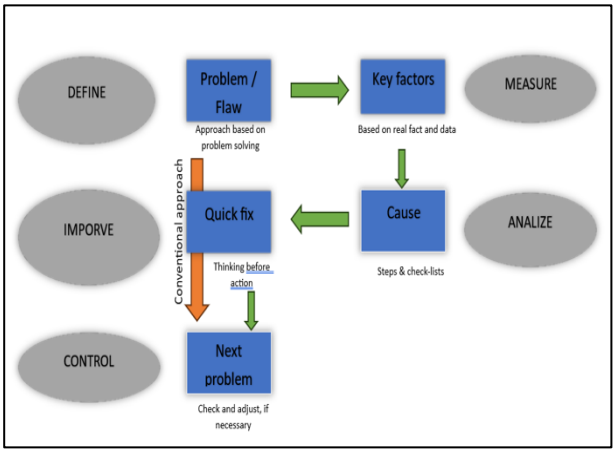


Figure 2: *D.M.A.I.C.*

DEFINITION – involves defining the targets of the improvement project, phase in which the bases for planning the activities within the project will be established, defining the project objectives and limits and identifying the aspects that must be acted upon to obtain an improved sigma level**.** Currently, the process of transmitting data to the business structures subordinate to the organization takes place decentralized through the following steps:

Step no. 1: the business structure receives a request to draw up a statement regarding various situations (annual, semi-annual reports, budget analyses etc.).

Step no. 2: the business structure drafts an "address" in which the reasons underlying the data request is stated, as well as the accurate definition of the required information.

Step no. 3: The "address" is printed on paper and follows the circuit of obtaining signatures, in hierarchical order: compiler, head of department / office / behavior, deputy general manager (if applicable) and general manager.

Step no. 4: The "address" is assigned a registration number from the issuing department / service / office / structure (as applicable).

Step no. 5: In this step the "address" can be transmitted to the organization. Transmission is done by e-mail, with prior scanning, or physically.

Step no. 6: Receiving the "address" and registering it within the organization.

Step no. 7: Analyzing the "address" by the general manager, assigning it to one of the sub-directorates and sending it by e-mail. This allocation is made in accordance with its specifics and the areas of activity of the sub-directorates.

Step no. 8: Receiving the "address" at the level of the competent sub-directorate, analysis by the director of the sub-directorate and its distribution to the service / office / department.

Step no. 9: Receiving the "address" at the service / office / structure level and distributing it, by the head of the service / office / structure to one or more persons, referred to as the person responsible for resolving the "address".

Step no. 10: The responsible person or persons responsible deal with the design of the computer script to extract the information requested by "address", the export of the information in a file .xlsx, .pdf, .txt, .csv, .docx

etc. and the transmission of information, by e-mail, to the requesting structure.

MEASUREMENT – refers to the measurement of the existing or initial state, therefore the period of analysis is considered from the 1^{st} of June 2023 until December 31^{st}, 2023. During this time frame approximately 500 unique "addresses" were received and registered.

As it can be seen from the definition step, the current process of transmitting data is an internal process which consumes the organization's resources. Regardless of whether the resolution is favorable or not, public entities have the obligation to communicate the requested information to the requester within 30 days from the date of registration of the address.

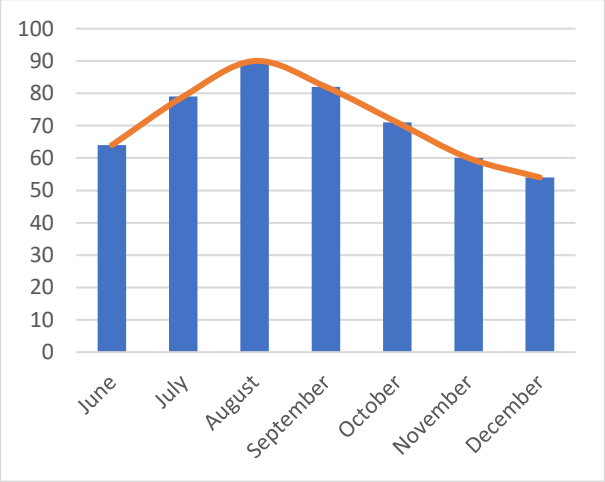


Figure 3: *Addresses registered monthly*

Analyzing figure 3, it can be observed that in the July-September period there is a sharp increase in the number of addresses resolved in a period longer than the ceiling period, which is 30 days, due to the specific nature of the vacation period, during which the number of staff is reduced. Consequently, although all received addresses were resolved, the number of those resolved within the 30 days' timeframe is lower than the number of addresses resolved exceeding the timeframe (Fig. 4), resulting in a weight of 70% of resolved addresses overdue and 30% of the addresses resolved within the deadline.

Next, the 6-sigma method is applied to improve the share of addresses solved in the overdue period, from the current 30% to a percentage of 60%, by developing the theoretical histogram (Fig. 5) and the practical histogram (Fig. 6).

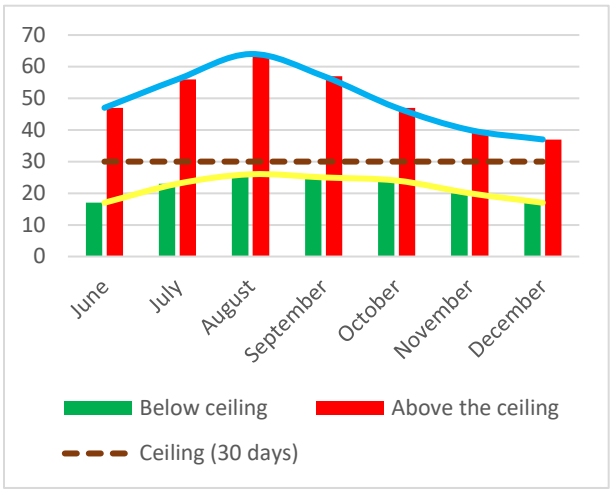


Figure 4: *Resolution time, in days*

In accordance with SR EN ISO 9001/4.9. consideration will be given to conducting the process under controlled conditions. Corroborated with the legislation in force, but also with the situations through which business structures require data in a very short timeframe, the transmission time should be of the order of a few days. 30 days and 10 days reference settlement term will be considered as the ceiling settlement term for addresses.

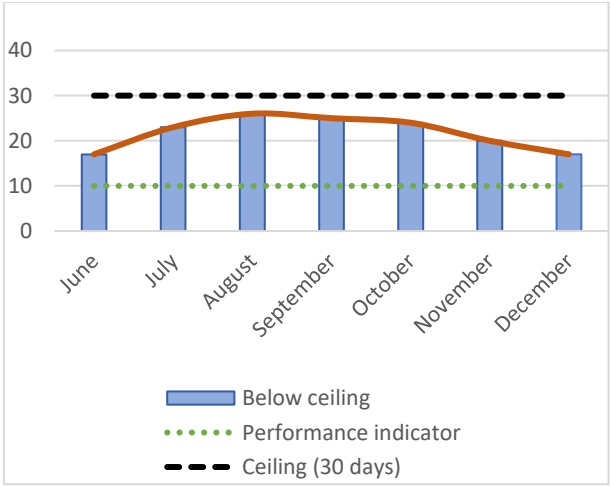


Figure 5: *Theoretical histogram*

For the elaboration of the practical histogram, the ceiling of 30 days was considered, by which, the number of addresses resolved in less than 30 days, the number of addresses resolved in more than 30 days and a reference resolution term of 10 days.

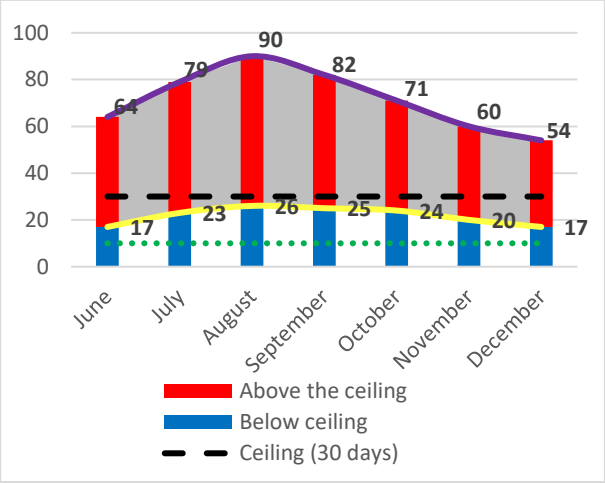


Figure 6: *Practical histogram*

ANALYSIS - in this phase, the necessary data is analyzed to identify ways to close the gap between the current performance of the process and the desired target. To be able to identify the causes that led to the delay in resolving the addresses, a Pareto diagram is drawn up (Fig. 7). The data transmission process to the business structures subordinate to the organization is analyzed and the steps that cause the delays are considered (Table 1).

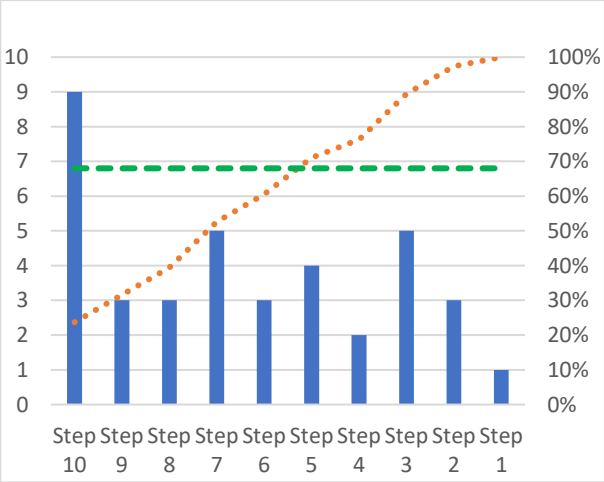


Figure 7: *Pareto Diagram*

Table 1

Steps	Days late	Weight
Step No. 1 - receipt of business structure request	1	3%
Step No. 2 - technical drafting of the business structure request	3	8%
Step No. 3 - printing and obtaining signatures	5	13%
Step No. 4 - registration number assignment	2	5%
Step No. 5 - transmission to the organization, for resolution	4	11%
Step No. 6 - reception and registration	3	8%
Step No. 7 – analysis and distribution to sub directorates	5	13%
Step No. 8 - reception within the sub-directorate and assignment to service/office/compartment	3	8%
Step No. 9 - reception within the service/office/compartment and distribution to those in charge	3	8%
Step No. 10 - settlement and transmission to the issuing structure	9	24%
TOTAL	38	100%

Using Table 1 it is possible to determine the number of days delayed as well as the length of each step in the transmission process. As can be seen, the current process has generated a total of 38 days of delay. This is not only three times higher than the performance indicator (10 days), but also exceeds the ceiling (30 days). The Pareto chart gives an overview of both the weight of each step in the process and its impact on the total number of delay days.

At the end of the analysis phase, an Ishikawa diagram (Fig. 8) was created to be able to determine which are the causes that lead to long delay times, which are equally generated both by business structures and by the organization. This diagram is divided into two main sections: the “business departments” section and the “IT department” section, each with its’ corresponding branches and subsequent delay factors.

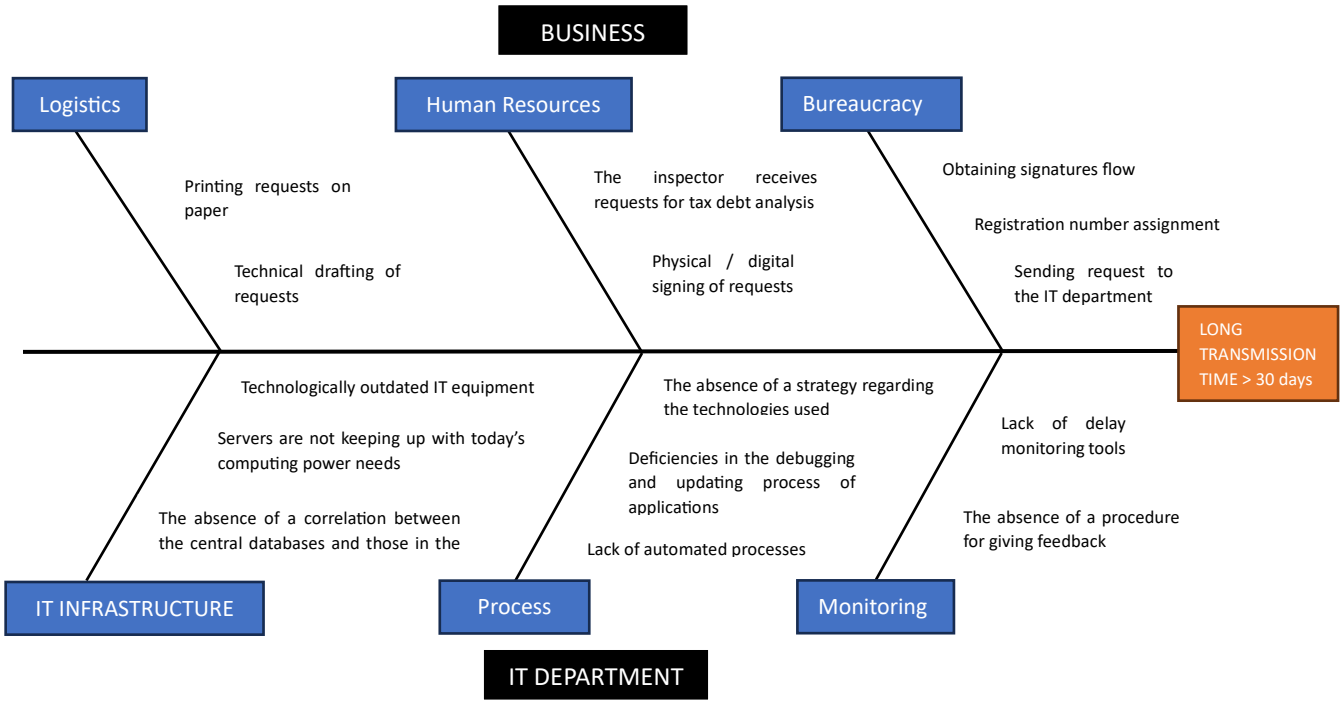


Figure 8: *Ishikawa Diagram*

IMPROVEMENT - process. During this phase, a technical solution is implemented that aims to reduce the number of late addresses. The technical solution is constituted in the form of a web application [7], which automates the entire data transmission process to the business structures subordinated into the organization. This solution enables all the steps involved in the current transmission process are eliminated, logistical resources, human resources and most importantly the time required to obtain information is substantially reduced.

The development of the application has taken 6 months and has been done in stages, as follows:

- In the first stage, the application is designed so that it meets the needs and requirements of business structures - 1.5 months;
- The second stage represents the construction of the application, with its components, the database, the component responsible for the functionality and the client interface - 3 months;
- The third stage: testing and validating the application, stage in which the functionality of the application and the behavior of the client interface is tested – 1.5 months.

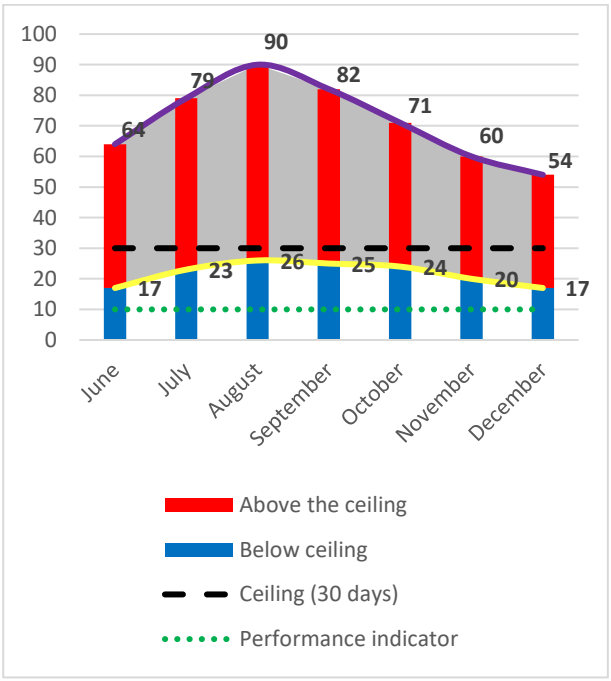
The application is of web application type, it runs inside a web browser and is hosted on the institution's internal servers. Secure [8] acces to the application is done using an internal link, but only employees within business structures are able to use the application.

CONTROL - keeping the new solution under control. The application will benefit from tools and technologies with which the application's performance will be tested and monitored. Among these we find Postman - A.P.I. development software (application programming interface) for testing, documenting and analyzing the performance of the Services; Docker - open platform for developing, distributing and running applications in containers. Using Docker, one can package all the dependencies of an application into a container, making the application portable and easy to distribute and run on different environments; Toad - application that helps to develop and manage Oracle databases. It provides a comprehensive set of tools and

functionality for database development, management, and optimization.

4. RESULTS AND DISCUSSIONS

After the implementation of the improvement project, a new final real histogram has been created and it was compared to the original real histogram. Analyzing the two histograms, one can observe that the number of late requests, called "Ceiling (30 days)" from the initial real histogram, is drastically reduced in the final real histogram (Fig. 9) throughout the analyzed period, approaching the "Performance indicator" of 10 days. This was possible because the implementation of the application has eliminated the need to go through the 10 steps of the data transfer process, the process now being fully automated. Consequently, the improvement project led to a considerable decrease in the number of delays in the transmission of data to business structures, reduced the consumption of logistical resources (printing paper, printer toner), reduced the human resource component (for the process of obtaining of all signatures) and most importantly the time required to obtain the data by the requesting structure.



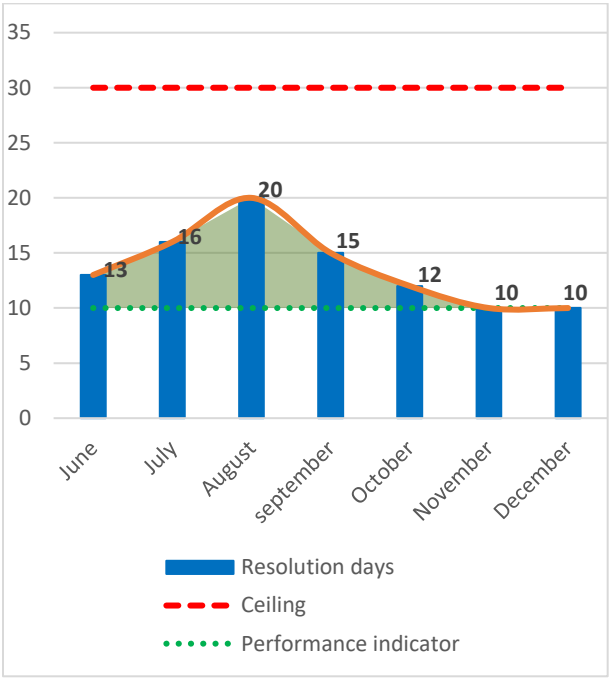


Figure 9: *Comparison between the practical histogram and the final real histogram*

Also, the share of addresses resolved within the ceiling, compared to those resolved (exceeding the ceiling of 30 days), was appropriate, according to figure 10.

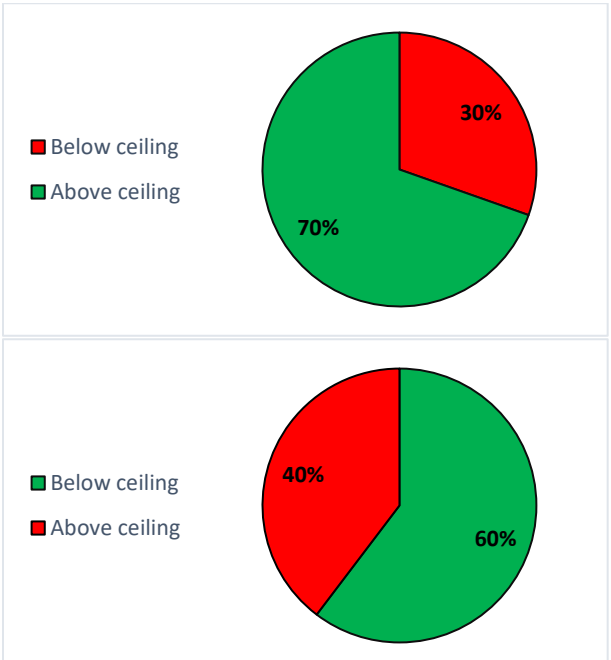


Figure 10: *Comparison between the initial and the final weight*

5. CONCLUSIONS AND FUTURE RESEARCH

The applied methodology in this case has revealed effective. The sequences consisted of (1) self-assessment of the Integrated Management System of the public administration organization in Romania, going through out the procedures, means, actions and dispositions related to activities of the institution as a whole, using EFQM model; (2) identification among the self-assessment criteria of those with the highest potential of improvement and effective impact for stakeholders; (3) commitment at management level for the selected area for improvement, such as the "Processes" criterion in the case study.

The next step was the development of the improvement project using the 6-sigma methodology. The improvement phase was structures in 5 phases: (D) the definition one where the current process data transmission and reception has been defined, (M) the measurement phase where the data was collected within 6 months of activity, (A) the analysis phase in which the collected data was analyzed to identify ways to close the gap between the current performance of the process and the desired target, (I) the improvement phase where the solution has been designed and implemented to support process automation and finally (C) the improvement phase where the focus was on keeping the new solution under control with the use of tools and technologies.

To summarize, implementing the application has replaced the perimated process of requesting and sending data and has greatly improved the efficiency of obtaining the data.. Furthermore, the IT personnel now can focus on developing more solutions that can respond to similiar problems and the business departments may now elaborate their business specific analyses much faster.

In the future the organization aims to closely monitor all the areas that require or may require a digital transformation or automation solutions in order to support the organizations' departments to achieve better results and efficiency.

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