

Received: December 2023 Accepted: January 2024

DOI: <https://doi.org/10.58262/ks.v12i2.038>

Electric Power Company Data Analysis as an Integrated Sap Erp Tool in Peru

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Abstract

The main objective of data management and analysis in a company is to manage data in an orderly, strategically organized way to know the movement of markets, as well as the preferences of the public. Let's remember that the main business goal is to have agile customers, who are attracted by the products and services developed for them. It is for this reason that data management and analysis will be essential to creating and promoting new products and services. In addition to complying within your processes with regulations that protect customer data and privacy, using fraud detection and prevention methods. Security incidents in an organization are considered the main source to evaluate the correct application of security controls and are based on the international standards ISO/IEC 27001 and ISO/IEC 27002. It is important to note the parts that are intertwined in this basic process in an organization that wants to occupy an important space within the competitive markets. The security within the data analysis allows to establish of the constant monitoring and supervision of the application of the controls to guarantee the continuity of the services and processes.

Keywords: *Statistics, Information Management, Markets.*

Introduction

The application of technologies such as data analytics for electricity distribution and commercialization company in the regions of Tacna and Moquegua in Peru has the intention of improving its performance in data processing, for decision making, this has suggested changes within its organization, new habits and new ways of processing data.

The distribution company has started its operations under the SAP ERP environment, a new world-class system in which all the company's movements are recorded in the areas of Finance, Accounting, Logistics and Human Resources, providing valuable information for decision making. ElectroSur S.A. has been growing over time, so day by day, the management of the company has become increasingly complex. This new SAP system seeks to adjust the management processes to the current market requirements and prepare the company for its continued growth, through a robust system that supports the permanent changes ensuring integration between the different areas of the company. ElectroSur S.A. has made a large

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investment in improving its business management, which will result in greater efficiency in its processes to improve the quality of service.

Similarly, various executives and IT asset managers are managing the information generated by security controls, which has allowed them to improve their decision-making capabilities (Caseiro & Coelho, 2019).

This part shows the process of data analysis Data Requirements Specification (DRS) is a complete description of the behavior of the system to be developed. It includes a set of use cases that describes all the interactions that users will have with the software. Use cases are also known as functional requirements.

- **Data collection** is examining a set of data to conclude to make decisions.
- **Data processing** deals with a subset of information processing.
- **Data cleaning** is the act of discovering and correcting or removing erroneous data records from a table or database.
- **Data analysis** is a set of data to conclude the information to make decisions.
- **Communication** is the need to send and receive data.

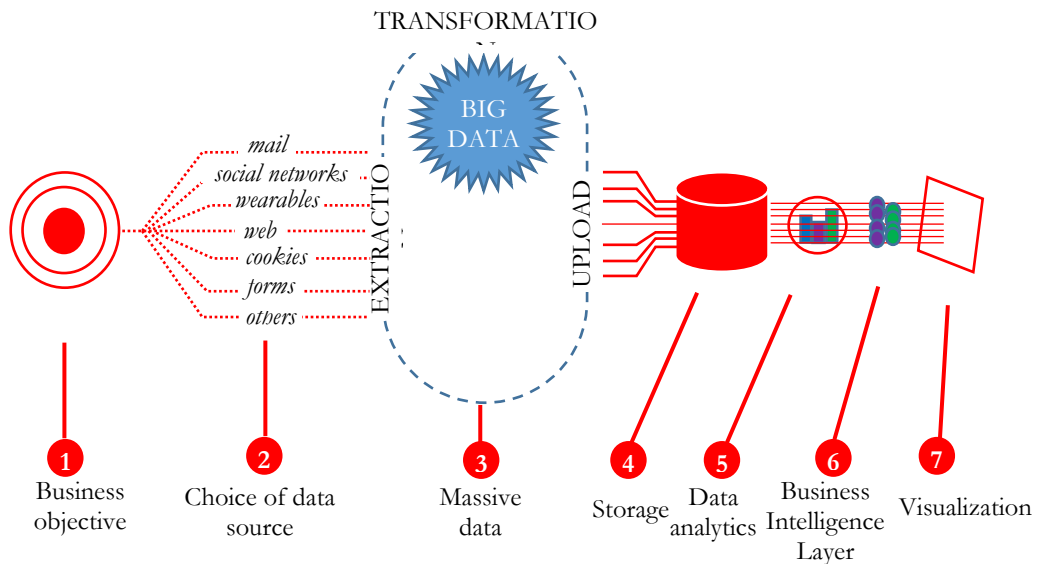


Figure 1: The Data Analytics Process and its Application (Bruno Tafur, 2018).

Materials and Methods

- The SAP System is related to ERP (Enterprise Resource Planning) systems, as it is an information system that allows managing the different actions of a company, especially those related to production, logistics, inventory, shipments and accounting.

The research was initiated through the analysis of the different business processes which are divided into management, which help with their activities to feed the data in a relevant way:

Commercial Management Operations Management Technical Management Planning and Development Management Administrative and Financial Management Community Relations Auditors' Opinion. (Annual Report_Electrosur_2016).

For the development of the SAP implementation, the scope of concession and influence has been considered.

Electrosur S.A. is present and is responsible for the supply of electricity in the 2 departments of Tacna and Moquegua, with an area of 1,601.40 km. In its concession area, it serves more than 503,000 inhabitants, serving 153,317 customers in the cities of Tacna, Moquegua and Ilo. The head office is in the city of Tacna.

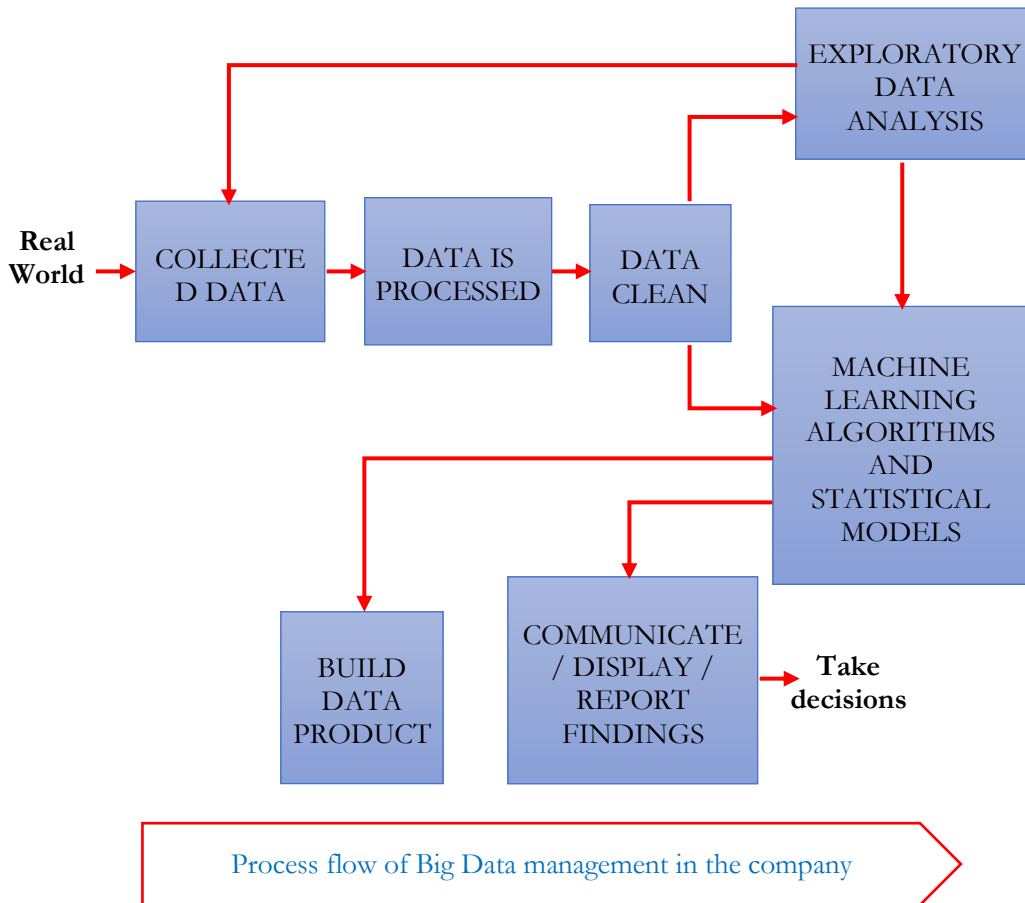


Figure 2: Process Flow of Big Data Management in the Company.

A business intelligence-based model was used to initiate information processing, which is depicted in Figure 3. This strategy for data processing was based on the combination of database architecture, business analytics and data visualization that allow extracting knowledge from existing data (Vajirakachorn & Chongwatpol, 2017). The framework was based on the following steps:

- Step 1. Establish the organization's objectives.
- Step 2. Establish performance metrics linked to security controls in the organizations.
- Step 3. Gathering relevant information for security incident analysis.
- Step 4. Integration of information from various sources.
- Step 5. Presentation of information clearly and concisely.
- Step 6. Identification of behavioral patterns of the processed information.

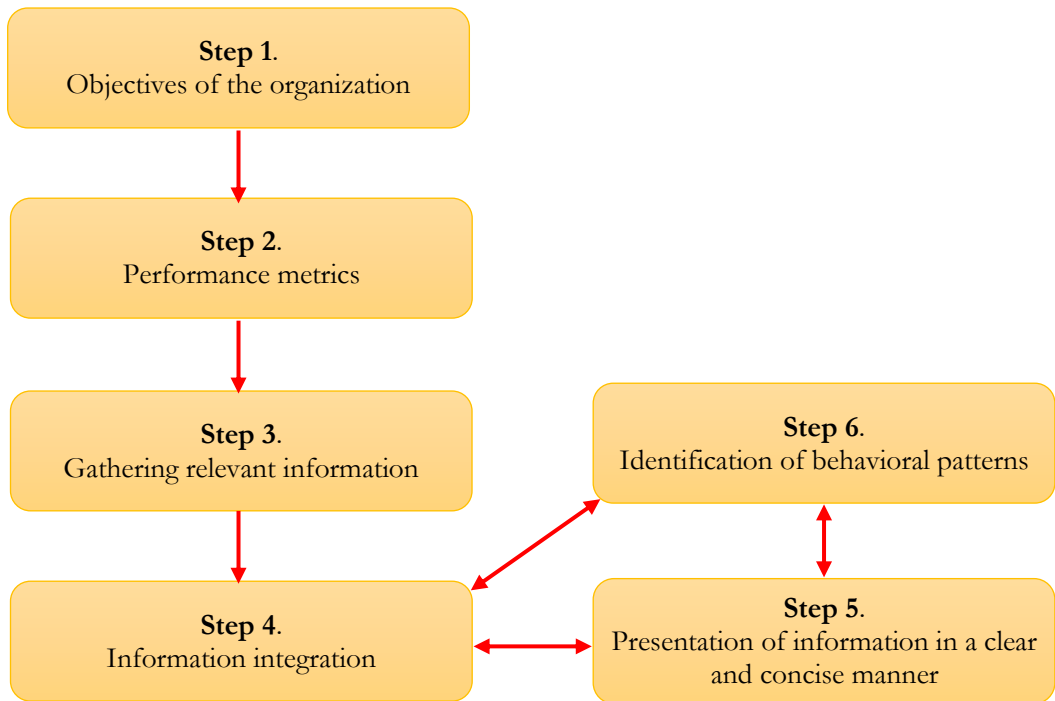


Figure 3. Business Intelligence Framework.

Results

The analysis of the information for the implementation of SAP - ERP in the electric energy trading company and the area where the energy trading is carried out.

Table 1: Electric Concession Areas Departament of Tacna.

Nº	Province	District	Location
1	Tacna	Tacna, Alto de la Alianza, Ciudad Nueva, Inclán, Pachía, Palca, Pocollay y Sama	Tacna, Alto de la Alianza, Calana, Ciudad Nueva, Inclán, Pachía, Palca, Pocollay, Sama, La Esperanza, Gregorio Albarracín Lanchipa, Miculla, Calientes, Las Yaras, Llostay, Boca del Río, Vila Vila, Los Palos, Toquela, Caplina, Ataspaca, Causuri, La Yarada
2	Jorge Basadre	Locumba, Ilabaya, Ite	Locumba, Ilabaya, Ite, Camiara, Chipe, Sagollo, Cinto, Fuerte Arica, Mirave, Chejaya, Chulune, Toco Chico, Toco Grande
3	Candarave	Candarave, Cairani, Camilaca, Curibaya, Huanuara, Quilahuani	Candarave, Cairani, Camilaca, Curibaya, Huanura, Quilahuani, Borogueña, Cambaya, Vilalaca, Coruguaya, Ancocala, Calacala, San Pedro, Talaca, Pallata, Totorá, Jirata, Sta. Cruz, Yucamane
4	Tarata	Tarata, Héroes Albarracín, Estique Pampa, Estique Pueblo, Sitajara, Susapaya, Tarucachi, Ticaco	Tarata, Chucatamani, Estique pueblo, Estique Pampa, Sitajara, Susapaya, Tarucachi, Ticaco, Yabroco, Challaguaya, Tala, Pistala, Londeniza, Chipaspaya, Coropuro, Talabaya

Table 2: Electric Concession Areas Department of Moquegua.

N°	Province	District	Location
1	Mariscal Nieto	Moquegua, Carumas, Cuchubamba, Samegua, Torata	Moquegua, Carumas, Cuchumbaya, Samegua, Torata, Taquila, Conde, San José, Montalvo, La Chimba
2	General Sánchez Cerro	Omate, Coalaque, Ichuña, La Capilla, Matalaque, Puquina, Quinistaquilla, Ubinas	Omate, Coalaque, Ichuña, La Capilla, Matalaque, Puquina, Quinistaquillas, Ubinas, Cogri, Challahuaya, Quinistacas, Carumas, Cambrune, Calacoa, San Miguel, Tonohaya.
3	Ilo	Ilo, El Algarrobal, Pacocha	Ilo, El Algarroal, Pacocha, Pueblo Nuevo

According to the strategic guidelines, Electrosur S.A. focuses its efforts and resources to achieve a high level of customer satisfaction. A total of 4,369 new customers were added, ending the year with a total of 153,317, a figure 2.93 % higher than in 2015. The growth in the number of customers is due to the execution of electrification projects in the urban-marginal areas of Tacna and Moquegua. Of the total number of customers, 98,731 correspond to Tacna, 28,979 to Moquegua and 25,607 to Ilo. The evolution of customers, from 2011 to 2016, is shown in Figure 4.

Zone	2012	2013	2014	2015	2016
Tacna	87274	90628	93361	95873	98731
Moquegua	25615	26872	27532	28006	28979
Ilo	23388	24394	24828	25069	25607
Total customers	136277	141894	145721	148948	153317

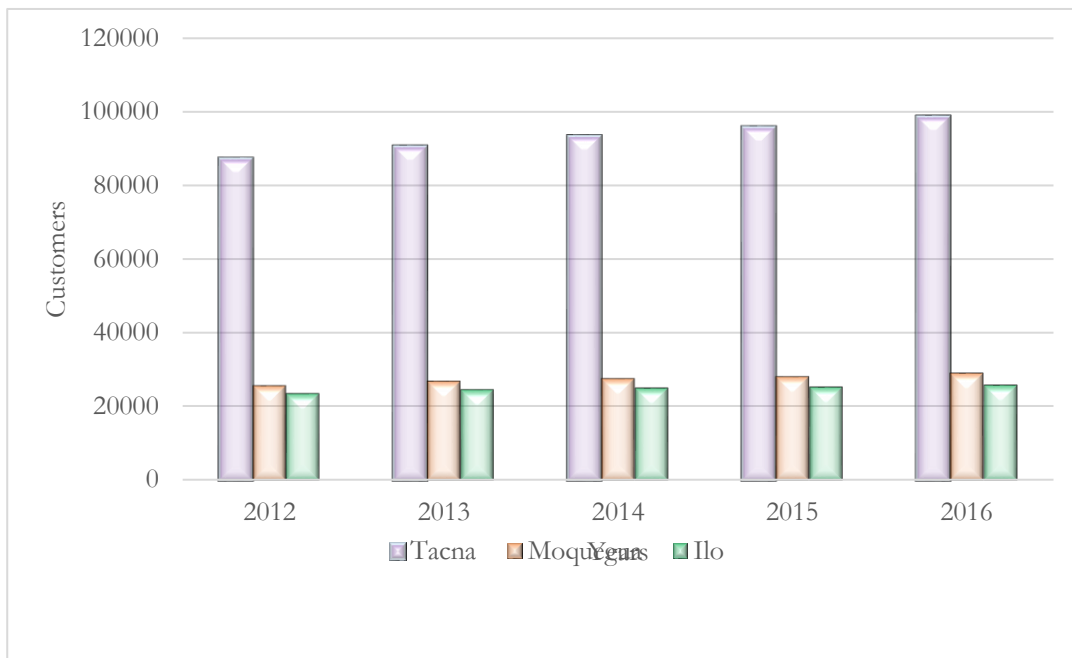


Figure 4: Increase in New Customers after SAP -ERP Implementation.

The sale and distribution of energy of this company is its *raison d'être*. For this reason, it is necessary to have comparative data on the scope achieved in sales and its increase, respecting the concessioned areas.

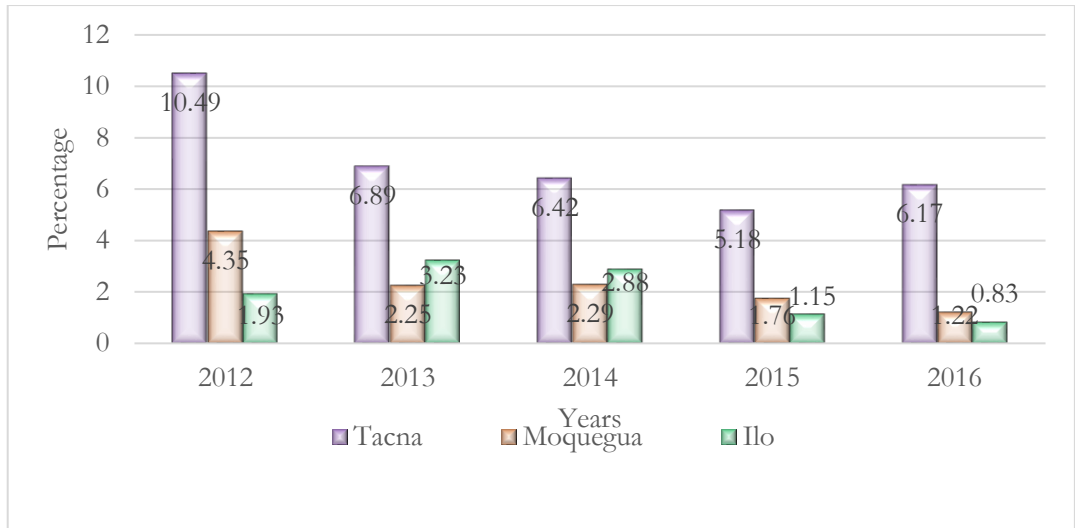


Figure 5: Saifi Indicator.

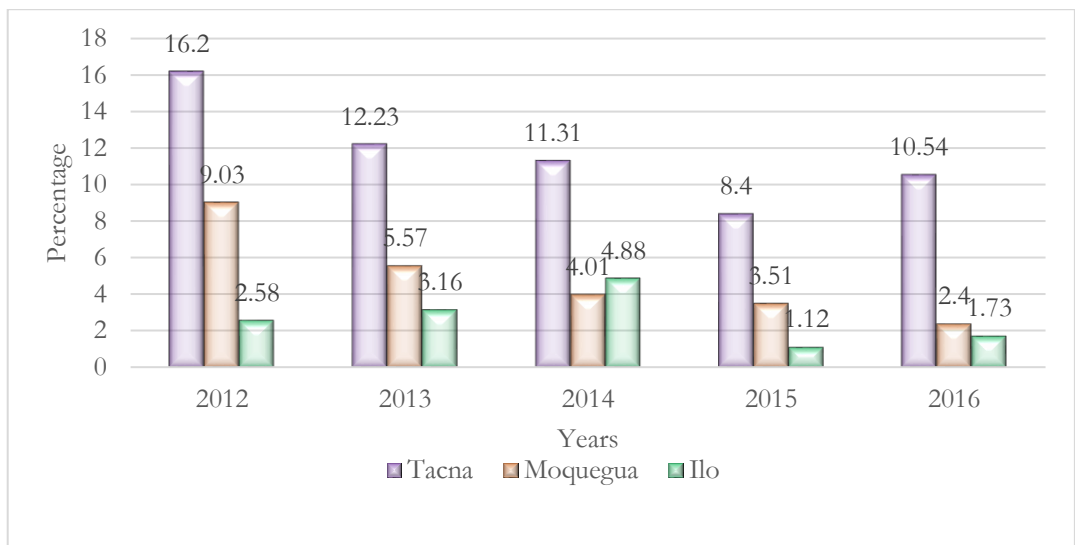


Figure 6: Saidi Indicators.

SAIFI: System Average Interruption Frequency Index, or Average Interruption Frequency per user in a given period. SAIDI: System Average Interruption Duration Index, or Total Average Interruption Time per user in a given period.

Human Resources

The number of employees at the end of 2016 was 151 people under the labor regime of Legislative Decree No. 728, classified as follows.

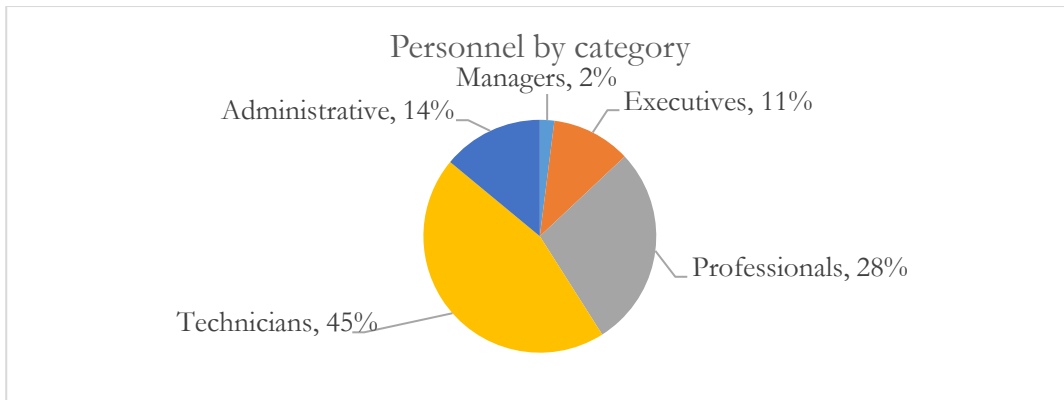


Figure 7: Human Resources.

Category	Quantity	Percentage
Managers	3	2%
Executives	16	11%
Professionals	43	28%
Technicians	68	45%
Administrative	21	14%

Human Resources Include an Important Part of the Implementation of SAP - ERP.

Zone	2012	2013	2014	2015	2016
Tacna	215589	227848	240429	240906	248989
Moquegua	58303	47864	47304	47932	44354
Ilo	54447	56158	58331	59203	59203
Total MWh	328339	331870	346064	348041	352546

Figure 8: Comparison of Electricity Sales by zones.

The category **Storage in work equipment** allows monitoring the use of work equipment in the storage of vital information for the development of processes in an organization. Figure 9 shows the behavior of improvement in the control of information; however, it can be seen that the use of information encryption in public organizations is very low.

The evolution of energy sales for 2016 in soles was S/. 178622341 as shown in the following chart

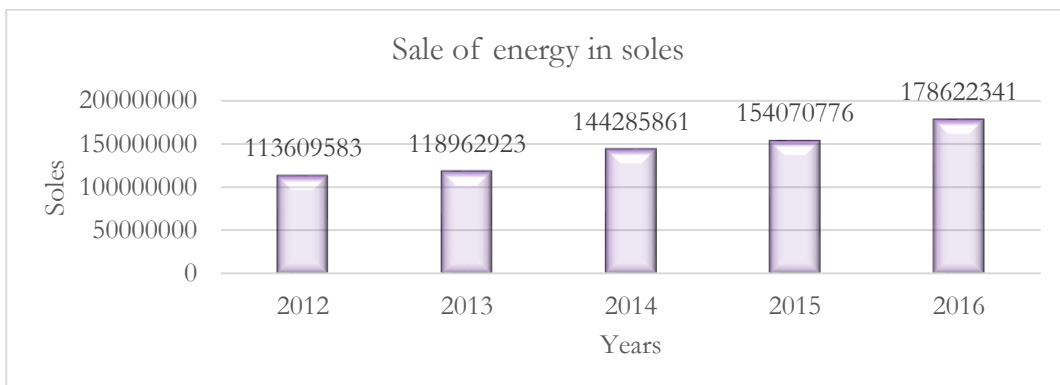


Figure 9: Evolution of Energy Sales in Soles as of 2016.

The quality of the energy supplied to our customers is represented in the SAIFI and SAIDI indicators, which include the average duration and frequency of interruptions per user of the electric service. These figures have been calculated using information from operations, which were reported to OSINERGMIN.

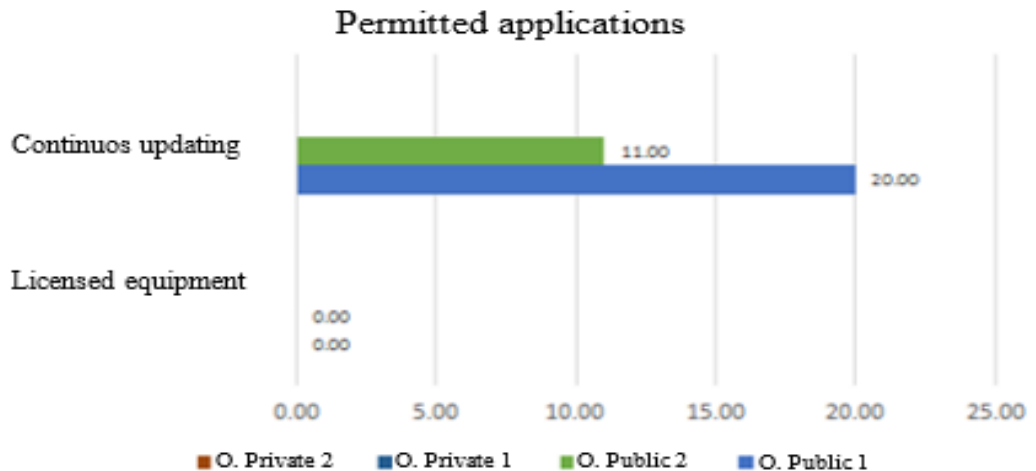


Figure 10: Permitted Applications.

The Information Classification category examines the degree of control of information assets based on a classification based on the critical value in the organization.

Discussion

Standardized Administrative Management Model (MEGA) ERP-SAP.

In January 2016, ElectroSur S.A. has started its operations under the SAP ERP environment, a new world-class system in which all the company's movements are recorded in the areas of Finance, Accounting, Logistics and Human Resources, providing valuable information for decision making. ElectroSur S.A. has been growing over time, so day by day, the management of the company has become increasingly complex. With this new SAP system, the company seeks to adjust the management processes to the current market demands and prepare the company for its continuous growth, through a robust system that supports the permanent changes, ensuring the integration between the different areas of the company. ElectroSur S.A. has invested heavily in improving its business management, which will result in greater efficiency in the processes to improve the quality of the service provided.

Risk Prevention

To strengthen the institutional policy and culture of prevention, the Annual Occupational Health and Safety Program was developed. In this context, ElectroSur S.A. promotes and fosters a culture of prevention of occupational health and safety risks. In 2016, the following documents that are part of the company's Safety, Health and Environment Management System were updated: Annual Occupational Safety and Health Program, Internal Work Regulations, Contingency Plan, Risk Study, Drill Program, Solid Waste Management Plan, Hazardous Materials Management Plan, Environmental Monitoring Report, and Environmental Management Report.

To mitigate hazards, risk managers must process a wide variety of heterogeneous information data sources. This heterogeneous information brings as a consequence an enormous difficulty in the processes of integration and utilization in security and risk management processes (Sauerwein et al., 2019). Therefore, the use of information integration techniques becomes essential for the proper data processing of established technological controls. Likewise, it should be kept in mind that IT services must be formalized and established as assets within organizations, to perform continuous supervision and monitoring.

The large amount of information generated in organizations has driven the process of transforming data into knowledge, achieving improved results in their different activities (Carvalho et al., 2019). The amount of information generated through the supervision and monitoring of technological controls has made it possible to implement logging platforms that are responsible for reporting security incidents that allow establishing the necessary behavior pattern to ensure the continuous operation of the organization's processes and services.

Conclusions

Aware of the global and national environmental reality, it has taken great care to ensure adequate quality standards in its electricity distribution operations quality standards in electricity distribution operations. For this reason, in 2016, annual monitoring of gaseous emissions continued to be carried out (air quality test in the substations). In addition, hazardous waste generated by electricity production was and will continue to be removed through a Solid Waste Provider Company (EPS-RS), as stipulated by the legal regulations currently in force in Peru, thus avoiding negative impacts on workers, the population and the environment.

To strengthen the institutional policy and culture of prevention, the Annual Occupational Safety and Health Program was developed. Annual Occupational Health and Safety Program. In this context, Electrosur S.A. offers updating of documents that are part of the Safety, Health and Environment Management System of the company: Annual Program of Safety and Health at Work, Internal Work Regulations, Contingency Plan, Risk Study, Drill Program, Solid Waste Management Plan, Solid Waste Management Plan, Data extraction and management, and its subsequent analysis and decision making has become a competitive advantage for the business.

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