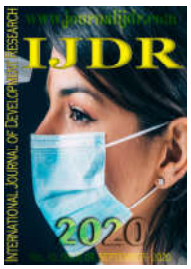
ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 10, Issue, 09, pp. 40836-40842, September, 2020
https://doi.org/10.37118/ijdr.20027.09.2020



RESEARCH ARTICLE OPEN ACCESS

ANALYSIS OF VOLTAGE LEVELS IN ELECTRICAL ENERGY DISTRIBUTION SYSTEMS IN A COMPANY IN THE INDUSTRIAL DISTRICT OF MANAUS/AM

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ARTICLE INFO

Article History:
Received 20th June 2020
Received in revised form
14th July 2020
Accepted 20th August 2020
Published online 30th September 2020

Key Words:
Voltage levels, Performance, Distribution, Electricity.

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ABSTRACT

Electrical energy is a very precious asset for contemporary society because the social reality is directly linked to devices that are activated by this type of energy. This study traces an approach to promote the analysis of energy distribution in the voltage levels of an electrical system in a company in the Industrial Pole of Manaus (PIM) making a statistical approach to the quality of the energy transmitted by this system and the quality factor. The base of the factors that promote criteria to judge in this research conditions of accomplishment is centered in the principles proclaimed in the resolution nº. 505/2001 of ANEEL (National Electric Energy Agency), The express regulation, highlights that all the companies in charge of the distribution of energy in Brazil must assume the needs to comply with the determinations and recommendations demonstrated by the regulatory agency. Power quality is a determination that must always be a priority for the improvement of the electrical system, as it passes through all stages of its generation, distribution and consumption. Work on the quality control of tension levels, addressing its guiding aspects and evidence prone to the use of an expressive diversity of new concepts related to the statistical control envisioned in the process, as well as questioning the indices on capacity and performance as an additional information required and prognosis. For a methodological treatment, a case study was performed relating two circuits of a low voltage distribution, the data were compared, using criteria and protocols according to what ANEEL expresses, which translates the consistency in the achievement of the highlighted objectives. The analysis of the potentialities and the contributions of the statistical device that was proposed based on the vigorous procedures that become the final product of the work that estimates the data collection, the indication of the defect, if any, and the delivery of possible solutions.

Citation: ***Giorge Figueira Souza and Francimeire Gomes Pinheiro, 2020.*** "Analysis of voltage levels in electrical energy distribution systems in a company in the industrial district of manaus/am*", International Journal of Development Research*, 10, (09), 40836-40842.

INTRODUCTION

Society is incorporating new ways of life and expanding into possibilities. The Electric Energy becomes a very critical, demanding current activities because the technological processes, developed based on this inset, is the electricity of makes the electrical devices and others work.Oliveira (2018) describes that electricity is an effective form of education for the socioeconomic development of societies and impacts on people's lives in a significant way, with it allows to trigger and emancipate diverse systems that are improving to respond to existing demands. The evolution of technologies, the growth and development of public institutions that incorporate new management capacities and services facilitator generates the estimate of consumption and generation as a forecast of market growth, as each change in the business and services scenario generates new demands and energy. Novaes' view (2017) of the energy generated and used can be from sources that cause less impact on the environment. For this aspect, the availability of energy that is generated should be considered, considering the rate of occasional losses and suggests that the transformations are potentializing agents for improvements, whether in economic, social or environmental areas, triggering new access points to technologies and speeding up the incorporation of new means of generation. Electric energy since its discovery increases a diversity of use that has been unfolding since the end of the last century, resulting in a strong, prominent dependence on the part of society in relation to the use of energy in different modes (TOLFO, 2017). Brazil at the center of the discussions, government initiatives

regarding electricity, have been based on the growth of energy availability and the counterpart is the emergence of electricity companies, favoring the construction of energy generating plants and the design of public bodies focused on the electric sector, the promotion of effective actions in the electric sector, reconciling with the regulation and management directed to successive improvements in the system. In Brazil, the adoption of an energy permission and negotiation model, whose companies operating in the market are subdivided into three segments: power generation, those that have the role of seeking to balance environmental impacts, diversify the ways and requalify the sources used, the transmission that implies the search for improvement of improvements for this service, where the systems tend to connect, high technology and diversity of ways of operation and the distribution that consists of the way of delivering quality energy to the final consumer and with improved cost. The distribution concessionaires admit the service condition in certain regions, which are called permission areas, these companies are charged with meeting residential, commercial and industrial needs, related to the supply of electricity. The requirements for participation in energy distribution, these companies must compete in open bidding processes that include the offer of subsidies that the concessionaire proposes.

Brazilian legislation clarifies the bidding process, according to Oliveira (2020) an electric energy distribution concession contract is signed with a distribution company that presented the most favorable condition in the concession area and the government, the legal representative of the Government is National Electric Energy Agency - ANEEL. Every concession contract has the condition of significant standards related to sustaining the quality and friendliness of the services provided by the concessionaires in the electricity sector, it still has the delegation to provide the requirements and parameters that allow the distribution of electricity, in addition to meeting deadlines stipulated for carrying out the demands. Fagundes (2017) points out that the structure is designated tends to show the quality and frequency of supply indices, the continuity of supply is a major factor in the quality of the electric energy delivered to the consumer, as the determination of indicators shows the period and frequency of faults that the system implies and, it is up to the regulatory body to determine measures that assure acceptable levels of quality of services provided by electric energy concessionaires in the country, being essential the continuous supply of electric energy for social well-being and development economic performance of a region.

The connectivity of the official regulatory system requires permission sector updates are implemented and description of the conditions of adoption of parameters and technical particularization voltage level that will be provided to users to be effective and capable of meeting the specifications and this reflects the quality condition of electrical and electronic equipment used fruit energy efficient distribution and committed to quality. For this work, the importance of diagnosing possible operational failures is glimpsed, the identification of which can be detected from the analysis, making it possible to correlate statistical tools as a mediating mechanism of parameters used in the development of activities dedicated to the question, quality of energy served to the user. So, I set out to question what is the standard of energy quality that we have and what is expected from the installed processes? Such questions raise responses that are mediated by the application of analysis of the data provided by the concessionaires and the operation system in addition to analysis of case study data that aims to assist in the understanding of the collected and analyzed data. Knowing that such mechanisms are the product of a vast chain that reflects on the quality of energy, it reflects the importance of requesting regulation of the quality of electricity as a crucial factor surveyed by ANEEL. In the midst of such concerns, Brazil (2001) brings ANEEL Resolution 505, of November 26, 2001 - R505/2001 which among its attributions, seeks to establish the provisions related to the conformity of the voltage levels of electricity in permanent regime, establishing the methodological standards that measure stress levels, based on such conditions, it promotes the assessment of possible new investments in strategic areas to correct operational failures, which often increases the cost / service. Mendonça (2016) clarifies that respecting the right to receive electricity with quality compatible with the usage requirements is essential, as well as promoting compensatory factors to automate the failed systems and minimize the burden on the consumer with respect to the tariff electricity. The observation of possible failures and the dynamization of corrections shows that this study aims to collaborate with the discussions and generate operational conditions, as a means of synchronizing the regulations that support the system, ensuring a level of distribution in operation in a desirable manner. It seeks to integrate knowledge to discuss topics of general interest, highlighting the aspect of using a statistical method based on characteristic concepts of the analysis process, as, as Montgomery (2004) points out, one of the points of view of the quality of electricity at the level of tension is in the observation of structural factors and their synchronization. The analyzes were carried out in a company at the Manaus Industrial Pole using appropriate equipment with a view to observe sustainability and energy quality.

Theoretical Development

Energy distribution and quality requirements: The distribution of energy within a supply chain to feed the demands in today's society requires planning and management of resources, for this reason the need to transmit energy over long distances requires that arrangement conditions be parameterized so that losses are minimized. Conceição (2016) demonstrates that ultra-high voltage transmission is a technology that is being developed in China and Russia and its arrival in Brazil impacts and allows the transmission of large blocks of energy, to regions further away from the generation centers. This mechanism regulates the high voltage system to minimize losses, thus observing the main technical concepts of direct current transmission as well as in ultra-high voltage transmission allowing to ponder on the mode of transmission of electrical energy in direct current seeking a reference that subsidize the analysis of the transmission system, thus starting from a macro system that remains changeable, the micro systems implanted in strategic sectors can be mirrored to respond to certain requirements in the search for understanding the impact factors within the operation of energy use. Dias (2019) points out that the term quality of electricity has a close relationship with the occurrence of deviations, whether they are magnitude, wave, voltage or current frequency, as it is known that energy is the product of voltage by current, through time. Since time is an uncontrollable variable, and it is also known that the electric current has its behavior determined by the load, resulting only in voltage as the only

quality control variable, the quality of energy, in turn, occurs through combination of the quality of the supply voltage, and this must be sinusoidal, and of constant frequency and magnitudes.

The quality of the energy can be monitored and measured with the aid of specific 'software', which reflects a certain criterion for the adoption of techniques that allow triggering the points of importance to apply direct actions where failures and deviations occasionally occur. The quality of the electricity supplied depends on the quality of the service provided by the companies that received the concession for the electric energy distribution sector, which according to Deckmann (2017) the assessment must consider distortions, voltage fluctuations, short-term voltage variation duration, imbalances in three-phase systems and fast transients, this is reflected in the system and its assessment can be made in the following ways such as continuity of supply, quality of customer service and quality of electric power product. The aspects that guide the definition of the various criteria, such as the location and dynamics of the substations, such as the location of the work teams, this implies in the selection criteria for control and protection inputs and equipment, voltage regulation and topography of distribution networks. The view of the management aspects of the quality system as understood by Moraes (2019) dictates that the lack of continuity of supply that corresponds to the availability of electricity to the consumer and if failures occur, voltage fluctuations in the feeders cause imbalance in the system and throughout the chain that feeds on this system, with the distinction of two profiles, one based on the duration and frequency of interruptions and the other on the quality of service that highlights the commercial relationship between the parties, such as the concessionaire and the consumer.

In the conclusion of the contract one should consider the interests of the parties for the accomplishment of the work and the mutual respect between the parties and the quality of the product should be clear and focused on the voltage wave, voltage fluctuations, harmonic distortions, momentary variations of tension, and others,where the system has to subsidize periodic analyses, correction of fluctuations and update the system for occasional existing damages. Beliski (2017) indicates that the parameters that characterize the quality of the electric energy supplied, whether in a permanent or ephemeral regime, are regulated by ANEEL where the Voltage system in a permanent regime: Steady state voltage, for which the appropriate limits are established, precarious and critical, quality indicators, measurement and registration criteria, deadlines for regularization and compensation to consumers, in case the limits of adequate service are not obeyed. The simultaneity condition of the works that generate harmony in the system for the distribution efficiently, requires that the coordinates prescribed by ANEEL are properly followed. Another condition to be effectively verified is the power factor that is characterized in the ratio between the active electric energy and the square root of the sum of the squares of the active and reactive electric energies, consumed in the same time interval, being the reactive electric energy that circulates continuously in the different electric and magnetic fields of the alternating current system, or by switching effect, without carrying out work, these measurements are expressed by kilovolt-ampere-reactive-hour (kVArh). Regarding the conditions of harmonic distortion, these phenomena associated deformations in the wave of conformations of voltages and currents with respect to the sine wave of the fundamental frequency, the distortion in the tension which refers to the phenomenon associated with changes of three-phase patterns of the distribution system. Voltage fluctuations and variations are analyzed by checking as a random, repetitive or sporadic variation of the active voltage value and the secondary short duration caused by significant deviations in the corresponding voltage value in short time intervals. The quality of electricity, as proposed by Rocha (2017), requires the definition of legislation aimed at controlling the injection of undesirable current harmonics into the electrical network by industrial consumers, in addition to responsibilities on the part of electric power concessionaires in relation to the quality of the voltage to be supplied to the final consumer, this item indicates a question relevant to the quality of the voltage, because in electrical systems the voltage can be controlled with goals to supply the quality of the electricity in question. If the loss occasionally occurs, it will obviously interfere in the quality of the electrical energy from occasional anomalies such as oscillation in the wave of the electric voltage, current or frequency, generating failures or even the improper disposition of the equipment. As for the receiver of this energy, a sustainable service is expected, and this quality of electric energy is defined as the receipt of stabilized energy with all the indications proposed in the current regulation. The facilities must comply with the specifications expressed for the implementation of the equipment and Editors SANAI (2018) refers to the operating factor corresponding to the electronic equipment, because the more viable and stable form of use of the equipment is one that follows the standards of technical specifications expressed by the manufacturer, cumulatively the energy provided, the correct incorporation of the equipment and the proper handling by the consumer are paramount for sustainable use. The quality of distributed energy, focused on the principles of sustainability requires that all the instances involved in the processes use their competencies to improve efficiency, if not, any mechanism practiced to suggest efficacy in the generation, distribution and consumption of electricity will be dependent on intermittent arrangements and doomed to failure and inefficiency.

Voltage levels in electrical systems: By definition the voltage is the difference in power of two points, that is, it can be exemplified as in the case of a conductor that the difference between the source of energy and the equipment whose unit of measure is the Volt (V). The voltage levels that power homes and industry can vary from locations where it applies. According to IMC (2020) on the tension and its specifications, highlight that:In Brazil, there are several voltage levels: 115 Volts, 127 Volts, 220 Volts, 254 Volts, 240 Volts, 230 Volts, 380 Volts and 440 Volts. ANEEL, the National Electric Energy Agency, makes available on its website the secondary voltage levels of each city. At 380/220V voltages, for example, indicate that the line voltage is at 380V, and the phase voltage, at 220V. Line voltage is the measurement between two different phases, and the phase voltage, the measurement between phase and neutral. The tensions present some differences that are not always noticeable. The higher the voltage, the lower the current and the thickness of the wires, the opposite being for lower voltages. In Europe, the voltage is usually at 220V, a way to save with copper wires (IMC, 2020-https://imcresistencias.com.br/). Voltage is a way to allow systems to be able to act more efficiently, since the electrical voltage in conductive materials, such as wires, moves because there are entities known as free electrons that move in constant

motion in a disorderly manner. Assunção (2019) points out that the free electrons when moving in the wires moved by a driving force that moves them in the same direction, this force that moves them is the electric voltage (U) that mobilizes the electrons to move is the difference of potential (voltage) between two points on the cable and this generates a difference in electron concentrations (electric charge).

Electricity Distribution Systems: The energy transits from different places wrapped to transmission line systems, which is a set of lines, substations, and other equipment necessary for the electrical interconnection between the transmission system or power generation for the consumption installations. ANEEL Normative Resolution No. 674 of August 11, 2015 highlights the preponderant factors for the energy distribution system. Santos (2018) describes that electric power distribution networks are characterized by operating in a radial configuration and by having load balancing between phases. The system is modeled in the PV and SAE systems if you consider the load imbalance, the power flow allows the determination of the values of the state variables, of the active and reactive power flows in addition to other quantities that trigger the electrical system in relation to losses, and others. The distribution system is the final step of the power supply is what delivers the service to the consumer, coming from a substation that converts the medium voltage energy signal to low voltage bringing the energy to the sectors of interest.

MATERIAL AND METHODS

The study presented here waving a quantitative research, to be an exploratory case study, Pereira (2017) mentions that once covered the characteristics of a process whose aim is to explore data for quantitative analysis is configured in a 'praxis' set, in this case, the analysis of the electrical voltage levels aimed at two distribution circuits of a company located in the Industrial Pole of Manaus. The analysis mechanism is made by the comparative factor following the specifications of the regulation established by ANEEL, in accordance with Resolution No. 505/2001, (Repealed by ANEEL Normative Resolution No. 395 of 12.15.2009) which establishes in an updated and consolidated manner , the provisions related to the compliance of the voltage levels of electric energy in permanent regime. Specifies the data processing mechanisms in question. Costa (2016) reveals that the set of systematic and rational activities guiding the generation of valid, true knowledge and indicating the path to be followed are the method, thus, the specific subsystems in which the researcher acts as an observer permeates the description based on the work. In this sense, the investigation is developed within a perspective of understanding the guidelines that address the quality of energy as a function of the analysis of voltage levels in the distribution system in the company. Exploratory research, according,Henklain (2020) develops, clarifies and modifies concepts and ideas, aimed at formulating more brief problems or examining hypotheses for later work. André (2019) highlights that when it comes to case studies, they become an alternative way of describing a phenomenon, adding subsidies to test or generate new forms of scientific advancement. The study is based on factors relevant to the quality of electricity distribution and part of the incivility that guides and controls voltage levels. The need to collect bibliographic information regarding the statistical control of the process and about the capacity and performance indexes provide the knowledge of the information that is processed and to glimpse the subsequent connotations. The methodology was established based on the analysis of the study, demonstrating its characterizations in the face of the discussions, leading to preliminary conclusions that link the effects of the material structure to the level of understanding of the problem. The result achieved was a subsidy for the quality of services, generating a high criticism, observing the constructive factors to enhance the cost reduction in the assessment of tension levels without reducing the established quality standards about the capacity and performance indexes provide the knowledge of the information that is processed and to glimpse the subsequent connotations. The methodology was established based on the analysis of the study, demonstrating its characterizations in the face of the discussions, leading to preliminary conclusions that link the effects of the material structure to the level of understanding of the problem. The result achieved was a subsidy for the quality of services, generating a high criticism, observing the constructive factors to enhance the cost reduction in the assessment of tension levels without reducing the established quality standards. This study addressed three phases starting with data collection where the interest factors were properly studied and characterized based on the literature, in the second instance the analysis of the data, correcting them and compiling the results. The data were analyzed with the help of the statistical software MINITAB version 15, using procedures for calculating the indices of autocorrelation and capacity.The interrelation of the data promotes the understanding of the functionality of the system and its organization.

RESULTS AND DISCUSSION

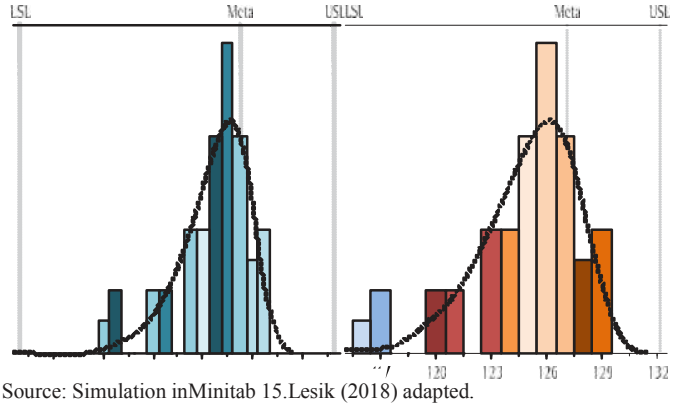
The definition of parameters that explains the points of convergence and divergence of the energy distribution system generates one of the definition characteristics of the study that passes through the relevant statistical approach with the voltage denomination tool, thus, the system allowed the identification of contradictory results , since, coming from the procedures expressed in ANEEL's resolution and its specifications. The procedure expressed in the resolution, does not extinguish the possibility of occurrence of service tensions outside the specified assessment for the situations analyzed, but points out critical factors that need adjustments and require guidance for substantial improvements. The possibility of observation through the analysis of Ppk indicators (real performance of a process). In the analysis scenario, Cp and Cpk represent the real capacity of a process that is operated in a predictable way. The indices are meaningless if the process is out of control. But Pp and Ppk represent the real performance of a process, whether it operated in a predictable or not, generating possibilities of self-correction, which culminates in a relevant condition regarding the application of statistical analysis on systematic collection data, which once identified were summarily eliminated. Franceschi(2017) reports that the statistical control process provides a description of the behavior of the same, identifying variability and enabling production to be controlled in a time interval, which can trigger CP and Cpkcapacity indicators and pp and Ppkprocess performance, which is highlighted by Mendelski (2017) who highlights that these indicators are shown to be a surface methodology of responses, manufacturing and assists in decisions in the face of action-taking challenges. For the study, collections were made at regular intervals that allowed to adjust the condition of self-correction, making the collections autonomous and free from such contradictions. In

the relation of the study aspect, different models were tested that suggested several edges for a well-diversified analysis of the distribution pattern related to the collected data, it was prioritized to verify if the reminiscences of normality, characteristics of many statistical approaches and others were also considered for the adjustment of the theoretical model, allowing deductions to be made about the data gladius and the obstinate adaptation to the voltage quality buckets pre-denominated in the ANEEL Resolution that accounts for such sectors. Regarding the concessionaire's action, Brazil (2008), it suggests that ANEEL establishes a periodic quarterly measurement program, where the concessionaire must comply with it, as a sample of consumer units is selected to determine the voltage compliance indicators. These measurements were at least 168 hours long, with integration intervals of 10 minutes, from readings with fixed and consecutive windows from at 12 to 15 cycles, totaling 1,008 valid records. Measurements must be made between phases and between phases and neutral.

The indicators to be determined are: DRP - Relative duration of the transgression of precarious tension; and DRC - Relative duration of critical tension transgression. The ability to analyze the stress levels can be seen in figure 1 which specifies the capacity for the stress limits at the critical level, allowing a comparison with Capacity index for the stress limits at the precarious rating level, which can be evaluated in a simulation which is expressed in graph 1. It is noticed that the amplitudes of the peaks in the analyzed data, which in figure 1 indicates the index of the capacity of the voltage limits with a critical character and at a precarious level, already shows a punctual oscillation that justifies the condition that there is a variation on data analysis. As compared to the graphs in figure 2, it refers to a significant difference. Ivanov (2017) points out that the calculated data of individual indicators with critical stress duration and relative duration of precarious stress transgression can promote the solution at stress levels that are outside the parameters acceptable by the established resolutions.

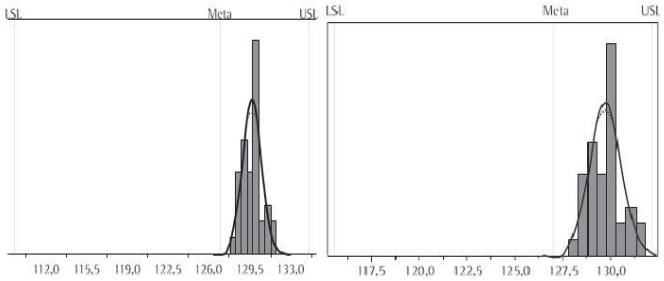
The method used in the analysis of the service voltage classification in its different situations in simulations 1 and 2, suggests an autocorrelation of the data, as it presented significance equal at 5, which predisposes that a standard amount of collections can be reached. Thus, we proceeded with a standard of systematic samples in an estimated time of 4 hours, since the samples analyzed as to their distribution and the model cannot normally be rejected. Dos Santos (2020) indicates that quality lies in a framework between common or special factors and the concept of independence, as the loss of independence between consecutive observations can be classified as autocorrelation. The punctually self-correlated data tends to trigger changes in a slow and gradual way that causes the system to adjust with its conjurations triggered. The result of this aspect generates estimates of simulation resulting data variances are generally lower than the actual values of variance for the system.

The factor expressed by Thesen (1990) that shows the confidence intervals based on such data approaching to appear more restricted, inducing errors in the simulation results, becoming a trend, but showing less errors than in the real situation, become a poor coverage system that allows to trigger other statistical means which can cooperate with the elucidation of the data more effectively.



Source: Simulation inMinitab 15.Lesik (2018) adapted.

Figure 1. Comparison of the situation of capacityindex for the stress limits at the critical (1) and precarious (2) classificationlevelin simulation



Source: Simulation inMinitab 15.Lesik (2018) adapted.

Figure 2. Correlation of the capacity indices for the voltage limits at the critical (1) and precarious (2) classification level in simulation 2

The data expressed in the figure highlight the results of the analysis carried out, concluding that the probability of generating tensions in the region of critical classification is more likely and less than at 0.03, showing that this probability represents, close to, a potential occurrence every 1 year and six months (given that the measurements considered have intervals of almost 4 days between them). Related to the precarious voltage limits, the Ppk index was at 0.74 and the Pp index was at 0.90, justifying that this circuit could be considered compliant for the procedure in the precarious classification. The Pp has an index less than 1 and different from the Ppk, actions would be necessary to reduce the variability of the tension in order to improve the Pp index and displace the average of the stresses, the goal is to match the Ppk and the Pp. In Figure 1, when Graph 2 stands out, it reveals the results of the analysis and shows the stress-generating probability in the precarious classification that would be, in the fullness at 0.7, or about one occurrence every 20 days, approximately. The method used in the analysis of the service tension classification was the same to enable the correlation of the data that favored the visualization of the performance and the clarity of the process. The autocorrelation data with significance level at 5 has been identified to a certain collection, specifically the 26th, the procedure for using systematic samples, with a temporal spacing at 4 days was used as basic parameter for the estimation of data generated . The samples were analyzed for their distribution and the model cannot normally be rejected ($p > 0.29$). The Ppk index for the critical level was at 1.86, with a Pp at 4.78 (Figure 1). For the precarious classification, the Ppk measured was at 0.90, with Pp at 3.11 (Figure 2), representing an episode approximately every two months, this evidence allowed an adjustment in the average service tension that would take

Table 1. Table of activities referred to the comparative referring to work-related approaches

Field Data	ANEEL Resolution	Consideration of the ANEEL resolution	Proposal for intervention
Collection	Duration at 240 hours, with integration intervals at 15 minutes and at 1.118 totaling records	Existence of autocorrelation of the collected data	Elimination of autocorrelation with the use of time series analysis
Data analysis	Measurement frequency per range and indicators of DRP and DRC	Does not consider variability within the ranges	Adjustment of distribution models and variability analysis
Classification	DRP and DRC range	Does not evaluate variability in the appropriate range	Use of Cpk and Ppk capacity indexes
Action	According to the classification	Losses are not identified when the CD is classified as adequate	Cp, Pp, Cpk and Ppk analyzes allow to identify losses and facilitate the definition of actions

Source: Lesik (2018), adapted.

system 2 from the simulation to appropriate rating level. Table 1 underscores a summarized and comparative condition between the characteristics of the method established by ANEEL and correlation with the fundamentals inserted in this work. The activity occurred within a planned scale under the guidance of a flowchart that determined the allocation of the collections, synchronize with the resolution of ANEEL, weave the considerations that converge or disagree with the resolution of the ANEEL and the citation of an intervention proposal. All these aspects corroborate the understanding that the use of statistical tools are quite predictable for energy quality analysis, in this case that it is a company that operates in a staggered manner, within a specific demand, the system shows that the correlation of the data can be an agent of differentiation, highlighting the points of precariousness and criticality that can be problems in a given energy distribution network. The amplitude of the results allows a comparison with the data expressed in 1 and 2 simulations, when mirroring the specification regulated by ANEEL, and analyzing the distribution circuit, the system was classified as adequate, which is not a consensus when using statistical procedures. , mainly the Ppk performance index indicators, which highlighted simulation 1 as precarious with potential for generating stresses outside at 0.7 specification, where the occurrence occurred in about at 20 days, in simulation at 2 both cases considered adequate. ANEEL's resolution focused on the data collection process, it established the collection time, this time in integration every 10 minutes for a period of one week (7 days). In the systems that were analyzed, the autocorrelation estimation showed that the stresses are influenced by the previous tension up to the above twenty in the sample, observing the systematization of the measurement system.

The occurrence of positive autocorrelation allows to ignore the variability of the data due to the violation of the assumption of independence between the results. As for the procedure established by Resolution No. 505/2001, it is detached from the concept of statistical confidence for decision making, since the system tends to be relevant in its results. However, a sample is used to infer about the population and, thus, it is estimated that the acceptable errors are improved in advance by generating inadequate conclusions, making the system adjust before rotation. Data analysis showed the Ppk index for the critical level at 1.86, with Pp at 4.78, as can be seen in Figure 2, in Graph 1 and the poor classification of the Ppk index, which was estimated around at 0, 90, with Pp at 3.11 as can be seen in Figure 2, in the second graph, which shows an occurrence every two months, in approximate values. For such an analysis, the evidence refers to an adjustment in the average service voltage, signaling for simulation 2 that it can be considered with an appropriate classification level.

The analysis of the stress and the data collection made in the company showed that the system has a certain capacity to subsidize quality, where the analytical parameters did not support differences that can be considered alarming, but suggested rather certain disequilibrium, which corroborates with variations in current voltage within the company and the predisposition of occasional differences in energy tariff.

CONCLUSION

Analyzing impact factors in any system promotes many variables and all of them can be studied and weighted, the proposal presented in this work converges for a combination of probabilistic methods that enables the analysis of stress data on or impact of the quality of the energy distribution system in A company of the Industrial Pole Manaus, this analysis enables the assessment of two levels of voltage quality in electrical energy distribution systems, leaving the leader of options that favor a diagnosis of the possibilities of interventions in systems that are shown to be highly efficient. Such an approach is shown as a viable alternative combined with what is suggested in No. 505/2001 resolution by ANEEL. Considering that this belongs or method of collection and analysis of two data, as conditions to mediate standards of quality of distribution of energy combined in contracting of services. The analysis process was developed by collecting data and by the comparative effect, whose aspects allowed the observation of the collected data that suffered a great influence of positive autocorrelation, thus indicating to allow highly optimistic estimates related to the variability of the driven tensions.

The evidence without scientific character tended to emerge that the violation of voltage levels tends to be constant and is associated with special causes such as defects in transformers or subsystems, or even overload in the network or maneuvering or maintenance actions, the question under analysis evaluates more punctual the impact on the quality of information generated by the analysis procedure used. For the current system, the analysis of data related to the supply voltage agreement considers only the adequacy criteria established by ANEEL, these requirements are based only on the counting of occurrences at each level. Thus, it is worth mentioning that, this study demonstrated a preliminary analysis and suggests more careful diagnoses of the data with more appropriate tools, the restriction regarding the analysis to a descriptive and coming aspect, involving the possibility of evaluating procedural standards and the inclusion of actions predictive of the variability and core of stress levels in relation to the quality standards established by ANEEL. Statistical analysis tends the best knowledge of the voltage levels of behavior over time, motivating the development of alternative

techniques of changes in electrical distribution systems, thus aiming to improve the quality of the supply voltage with the lowest possible cost. It also seeks to qualify the service provided by the concessionaires to the consumer, reverting to less damage and costs associated with processes and restorations, as well as in the preparation of adequacy plans that take advantage of the effective capacity of the network that is still unused, thus corroborating the programming. of possible disconnections, favoring the minimization of interruptions due to lack of energy, in the supervision of the quality of supply and others. The prediction that the distribution of energy in the face of functional and operational difficulties can be worked on so that the system gains more and more energy efficiency.

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