Analysis of The Billing Process of Electricity Accounts At A Shared Service Center (Csc) In The State of Minas Gerais

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Abstract *— Due to increased consumption and consumer electricity units, distributors are seeking continuous improvement, making their processes more agile and assertive. This article presents a study of the billing process of medium and high voltage electricity bills in a service center shared in the State of Minas Gerais. The objective of this work is to analyse the billing process of electricity bills and demonstrate the variables that may be responsible for the accumulation of activities in the sector, through studies and analysis of billing periods, amount of invoiced customers and activities performed parallel to billing, showing the impacts and proposing an automation. Data were collected in the company studied from 10/2018 to 04/2019 and minitab16 software and Pareto graphic were used to demonstrate this data. Based on the results obtained, it was observed that there is an accumulation of demand in the process, considering that 51.23% of customers are billed in the last week of the month, which causes 75.67% of the overtime of the area causing failures in the process and loss of quality. Finally, it proposes the incorporation of Robotic Process Automation (RPA) to streamline the billing process and make it more accurate by reducing the number of reworked.*

Keywords *— Shared Services Center; Revenues; Neck*

I. INTRODUCTION

The number of units consuming electricity has been increasing considerably in recent years and consequently also increasing the demand for this service. For this reason, distributors are seeking to improve their processes aiming at a more agile and higher quality service for their customers.

According to the Energy Research Company (EPE, 2019), demand for electricity grew in all classes between 2017 and 2018, highlighting two of the three sectors, which recorded an increase above the national accumulated of 1.1 %. The industry ended 2018 with the largest increase in consumption: 1.3%; followed by residential consumption, with 1.2%, and commercial consumption, with 0.6% more, compared to 2017. The Other class ended the year with growth of 1%.

Therefore, the National Electric Energy Agency (ANEEL, 2018) uses an index to measure customer satisfaction. This index is called the ANEEL Consumer Satisfaction Index (IASC) and its main objective is to encourage the improvement of the provision of electricity services. Since 2000 ANEEL has been conducting a survey to assess the level of customer satisfaction with the services provided by the electricity distribution companies and the IASC is the result of this survey.

In the company studied there is a large excess of demand in a certain period of the month and the present work is justified by the need to identify bottlenecks in routines and the main causative agents, seeking continuous improvement, thereby reducing the margin of errors and rework. , increasing the quality of service and consequently making the company more competitive.

The objective of this work is to analyse the billing process of the electric bills in a Shared Services Center (CSC) in the state of Minas Gerais, after which to demonstrate the variables that may be responsible for the accumulation of activities in the sector, through studies. and analysis of billing periods, number of customers invoiced and activities performed parallel to billing showing the impacts and propose an automation of the process.

II. LITERATURE REVIEW

A. ROBOTICPROCESS AUTOMATION (RPA)

According to Aguirre and Rodriguez (2017) RPA is an automation technology that is based on software tools that can reproduce human activities for repetitive and non-value added tasks such as deleting, copying, pasting, extracting, mixing and moving dice from one software to another. The main benefits of RPA are reduced process execution time, reduced errors, improved work quality, improved productivity and, consequently, reduced costs.

III. METHODOLOGY

This study was based on analysis of data collected in the studied company from 10/2018 to 04/2019, which are, number of customers invoiced

and the billing period of each distributor, types of service orders opened by company, and overtime performed by employees.

A. COMPANY CHARACTERIZATION OBJECT OF STUDY

The work was performed in a Shared Services Center (CSC) that provides administrative services to other companies of the same group and is located in the state of MinasGerais.

The company in question belongs to a group that operates in 788 municipalities distributed in all regions of the country. The group consists of nine electricity distributors, having acquired in 2018 two more; a generation company; a trader; a solutions company and a shared service center.

Within the CSC there are several sectors including Billing Service Management (GSFAT), which is comprised of four areas: Group A Billing, Group B Billing, Collection, and Information Management. Group A is the area responsible for the billing of consumer units connected in medium and high voltage, has thirteen employees and is the sector where the work in question was performed.

B. MATERIALS AND METHODS

Through documentary and systemic analysis, the collection and quantitative analysis of the number of customers invoiced and their respective billing dates were performed from October 2018 to April 2019, the overtime generated in these respective months by Group A employees and work orders (OS) that are generated and fulfilled in parallel to billing. To demonstrate this information, the Minitab16 software and the Pareto Diagram were used. According to Cymrot and Jorge *et al.* (2006), Minitab16 is a statistical analysis program created in 1972. This software made it possible to generate graphs of the months studied with the number of customers invoiced per day in each distributor of the group and thus the demonstration of periods where there are bottlenecks billing process.

"The Pareto chart is a bar chart in which the bars are sorted from highest to lowest and a curve is drawn that shows the cumulative percentages of each bar." (WERKEMA,2014, page. 68).

The Pareto Diagram or Pareto Chart are vertical bars sorted according to quantity, frequency of occurrence, in descending order, giving priority to problems. The Pareto chart principle states that a problem is caused by a reduced number of variables. "Thus, with the identified causes, actions are taken to eliminate or reduce them, which will mean an 80% reduction in company losses" (TRIVELATTO, 2010).

IV. RESULTS

The presentation of the results and discussions of this work was structured in the stages: study, investigation and proposal.

A. STUDY

In the company under study, the clients are grouped in books, these books have itineraries according to the location (City where the consumer unit is located), route (sequence in which the readings will be collected) and account (customer identification) consumer unit. Books can be either remote or field telephones, measured telephones are those where all UCs have a remote installed on their meter that causes reading records to be sent remotely to the corporate system; The field units, on the other hand, do not have a remote installed in the UC meter, and the collection of these records is made directly at the consumer unit by a qualified professional.

Each book has a reading period and a given day for collection and billing. Books whose readings range from the first to the last day of the month are within the fiscal month and consumer units that have no reading range generate what is called "uninvoiced". An example of this is a UC that is in a book whose reading date is every 15th day this unit will have in that reference 15 invoiced days and 15 non-invoiced days. And it is with the goal of reducing the amount of " uninvoiced" that the company in question allocates the largest number of customers in the last days of the month.

About 16,390 consumer units are billed monthly by group A, and with the incorporation of the two new companies acquired by group A this number will increase to about 19,046 UCs.

In addition to the large volume of customers concentrated in the last days of the month, unforeseen events often lead to unexpected process delays, such as a system failure. Another variable is the requests made by other areas to the billing sector through work orders (OS) that are generated with several requisitions. These are: OS 289 (Registration Update), OS 206 (Refinancing), OS 619 (Judicial Re-Billing), OS 682 (Suspension of Fee Collection), OS 683 (ICMS Exemption on Tariff for Use of Distribution System) - TUSD), OS 684 (Inclusion of ICMS on the tariff for the use of the distribution system - TUSD), OS 686 (Return of values by court decision), OS 617 (Cancellation of debit by court decision), OS 815 (Refund of values), OS 180 (Invoice Cancellation).

Each work order has a specific deadline for fulfilment, and for OS 289, 206, 137, 180, 815, 682, 683, 684 and 686 the deadline is 5 working days and for OS 619 this time is shorter, 2 business days.

B. CLEARANCE

With the help of the Minitab16 Software and the Pareto chart, it is possible to analyse and demonstrate through graphs the date collected in the company under study.

Figure 1 presents the charts with the number of UCs and the billing dates of each company from October 2018 to April 2019.

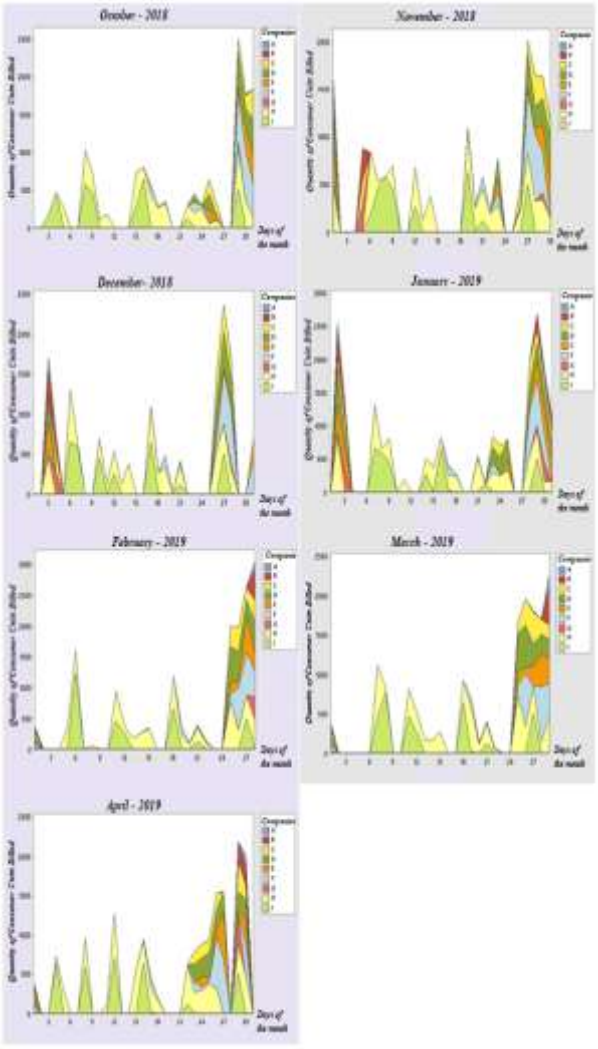

Figure 1: Billing Schedule of nine distributors in the period from 10/2018 to 04/2019. Source: Author. 2019

It can be observed that there is an excess of demand in the period between 24 and 30, this is due to the objective of the studied company to reduce the total of " uninvoiced". It is also observed that on the other days of the month only three of the nine distributors have high voltage books to be billed.

Customers concentrated in the last week of the month account for approximately 51.23% of total customers invoiced in the month and this leads to process backlogs, overtime and even errors and rework during that period.

Figure 2 shows the graph with the average overtime worked by group A employees during the study period.

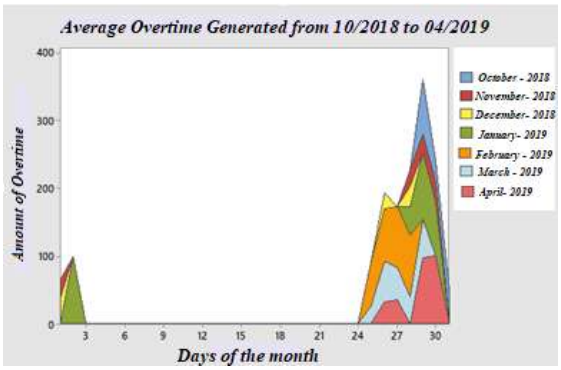

Figure 2: Average of Overtime Generated from 10/2018 to 04/2019. Source: Author. 2019

The period in which most overtime is generated is exactly the same period as the excess of Group A consumer units in the billing process. During this period of the month, employees generate 75.67% of the total overtime of the month.

One of the activities performed in parallel with the billing process is work orders that are generated during the month with various types of requests.

Figure 3 shows through the Pareto chart the average of work orders generated in the months studied:

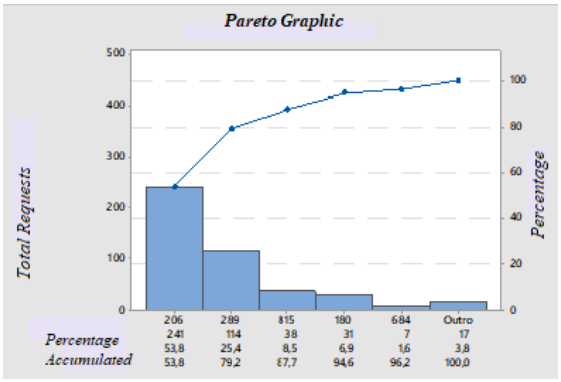

Figure 3: Average of work orders generated in the studied period

The OS with the highest incidence of openness is 206 (Re-Invoicing) which has a service term of 5 business days.

Below is shown in Figure 4 the ratio of the average work orders 206 requested during the month.

Figure 4: Work Orders Average Graph 206. Source: Author. 2019

Based on the above date, it is concluded that OS 206 generated after the 20th must be serviced and run parallel to the billing process due to its due date, and this will cause employees to suspend their activities to perform the service and to compensate for this break and to complete their activities, they must overcome their daily work hours, resulting in overtime.

C. PROPOSAL

There are currently several technologies that are used to automate mechanical processes that are performed manually. Lacity and Willcocks (2016) identified, after twenty-five years of research, that there are five levers for transforming companies' Shared Services Centers. But recent developments in automation have added this sixth lever to the Shared Services Centers transformation model. Also according to these same authors, cited by Suri *et al*. (2017), mention that Robotic Process Automation (RPA) embodies this sixth lever and should be incorporated into CSCs as the next transformation lever.

Figueiredo, Alcídio Fernando da Costa da Silva (2019), after performing a process of implementing robotics solutions as an automation tool in six Portuguese Shared Services Centers and discussing their impacts, concludes that for the companies participating in the process it was clear that after realizing what RPA is and the results that these solutions can bring, its adoption comes as a near necessity, otherwise companies are missing out on a competitive opportunity. And they adopted the method to achieve resource savings and rationalization of structure, systematization and consistency of processes, release of resources for higher value-added processes, release of resources and upgrading of skills, efficiency and also cultural change.

In order to reduce the time taken to complete the billing process, it is proposed to implement an RPA that makes a series of checks on the book to be invoiced, namely:

Check current consumption, compare with last 12 months consumption and if there is a variation greater than 30% the corporate system itself will send an automatic confirmation request to the measuring sector;

Check if there were any changes in the register of the consumer unit and if so, check if there are readings of the meter taken to collect the residue;

Check between the previous and current month for changes in customer registration client ;

After completing the checks, the system should list only consumer units that did not fit the above filters to be handled by employees.

V. CONCLUSION

It is considered that the consumption of electricity is increasing more and more in Brazil and in the world and with the increase of the demand, the distributors are trying to improve their services making their processes more efficient and with higher quality. The analysis carried out in the CSC billing sector in Minas Gerais aimed to identify the process variables and bottlenecks, show the impacts caused and propose a solution to reduce excess demand in the last week of the month.

The methods used for the elaboration of the present work were bibliographic revision, documental collection and analysis and data system of the company object of study, and demonstration of the data through the Minitab 16 software and the Pareto graph.

It was observed through the collected data that the company object of study concentrates the invoicing of 51,23% of the clients in the last week of the month to decrease the amount of uninvoiced and this generates a demand accumulation in the period. It was also observed that in the last week of the month, the highest volume of requests for refilling of electric energy bills (OS 206) is generated, which may be caused by the excessive fatigue of employees, given that during this period 75 , 67% of overtime in the area.

Based on the above data, it is proposed an RPA that makes the primary and mechanical analysis of the billing process, making the process faster, reducing the margin of errors and increasing the quality of service.

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