

# Development of a delinquent customer management model using DMAIC steps and KPIs at a Service Station.

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*Keywords– Six Sigma, cost reduction, DMAIC, operating profit, customer delinquency.*

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## I. INTRODUCTION

The business world is constantly changing. This is due to the appearance of new competition and the variation in consumer demands. These changes require companies to identify new business opportunities and constantly improve their performance. Likewise, the competitive pressure to which organizations are exposed forces them to improve their internal and external processes to achieve better results [1]. Companies must pay special attention to area functions such as Finance and Accounting, since together perform a valuable organizational process to achieve customer satisfaction and retention. In this area, it is vitally important to understand the proper management of processes in these areas of the company, since in many cases it is necessary to improve efficiency; effectiveness and actively manage capacity to ensure that these areas meet the reporting and control obligations required by the organization. If this is the case, it is necessary to find a method to improve the operational performance of Finance and Accounting services.

In the field of service stations, the importance of the Finance

and Accounting areas becomes more important. According to Aurelio Ochoa, former president of Petroperú, the service stations, according to Petroperú, have an average profitability of 20%, and that is excessively high, probably one of the highest profit margins in the world. Likewise, the AGESP (Association of taps and service stations of Peru) details that the average sales in the taps is between 1,500 to 2,000 gallons per day nationwide. In this sense, it is stated that when refineries raise the price of fuel, sales (in gallons) of taps tend to fall. This has been especially evident in recent years in which this sector has been affected by various factors. The most recent cause is the Covid-19 pandemic. This has had a strong impact on this sector. According to NRG (Natural Resource Governance Institute) (2021), "What has aggravated the impact of the pandemic on oil has been the abrupt drop in demand and international prices, as well as the slow recovery of prices and national production. The rise in oil prices combined with the rise in general prices worldwide, generates discomfort among users, especially in transport companies, whose indebtedness may increase because they buy fuel on credit at various service stations in the country. . Therefore, the implementation of a customer credit management model could be relevant in this area, since they have a large number of customers whose purchases are made on credit. The objective of this work is to propose a customer management model to address the high delinquency existing in a company dedicated to the retail sale of fuel. To do this, the structure based on the DMAIC steps (Define, Measure, Analyze, Improve and Control) will be followed to address the problem of customer delinquency[7,8]. The motivation for this work is to establish a model of evaluation and credit classification of clients, which serves as a guide for the various companies belonging to the retail fuel sector.

The document is presented as follows: the second section highlights the Theoretical Framework, the third section the State of the Art. The DMAIC input and approach is described and detailed in section four. Section five describes the validation and results. Discussion and limitations are described in section six. Finally, section seven highlights the conclusions of the work.

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## II. STATE OF THE ART

### A. Six Sigma DMAIC Methodology

The meaning of Six Sigma as a management philosophy refers to the desire of the organization or company to increase profit by improving the quality of the process. Likewise, the reduction of defects in a process is achieved through the DMAIC steps, since these are used to seek a substantial improvement of existing processes that are below the established specifications[2,4]. In this way. The objective of the six-sigma methodology through the DMAIC steps is to define opportunities for improvement, measure the effectiveness of the process to quantify the magnitude of the problems, analyze data to investigate the fundamental causes of the problems. problems, apply experimental techniques necessary to improve the process, and monitor techniques to maintain the effectiveness and improvement of the process.

### B. Six Sigma through the Financial Approach

On the other hand, when it comes to financial and accounting processes, this methodology has contributed to the reduction of errors in the processing of invoices, the reduction of cycle time and the optimization of cash flow[1]. Finance and Accounting is adopting a new approach, like Six Sigma, to address the needs of a variety of internal and external stakeholders." In the same way, in his study, he assures that, from a managerial perspective, the Six Sigma approach makes it possible to improve the efficiency and effectiveness of the Finance and Accounting areas. He also recommends that companies pay attention to the function of these areas in particular, as together they perform a valuable organizational process for achieving customer satisfaction and retention[6].

### C. KPI's

KPIs allow you to measure data in order to determine the performance of a process. This makes KPI's a key element for the improvement of processes in an organization. In the case of financial indicators, these are extremely important for the measurement of any project. According to Cox, Issa and Ahrens (2003), to measure the performance of companies and carry out a comparative evaluation, the priority is to establish key performance indicators (KPI's), which are essential to determine the success of a company. KPIs are collections of data measures that are used to assess the performance of an operation. These are the key to provide information on the performance of the processes and projects that are carried out in an organization.

### D. Six Sigma and KPI's

Quality excellence methodologies such as Six Sigma, Lean, help improve KPI levels based on customer-defined compliance standards. Therefore, it becomes a prerequisite for any organization to mature as a metrics-driven organization to absorb any quality methodology for process improvement.

Indeed, the use of KPIs is essential to know the state in which the processes of an organization are. It is necessary to establish them clearly and concisely so that their application and understanding is favorable for all members of the company. Without the use of KPIs, the application of any improvement tool or technique would be complicated and would require more time than necessary to carry out any implementation.

## III. CONTRIBUTION

The contribution arises from the need to implement an effective model that allows providing an optimal solution to the problem of the high number of delinquent clients presented by the company ETISSA S.A. This model makes it possible to correctly manage credit and collection policies and processes involved in the existence of a high number of delinquent clients, in such a way that said processes can be redefined, as well as achieving a reduction in the number of clients who do not pay off their debt. within the established time and become part of the company's delinquent portfolio. For this, the Six Sigma methodology is used through the DMAIC steps in order to structure the activities to be carried out to improve the credit and collection process. Likewise, this methodology, together with the use of KPIs, will serve to restructure the collection policies that the company had and keep track of the new proposed guidelines.

Below is a map of processes prepared and aligned with the main objective, which focuses on reducing the number of clients that become part of the delinquent portfolio of the company in question.

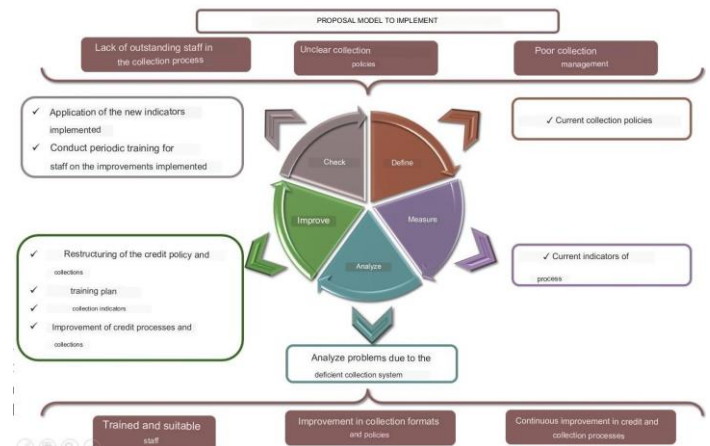


Figure 1 Proposal model

## IV. PROPOSED SOLUTION

For the application of the solution proposal, the implementation will be divided into five stages known as DMAIC belonging to the Six Sigma methodology. According to each stage, the problems to be solved and the different

improvement techniques used to reach an optimal solution will be identified.

a) **Define:** In the first stage, the company's current credit and collection policies will be identified.

Company's current credit and collection policy

1. Before a credit application, the person in charge of the credit process checks if the applicant presents data in Infocorp. If so, the requested credit is denied.
2. The applicant's data is verified, if correct, the application is registered and the credit is provided.
3. The collection area is notified of the entry of a new credit request and the area manager proceeds to communicate with the client and establish the payment date of the credit provided.
4. Payments made by customers are deposited by transfer to the company's account or through checks in the name of ETISSA S.A.
5. In the event of an overdue debt, the corresponding follow-up is carried out by email and/or calls.
6. If the debt is not canceled after the rescheduling of the payment, the client is transferred to the company's delinquent portfolio and the collection will proceed through legal channels.

b) **Measure:** In the second stage, the indicators with which the ETISSA company measures the credit and collection process will be measured. Likewise, it can be observed that in all the indicators the company is well below the expected average.

TABLE I  
COMPANY INDICATORS

Name	current result	Goals	
accounts receivable turnover	70 days	unacceptable	> 61 days
		acceptable	between 31 and 60 days
		excellent	<30 days
% of overdue portfolio	15%	unacceptable	>10%
		acceptable	between 6% and 9%
		excellent	<5%
% of clients managed	49%	unacceptable	<45%
		acceptable	between 46% and 75%
		excellent	>76%

c) **Analyze:** In the third stage, current management indicators will be analyzed in order to analyze whether the measurements

made previously are above the acceptable range. Likewise, the collection policies that the company has will be analyzed.

d) **Improve:** In the fourth stage, in order to improve the process, credit policies will be identified and current collections of the company and a restructuring of the same will be proposed. In this way, a prudent selection of clients will be made and it will be decided with whom to maintain a long-term relationship and with which clients to terminate the relationship.

**Credit Policies:**

- In a credit application, the person in charge of the credit process checks if the applicant presents data in Infocorp. If so, the requested credit is denied.
- The client fills out the credit application form provided by the company, which is reviewed by the person in charge of the credit area.
- The head of the credit area verifies the client's credit history with the company (if he has it). If the client meets the requirements, the heads and managers of the area proceed to sign the necessary documents approving the credit request.
- The client is notified of the requested credit approval and the credit and collection policies are attached. The electronic invoice is issued and sent.
- The collection area is notified of the entry of a new credit request and the area manager proceeds to communicate with the client and establish the payment date of the credit provided.
- Payments made by customers are deposited by transfer to the company's account or through checks in the name of ETISSA S.A.
- In the event of an overdue debt of less than 30 days, the collection manager must identify and notify customers of the due date of their debt through emails and/or calls.
- In case of an overdue debt of more than 30 days, but less than 90 days, follow-up is done through emails and calls, also notifying the Manager. Likewise, a collection request letter is prepared to collect the overdue debt. In addition, default interest is calculated and the debit note corresponding to such interest is issued.
- In the event of a debt overdue for more than 90 days, a debt file for the client with late payment is opened.

The client is notified of the opening of the file. Then, the client is transferred to the company's delinquent portfolio and the payment is made through legal means.

TABLE II  
TRAINING PLAN

Training plan for managers and collaborators						
Managed	workshop	topics	goals	participan ts	responsib le	Hrs
Credit and collection staff	1	Standardization of collection processes	Highlighting collection's credit role and overdue portfolio issues' impact.	General managemen t/ managemen t and staff of the accounting area and those in charge of collections	consultant, workshop organizer and credit and collection advisors	8h
	2	collection management tools	Know the techniques and collection tools, as well as control of the client portfolio			8h
	3	collection policies and strategies	know the importance of collection policy and collection mechanisms			8h
	4	stages of the collection process	know the stages of the collection process of a business credit			8h
	5	credit study techniques and payment capacity	Carry out a good study of the credit analyzing the client's ability to pay			8h

TABLE III  
COLLECTION INDICATORS

Name	current result	Goals	
Portfolio turnover rate not greater than 30 days	$\left(\frac{CXC + 360}{VNC}\right)$	excellent	< 30 days
		acceptable	between 31 and 60 days
		unacceptable	>61 days
percentages of clients managed	$\left(\frac{VPM}{VPC}\right) * 100$	excellent	>76%
		acceptable	between 46% and 75%
		unacceptable	<45%
percentage of overdue portfolio	$\left(\frac{MCV}{MC}\right) * 100$	excellent	<5%
		acceptable	between 6% and 9%
		unacceptable	>10%
claims rate for inefficient payment method	$\left(\frac{RMPI}{TC}\right) * 100$	excellent	<10%
		acceptable	between 11% and 30%
		unacceptable	>31%

e) **Control:** In the fifth stage, the new indicators implemented will be applied in order to maintain continuous monitoring of the improvements made. In the same way, a periodic training schedule will be carried out for area personnel in order to ensure the correct understanding and adoption of the implemented solutions.

## V. VALIDATION OF THE RESULTS

In order to be able to validate the results of the model proposed in the investigation, the simulation of the operational processes was carried out in the Bizagi software. What was sought with the simulation of the operational processes is to determine the impact that the proposal generates in the organization.

An analysis of the current situation of the company was carried out, in which it was concluded that ETISSA presents problems in the credit and collection process. Therefore, with the methodologies and tools selected in the investigation, it is expected to improve said process, reducing the number of clients that present debts with the company and consequently, the number of clients that go to the delinquent portfolio.

Below is a simulation of the diagram in BIZAGI for the current ETISSA credit and collection process. For this simulation, we took a maximum number of 70 replicates.

Validation Scenario:

The proposal is implemented in the area of Credits and Collections. Next in figure 2, the model of the proposal without the improvement is presented.

It is evident that of approximately 36 clients approved for credit, 12 cancel their debt, while 24 must be followed up and establish a new payment date. Of these 24 clients, only 9 cancel the debt, while approximately 15 clients go to the company's delinquent portfolio. It should be noted that the current credit and collection process has a maximum duration of approximately 27 days.

### Improved Credit and Collection Process:

Next in figure 3, the simulation of the model proposed in BIZAGI of the credit and collection process is presented, applying the new formats, policies and training proposed to reduce the number of delinquent clients and, in this way, achieve an increase in the operating profit of the company. It can be seen that of approximately 43 clients who meet all the requirements for credit approval, 9 cancel the debt in less than 30 days. Approximately 18 clients cancel their debt in a term greater than 30 days, but less than 90 days, to which late interest is charged for having canceled the debt outside the agreed term. Likewise, there is evidence of an approximate total of 4 clients who do not cancel their debt within 90 days, for whom a debt file is opened and they are transferred to the company's delinquent portfolio. It should be noted that the proposal to improve the maximum time for the credit and collection process was reduced to approximately 22 days.

### Results

Below is a comparative table of the credit and collection process before and after the improvement, according to what has been shown, it can be seen that the number of clients who have debts with the company decreased by 85.71% after restructuring the credit and collection process by applying the chosen methods and tools.

TABLE IV  
RESULTS TABLE

Results comparison		
number of customers with debts before improvement	number of customers with debts after the improvement	% distribution of delinquent clients
15	4	73.33%

## VI. VALIDATION OF THE RESULTS

The proposed model provides guidelines to improve the planning of granting credit to clients, achieving the optimization of the processes and the reduction of delinquent clients with accounts payable that go to the delinquent portfolio.

The Six Sigma methodology through the DMAIC steps allowed to identify the activities that did not generate value and thus be able to eliminate them, allowing to have the most

The implementation of new collection KPIs helped to better control the delinquency rate and the delinquent portfolio.

The proposed training plan served to instruct the personnel of the area in question regarding new issues of credit management and collections. Likewise, this plan will serve to periodically train staff and keep them updated and aligned with the proposed improvements.

For the validation of results, a simulator was implemented using the Bizagi Modeler software, which allowed restructuring the credit and collection process, reducing by 73.33% the number of clients that go to the delinquent portfolio, out of an estimated total of approximately 15 clients.

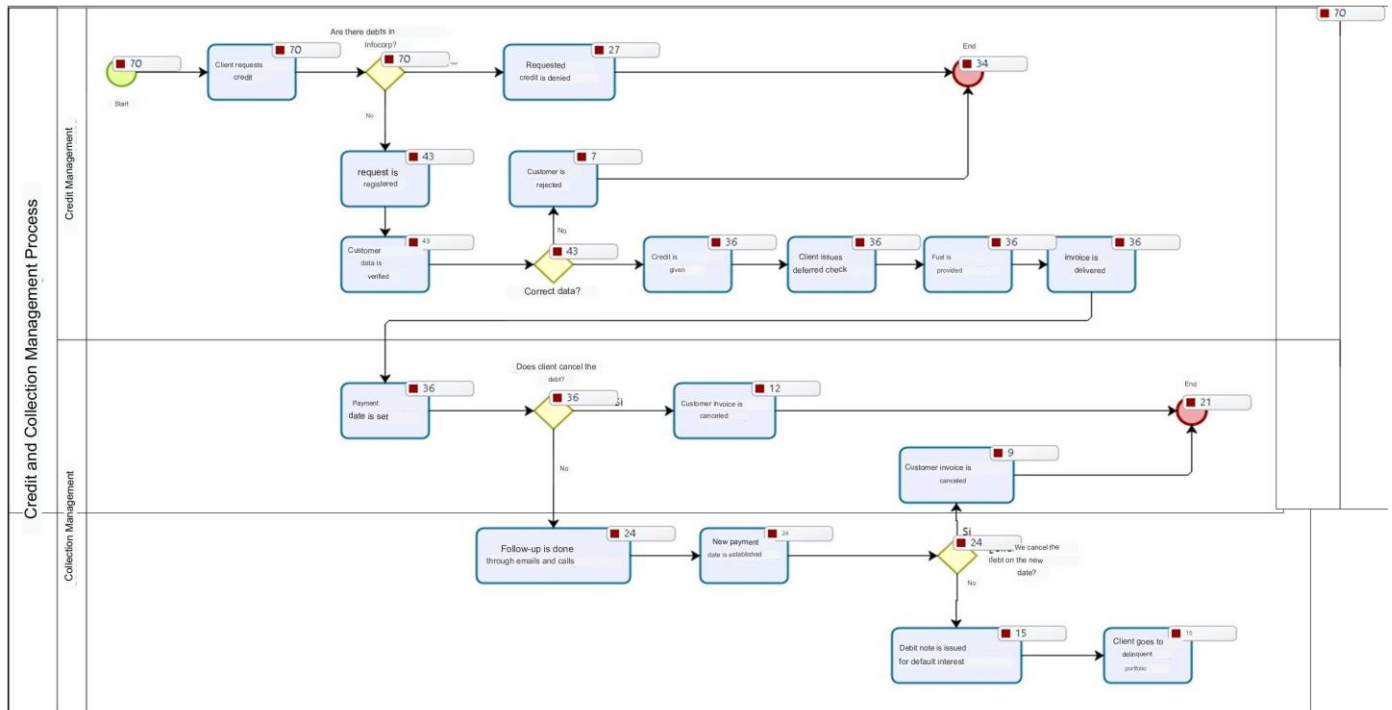


Figure 2: Credit and Collections process before the improvement

efficient and synchronized operational processes.

The credit and collection policy that the ETISSA company had was not the most appropriate for handling these processes. Likewise, said policy was related to the high delinquency rate in the company. Restructuring the policies and including a detailed format for the granting of credits in the process contributed to a great extent to the evaluation of clients to whom the credit was granted and consequently helped to reduce the number of delinquent clients.

in the process without improvement, to a total of 4 clients approx. in the process with the solution proposal.

When carrying out the simulation of the proposed model, it is concluded that the proposal is viable and will improve the customer management processes. In addition, it will improve the performance of managers in the Credit and Collections area and standardize tasks related to the client, resulting in a decrease in the delinquency rate.

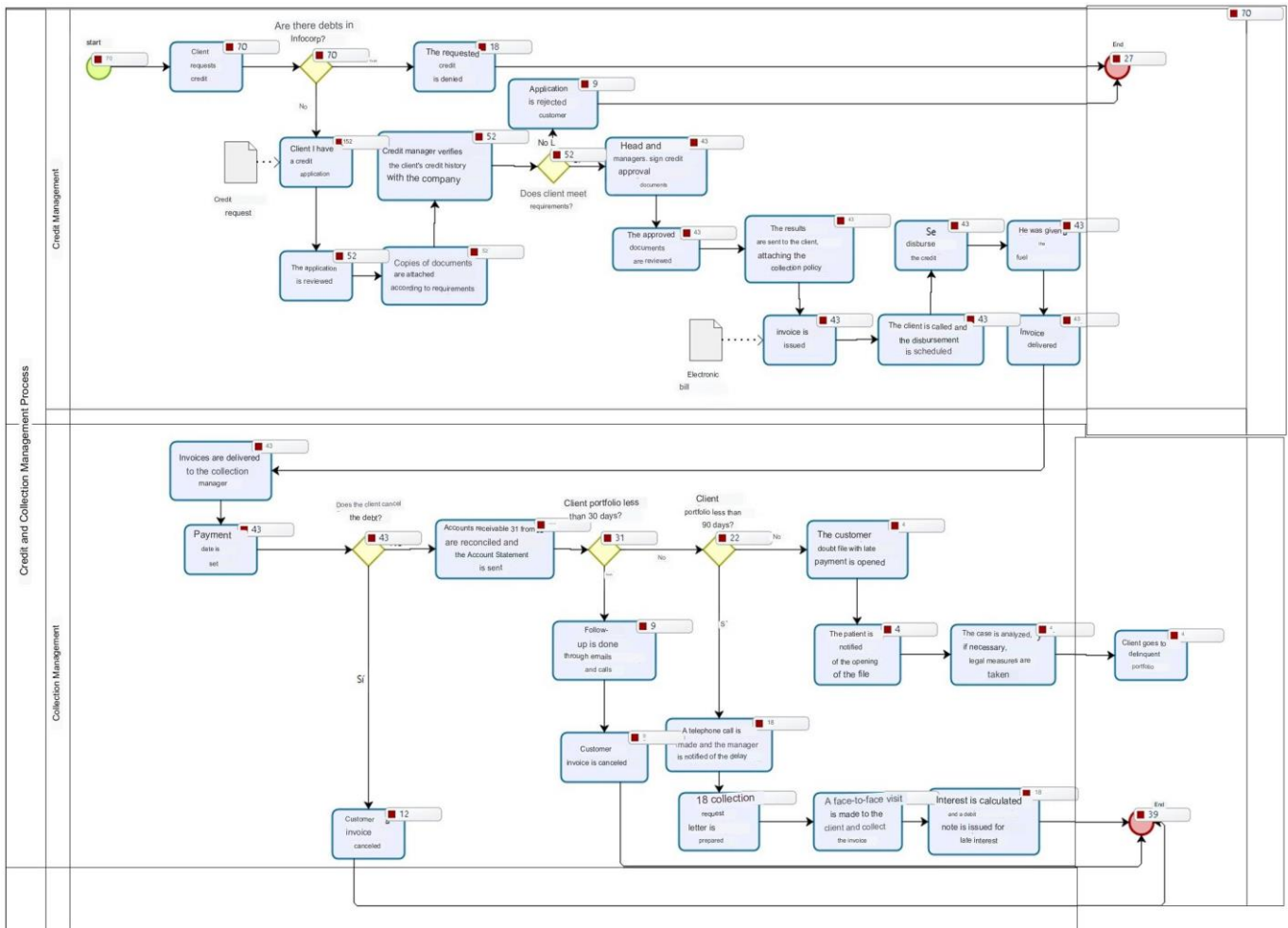


Figure 3: Improved Credit and Collection Process

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