Study of Improper Dislocations in a Brazilian Electric Power Concessionaire: A Proposal of Reduction

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Abstract

One of the greatest difficulties faced by electric power concessionaires is the improper dislocation, that is, the dislocation of field teams that should not have occurred. Therefore, the purpose of this study was to reduce the number of improper dislocations in a Brazilian electric power concessionaire optimizing the work of teams. For this, an analysis of the stages of the occurrence attending process of lack of energy recorded by the call center was made to identify the main causes and propose improvements. In the methodology, we carried out analyzes of the company's reports of attendance and service model through a flow chart and it was verified that the major cause of the improper dislocation is the fact that the energy is already normalized when the field team arrives at the requested place. Therefore, a new system was implemented for three months, in which a company employee returned the calls to customers 10 minutes after the call was opened to check for possible energy normalization. According to the results presented, it was possible to avoid 427 improper dislocations in a total of 2829, a reduction of 15% in the index provided by the new system.

Keywords – *Improper Dislocation; Field teams; Electric power*

I. INTRODUCTION

In the contemporary world, electricity is considered an essential good for society. Through it, it is possible to operate different electrical and electronic devices, to move motors, to generate electric light, being vital for the everyday life. The electric energy consumption has been growing, and according to the [1], in 2017 the variation in electricity consumption in Brazil was + 0.8% in relation to 2016.

As a result of this increase, electricity distribution companies have sought to improve the quality of their services to provide customers with a continuous supply of energy, since any lack of energy causes a great deal of dissatisfaction and costs to the company due to the dislocation of field teams.

A constant problem faced by the operations center of the electric power distributors is the improper dislocation, that is, the movement of the field teams that should not have occurred. Therefore, the study is relevant because it presents an alternative that provides a reduction of these inappropriate displacements.

Given this situation, this study has the general objective of quantifying the total improper dislocation occurrences in a Brazilian Electric Power company from January/2017 to March/2018 to reduce these numbers and optimize the work of field teams. In addition to it, as specific objectives, the study seeks to analyze the causes, verify the processes that precede the dislocation of the teams and implement a call-back method, which consists of a new telephone contact with the client after the first contact to reduce improper dislocation in the company during the months of April, May and June/2018.

II. LITERATURE REVIEW

A. The Brazilian electricity sector

Electricity is vital to society and contributes directly to the socioeconomic evolution of nations. The National Electric Energy Agency (ANEEL) is the agency created to regulate the Brazilian electricity sector. "ANEEL's purpose is to regulate and supervise the production, transmission, distribution, and commercialization of electricity according to the legislation and the federal government guidelines and policies" [2].

According to [3], in Brazil, the main source of electricity is the hydroelectric (river running water), which accounts for 62% of the total country's production, followed by thermoelectric (natural gas, coal, fossil fuels, biomass, and nuclear), with 28%. The rest comes from wind power plants and energy imports from other countries.

According to the [4] [5], Brazil ranks 7th on a scale of developed countries, and its economy is supported by several sectors, among which the electricity sector stands out, consequently assuming a role of growth propeller, considering that the investments in this area contribute to the development of other sectors of the economy, especially the infrastructure.

B. Consumer service in the Brazilian electric power sector

One of the first attitudes adopted by costumers in cases of lack of electricity in households or commercial institutions is to contact the company to report the inconvenience. In this case, “it must be reestablished almost immediately, since, nowadays, the comfort brought by the use of electricity has made people dependent on this type of service” [6].

According to [7], the volume of requests from users of electric companies is quite significant and may vary according to the time of day (day or night), day of the week (weekdays or weekend), season (dry or rainy), user location (conditions of network equipment), in addition to winds and storms, which rarely occur, causing damage in several places of the network simultaneously.

Reference [8] states that: The number of occurrences in a LV (low voltage) distribution system is directly related to the climatic conditions, being strongly influenced by the high temperatures, which contribute the increase bad contact problems in the connections and extensions of the customers, and disarming or burning of transformers due to the increase of the consumption. In addition to the heat, heavy rains with strong winds cause the number of occurrences to grow frighteningly.

The author states that in the first contact with the consumer, the company’s call center operator usually follows a guide, a script to try to immediately identify the cause of the lack of energy, also guiding them to simply inspect the premises for a possible disarmed circuit breaker, blown fuses and even burnt out light bulbs. This procedure is intended to prevent field service personnel from moving to the site, and after arriving there, realize that it was an internal problem at the customer's premises. When it happens, the number of improper dislocations increases.

C. Improper Dislocation

The improper dislocation is classified as “any occurrence reported by the field team caused by internal defects, closed households and/or with difficult access to measurement, and when the power supply is already normal” [9].

As stated in the Brazilian Association of Electric Energy Distributors Association [10], in cases of internal defects proven through analysis of the measurement data, when is evident to the electricity distributor that the problems are actually internal to the consumer, the company would indicate the usual procedures and the contracting of specialized consulting to propose the best solution, since the correction of this type of problem is not the responsibility of the distributor.

1) ***Main causes of improper dislocation:*** According to [11], in their research, there are five classes of common causes of improper dislocations, described below:

- Energy normalized: customer with electric power at the time the team arrives at the place;
- The internal problem: customer without power due to internal defect;
- Address not found: staff cannot find the address, for reasons of inaccurate names or numbers;
- Closed building: staff finds the address, but no customer in place/closed.
- Public lighting: team finds wires of public lighting, for which has no technical responsibility of attendance (city hall is responsible).

Reference [12] identified four important agents that can contribute to reduce the dislocations:

- Client: usually confused in the description of the event and insists on having a field team to attend to their request, even without first evaluating the possibility of having some internal problem in their consumer unit.
- Call Center: the attendant, in doubt and due to the possible risks to the client involved, request the use of the teams.
- Operations Centers: the operator, despite the available technological resources, cannot always be assertive in the diagnosis of improper dislocations.
- Field Teams: When the problem is internal, team action is difficult. Thus, there is a possibility of repetition of these dislocations, since the client can remain without power even after the team has moved to the place, which can create new improper dislocations.

III. METHODOLOGY

For the development of this work, the following research classifications were used:

• Applied research: The present study used an available alternative to implement a new method of reducing improper dislocations.

• Case study: Held at a Brazilian electric power company to analyze, describe, explain the processes studied and apply improvements.

• Bibliographical and documentary research: In order to obtain a broader knowledge of the subject, a bibliographical review was carried out through articles found in google scholar and in governmental sites associated to electric power, from April to October/2018. The documentary research was based on system reports and institutional worksheets.

• Descriptive research: For this study, an analysis was performed on the customer service model, shown in a flow chart (see figure 1). A survey was made of the information provided by the company referring to the index of improper dislocations in the period from January 2017 to June 2018, which were then analyzed and interpreted.

• Quantitative research: After collecting, analyzing and interpreting this information, they were quantified and recorded on a graph (see figure 2) for a better visualization and evaluation of the behavior of the dislocation variable, which is undesirable in the course of the months.

• Qualitative research: To verify the behavior and analyze the script performed by the call center during the customer service process.

A. Customer Service Process Flow Chart

Figure 1 illustrates the current model of customer service, referring only to complaints of lack of electricity. This flow chart was developed in a Microsoft's software for creating diagrams, Visio 2013.

As shown in figure 1, complaints can be made via call center, application or social media. When it is received through the call center, the attendant, who is instructed to make the standard script, tries to make sure if the client's request proceed, i.e. through the script, it seeks to eliminate any possibility of improper dislocation. Yet, in cases in which the complaint is made in the application or social media, the customer himself responds to this script on his device.

If after the verification phase it is determined that the complaint does not proceed, either because of an internal defect or public lighting, etc., it is filed. Otherwise, the complaint is transferred directly to the operations center, which is responsible for providing the service, by forwarding services to the field teams, according to their region of operation.

After the field team has solved the problem, the service is finished. When a request is not attended, it is probably because it is not the responsibility of the distributor. If this happens, the complaint is finished and filed, thus making it improper due to the unnecessary movement of the team to the place. And, if for any reason the client needs more clarification regarding his request, he may resort to other service channels, which will not be analyzed in this study.

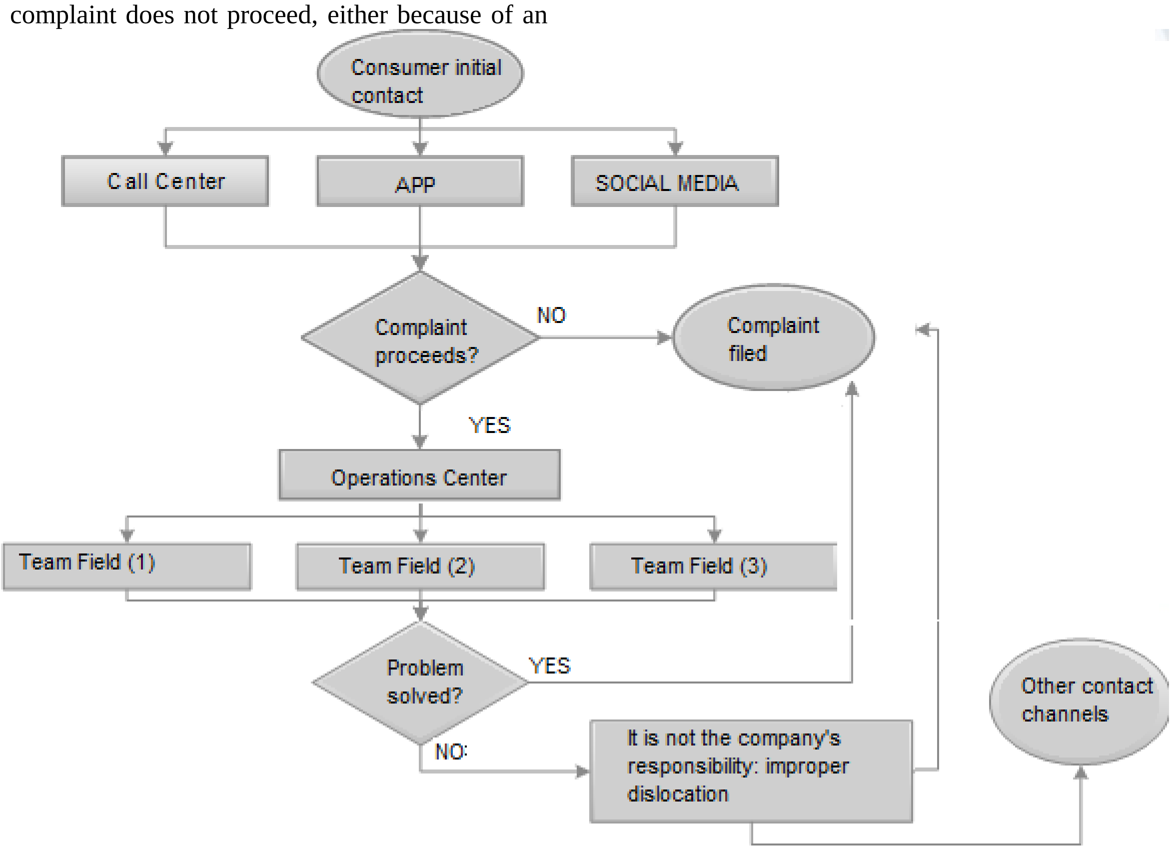

Fig. 1: Customer Service Process Flow Chart

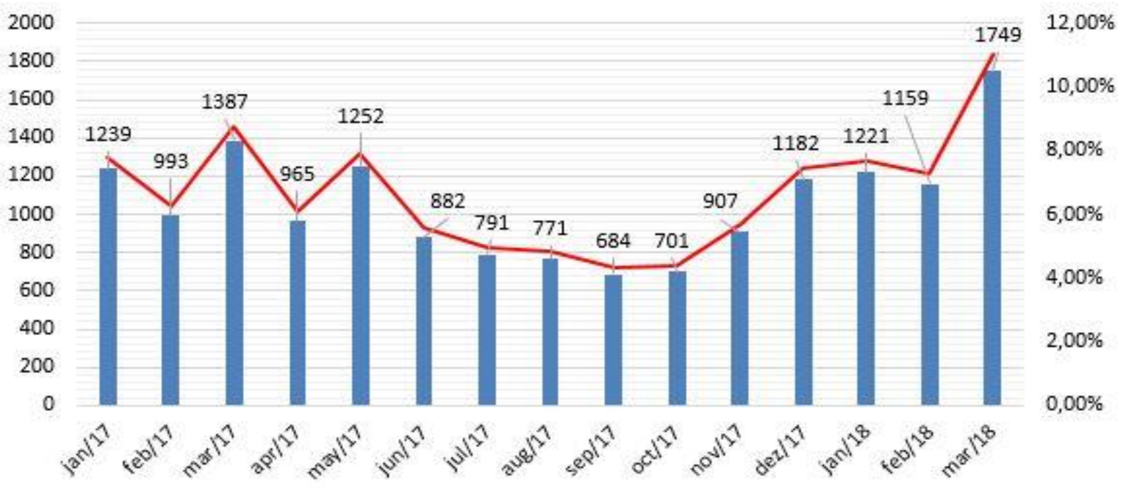

Fig. 2: Graph of the number of dislocations

B. Index of occurrences of dislocation in the company

With the information contained in the system reports and spreadsheets of the company under study, the data were published graphically as shown in figure 2.

Through figure 2 you can see the amount of calls that led to an improper dislocation from January/2017 to March /2018 in the company, totaling 15,883 occurrences with the lowest percentage in September/2017 with 4.31% and the highest in March / 2018 with 11.01%.

Reference [13] states that the wet period is from December to April, and is usually the period with the most rainfall, and the dry period usually presents few rains, from May to November. This explains the reason for the decrease in the records of improper dislocations in the dry period shown in figure 1, since, with few rains, the number of occurrences decreases.

After analyzing the information contained in the company's service reports, it was found that in some cases the power had been normalized after a few seconds, but the customer had already requested a service. However, the information regarding energy normalization did not reach the operations center, which dispatches the services, thus causing an improper dislocation. Therefore, the alternative found to minimize this index and reduce the impacts caused by it, was a c new contact with the customer by the company.

To do this, during the months of April, May and June/2018, during some periods of the work shift, an employee contacted several clients who opened a call in that time, acting before the requests were forwarded to the field team to try to avoid improper dislocations. Thus, the employee called customers back about 10 minutes after the first contact to check for possible electrical power normalization or an internal customer problem.

IV. RESULTS AND DISCUSSION

After the implementation of the returning call method proposed in item B, in the methodology, the service flow chart was presented according to figure 3. The changes occurred before the operations center performed its function, so the consecutive processes remained the same.

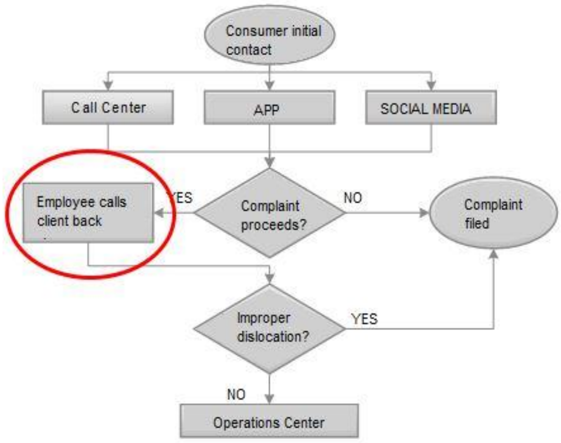

Fig. 3: Flowchart after call-back method

After the stage in which the call center operator classified the call as "proceed", the employee responded by returning those calls to the costumers 10 minutes after the registration. When he identified that the request was a cause of improper dislocation he would finish and file it, or else he would forward the calls to the operations center that then forward the service to the field team.

This method was applied from April to June/2018, for 52 days, totaling 260 hours. During this period the company recorded a total of 2829 improper occurrences: 1167 in April, 904 in May and 758 in June. However, due to the implementation of this method it was possible to prevent 427 of these occurrences from being attended, since they would

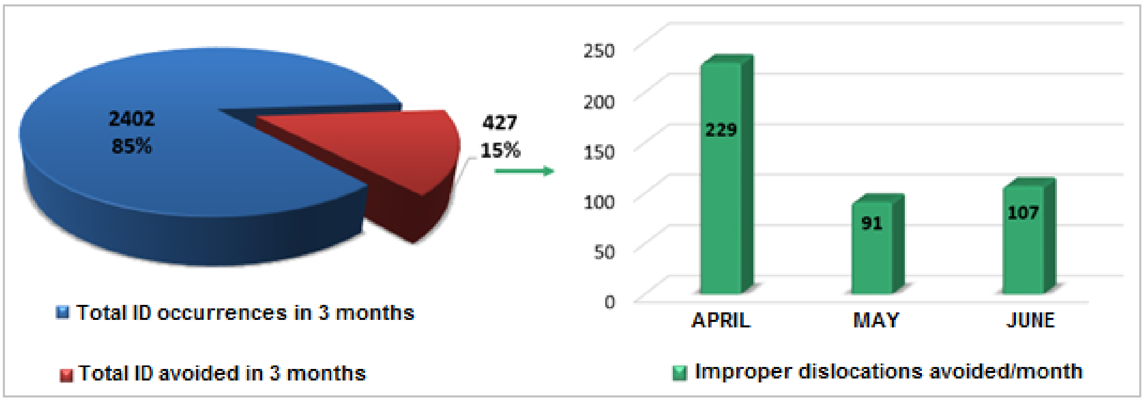

Fig. 4: Relation between the total of improper dislocations (ID) occurred and avoided per month

cause unnecessary dislocations, as shown in figure 4.

According to figure 4, 2402 improper dislocations occurred during the three months of this research, which corresponds to 85%, 427 of them were avoided by the new method (229 in April, 91 in May and 107 in June, corresponding to a reduction of 19.62%, 10.0% and 14.1 2 7%, respectively, with an average of 15% of reduction.

During the application, 824 calls were made. 427 of those calls were the improper dislocations avoided (energy already normalized / internal defect), 138 of them were unsuccessful either because the customer did not answer the phone or because there was some inconsistency in the information registered (unsuccessful contacts) and 259 were requests in which the client really needed service from the staff (complaint proceeds).

According to Table 1, "already normalized energy" is one of the main reasons that causes the improper dislocations corresponding to 99.29% of (improper) occurrences avoided. This can occur when the call center operator or the client mistakenly generates an occurrence without identifying the information passed on by the customer, or when the client is not able to describe precisely the problem. It can also occur when the power supply is oscillating due to heavy rains and/or strong wind. These short circuits cause the network's protective equipment to start up, performing three cycles of interrupting the power supply for 3 seconds/cycle. However, in cases with permanent short circuit, the equipment remains disabled for inspection by the team.

The "internal defect" is observed when the customer's circuit breaker disarms, and when trying to turn it on, it does not work due to a short circuit on the customer's premises. This problem occurs less frequently, and during the period of this study only 3 occurrences were recorded.

Although this study did not address the costs generated by the improper dislocations, its reduction brings financial benefits since it avoid the waste of time of the teams in the field optimizing man-hour cost and also reduces expenses with vehicles related to dislocation of the teams.

Moreover, this reduction provides more agility in the service to customers who really need it because field teams will be more available, thus improving the company DEC (Equivalent Duration of Interruption per Consumer Unit) and FEC (Equivalent Frequency of Interruption per Consumer Unit) indicators. These indicators represent, respectively, how long and the number of times a consumer unit runs out of electricity and are accounted for by the distributors and sent to ANEEL to verify the continuity of the service provided.

The results also prove the importance of the attendants, of the verification script and of the customers to reduce improper dislocations, showing that the precision of the information provided by customers, the level of knowledge of the attendants and the proper compliance of the script make a great difference to achieve a good result.

Reason / Month	April	May	June
Normalized Energy	228	91	105
Internal Defect	1	0	2
Unsuccessful Contacts	28	81	29
Complaint Proceeds	42	126	91
Total	**299**	**298**	**227**

Table 1: Shows the result of the connections

V. CONCLUSIONS

The present study sought to identify the reasons that cause improper dislocations and reduce the percentage of occurrences in a Brazilian electric power company. For this, it was necessary to investigate the customer service process from the opening to the closing of the call and an analysis of the data recorded in the reports and spreadsheets of the company.

The flowchart allowed a better understanding of the customer service process, and then it was possible to propose an alternative to the process with a system of returning telephone calls made by a company employee before the request was forwarded to the field teams. This method was applied during the months of April, May and June/2018, totalling 260 hours of activity. During this period, from the insertion of a new phone contact with the client performed by the employee for the verification of a possible normalization of energy, according to the proposed methodology, it was possible to avoid 427 improper dislocations, reaching a reduction of 19.62% in April, 10.0 7% in May and 14.12% in June.

The study concluded that the major cause of improper dislocations is " energy already normalized", which can occur due to an error or misinterpretation of the information during the opening of the call between the call center operator and the customer, or due to oscillations energy caused by natural phenomena such as rain and strong winds. The results indicated an average of 15 % reduction of the index of improper dislocation due to a simple change in the flowchart with the introduction of a telephone call, with no costly measure required.

Other issues could be explored in future studies, such as the costs of these dislocations and their impact on the company. Different techniques for minimizing problem can also be studied, such as training for call center teams to improve customer service, the development of an informative with tips and explanations to customers, and even more complex measures like the application of the functions of a call-back, which are executable codes that automatically return the call to the customer who previously contacted the call center.

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