Article **Journal-Financial Economy**
December 2022 Vol.6 No.11 20-32

# Quality management system at the Isla de la Juventud electricity company

# Sistema de gestión de la calidad en la empresa eléctrica Isla de la Juventud

GARIZURIETA-BERNABE, Jessica†*, CÁNOVA-HERRANDIZ, Adrián, GONZÁLEZ-BENÍTEZ, Rubén Álvaro and HERNÁNDEZ-RAMÍREZ, Juan Esteban

*Universidad Veracruzana, Facultad de Contaduría y Administración, Xalapa, Veracruz*

ID 1st Author: *Jessica, Garizurieta-Bernabe* / **ORC ID:** 0000-0002-1443-4737, **CVU CONACYT ID:** 273881

ID 1st Co-author: *Adrián, Cánova-Herrandiz* / **ORC ID:** 0000-0001-7817-9301

ID 2nd Co-author: *Rubén Álvaro, González-Benítez* / **ORC ID:** 0000-0002-6396-0100

ID 3rd Co-author: *Juan Esteban, Hernández-Ramírez* / **ORC ID:** 0000-0002-2940-3132, **CVU CONACYT ID:** 1000287

**DOI:** 10.35429/JFE.2022.6.11.20.32 Received August 25, 2022; Accepted December 14, 2022

**Abstract**

This research develops a quality management system and its procedures that contribute to the improvement of organizational performance at the Isla de la Juventud Electric Company. Methods, techniques, and instruments were used, both theoretical, empirical, and statistical. The main results were the application of the diagnosis that made it possible to verify the feasibility and effectiveness of its use as a methodological instrument, since it was verified: the regularities that in general are in the order of problems with the delivery of the information until the fluctuation of the personnel, these being the process managers. The quality management system is a methodology applied by the working group that contributes to the improvement of organizational performance and has an impact on the increase of the results seen from the development of activities by the key processes for the fulfillment of work objectives which provide compliance with the fundamental processes. The implementation of the Quality Management System from its procedures and manual resulted in the collection of information and ideas for decision making, feedback is established on the results of audits, supervision, and other control actions, which allowed to improve performance, adjust and improvement actions.

**Organizational performance, Quality management, Decision making**

**Resumen**

Esta investigación desarrolla un sistema de gestión de la calidad y sus procedimientos que contribuyan en la mejora del desempeño organizacional en la Empresa Eléctrica Isla de la Juventud. Se utilizaron métodos, técnicas e instrumentos, tanto del nivel teórico, empírico y estadístico. Los principales resultados fueron: la aplicación del diagnóstico que posibilitó constatar la factibilidad y efectividad de su empleo como instrumento metodológico, ya que se verificó: las regularidades que de forma general están en el orden de problemas con la entrega de la información hasta la fluctuación del personal, siendo estos los gestores de procesos. El sistema de gestión de la calidad constituye una metodología que aplicada por el grupo de trabajo contribuye a la mejora del desempeño organizacional y repercute en el aumento de los resultados vistos desde el desarrollo de actividades por los procesos claves para el cumplimiento de objetivos de trabajo los que proporcionan el cumplimiento a los procesos fundamentales. La implementación del Sistema de gestión de la calidad a partir de sus procedimientos y manual arrojó como resultado, recolección de la información e ideas para la toma de decisiones, se establece una retroalimentación sobre los resultados de las auditorías, supervisiones y otras acciones de control, que permitieron mejorar el desempeño, efectuar ajustes y acciones de mejora.

**Desempeño organizacional, Gestión de la calidad, Toma de decisiones**

**Citation:** GARIZURIETA-BERNABE, Jessica, CÁNOVA-HERRANDIZ, Adrián, GONZÁLEZ-BENÍTEZ, Rubén Álvaro and HERNÁNDEZ-RAMÍREZ, Juan Esteban. Quality management system at the Isla de la Juventud electricity Company. Journal-Financial Economy. 2022. 6-11: 20-32

* Correspondence to Author (e-mail: jgarizurieta@uv.mx)
† Researcher contributing first author.

## Introduction

Organizations are challenged to face a series of challenges related to changes in management styles, customer satisfaction, environmental preservation and the correct use of environmental resources. Therefore, the implementation of effective integrated management systems in organizations contributes to improving their competitiveness in the context of the current economic globalization. The progressive entry of new players in the supply, the lack of financial sources and the growing needs of customers, among others, are factors that have influenced the genesis of the processes of modernization and transformation of organizations (Gonzalez, 2004).

The quality management systems include a series of advantages, among the most important of which is the reduction of costs due to the simplification of the documentary systems, as well as contributing to an improvement of the organizational control over activities and processes of the company, thus achieving an improvement in the behavior of the companies in terms of quality and environment (Cruz, 2004). Among the disadvantages are the greater need for training and awareness of the organization's personnel and that the increase of requirements in procedures and work instructions may affect workers.

The increase in competition, the globalization of markets and the greater demands of customers and society have motivated companies to seek greater competitiveness through the development and implementation of management systems. But behind these systems, there is the reality of the company as an indivisible whole and the concept of integration necessarily appears (Duque, 2006).

In this context, Empresa Eléctrica Isla de la Juventud is a dependency of Unión Eléctrica, in charge of generating, distributing and commercializing electricity in the municipality and Cayo Largo. It was established by Resolution No. 97 issued by the Minister of Basic Industry on March 19, 2001 (which in turn establishes the beginning of business improvement), with the purpose of providing quality electric service, having fully identified its consumer market.

It is headquartered at 41st Street No. 56 and 60, Nueva Gerona. It also has four commercial branches, two in Nueva Gerona, one in La Fe and the fourth in La Demajagua. It has two distributed generation sites, a wind farm, four unattended distribution substations, two Forest Biomass plants and two photovoltaic solar farms. Its assets also include 1,200 km of distribution lines and a total of 1,934 transformers. It has 30146 customers, which represents 99.8 % electrification of the territory. It has a total of 544 workers organized in nine UEBs, three Integrated Project Directorates (DIP), three functional directorates.

The Integrated Management System aims to achieve the necessary improvements that lead to excellence, based on the premise that there is no perfect organization, it is based on the criteria of continuous improvement. In this way, perfection is never achieved in an organization because failure is intrinsic to human beings and when certain objectives are reached, the achievement of other more demanding objectives is considered, which allow obtaining information about the level of customer satisfaction in order to anticipate their expectations and act in a preventive manner.

In this company, the decentralization of the systems leads to non-compliance with the objectives, because each process specialist seeks certification and compliance with legal regulatory procedures, which becomes cumbersome due to the duplicity of information that each of the systems contributes.

Through an observation guide applied in 2016, several shortcomings were detected that threaten the organizational performance of the case study entity. Among the elements identified were: the existence of a high volume of documentation, which must be handled by managers, causing staff to feel overloaded by having the responsibility of managing several Quality, Environmental, Health and Safety and Internal Control systems, in addition to which there is duplication of information, staff feel overloaded, late delivery of information from the UEBs to the General Management, staff fluctuation (system managers) and a greater number of audits and inspections (for the different systems).

ISSN-On line: 2531-2995

**Quality management systems**

The 1980s marked the beginning of the era of quality management, a period in which business management was transformed. Since then, many methodologies based on statistical techniques have emerged (García, González, Hurtado, Ornelas & Ramírez, 2016), the link between metrology and quality is reinforced to obtain accurate, precise and exact measurements.

In today's markets, the concept of quality transcends the physical and functional characteristics of goods and services, including attributes related to the integral management of the organization. This concept demands a management culture focused on customer and user satisfaction through constant quality improvement (Banguela, 2009).

Quality is a term that the vast majority of organizations believe they know, but this is not entirely true, since organizations, whatever their size, industrial sector to which they belong and product or service they offer to their customers, at the time of defining and complying with this term, it is complicated for them, which denotes a lack of knowledge of the term by employees and, consequently, failure to meet the requirements of their customers (Maya Mendoza, 2014).

The NC ISO 9001 defines Quality Management as: set of coordinated activities to direct and control an organization with regard to quality.

In summary, it can be stated that quality management should be led in the first place by the entity's top management, but gradually this leadership should be exercised up to the level of each process (García, 2010).

In this environment, quality assumes a new and singular importance; it is essential in the whole process of providing services, since it is one of the most effective ways to achieve maximum competitiveness and, consequently, business leadership. In times of world economic crisis, the Cuban economy does not escape this phenomenon, especially due to the low levels of availability of material resources, which forces most of the entities to a more rational use of those available, with maximum efficiency (De la Nuez, 2005; Pérez, 2011).

The establishment of quality management systems and their certification by accredited and prestigious organizations has become a necessity for any organization today, regardless of the product or service it provides, where it is located, who its customers are or its size. This is because according to (González, 2009):

- Customers want to be confident that what they ask for is delivered consistently, and that their money (payment or social contribution) is spent on services or products that meet their needs, enabling them to be more effective and efficient.
- Customers, in turn, want to satisfy their own customers and need to be sure that their suppliers will not affect their quality and image.
- Society, as a client of social services, wants to ensure that the expenditures are spent on adequate and effective services to meet the expected needs and expectations.
- Managers want to ensure that they can consistently meet their commitments to customers and shareholders, owners (state or private) or society to maintain and grow revenues and profits and/or effectively utilize the budgets of the organization they manage.
- Shareholders or owners (private or social) want to ensure that the organization is properly managed to receive the expected benefits, either in terms of money or social satisfaction.
- Employees want to make sure that their company is maintained, grows and improves, thus improving their security, stability and also their benefits.

Successful management and operation of an organization requires that it be managed and controlled in a systematic and transparent manner. Success can be achieved by implementing and maintaining a management system that is designed to continuously improve its performance by considering the needs of all stakeholders, such is the case of quality management systems, as a management system in itself or, given its compatibility, as part of another business management system as a whole, or as part of other systems, such as innovation management or integrated systems of quality management and environmental management (Medina, 2010).

ISSN-On line: 2531-2995

Also in Cuba a growing number of organizations are engaged in restructuring their functions with a view to improving compliance with legal requirements with the implementation of ISO 9001 NC, ISO 14001 NC and OHSAS 18001 NC; an analysis is presented below (Ricardo, Medina & Nuñez, 2015).

In Cuba, the National Standardization Office is the entity officially designated as the National Certification Body. Foreign bodies such as Buró Verita and Loyd Register also certify. In addition to the above, other companies such as Registro Cubano de Buques have been authorized to endorse, it is not a certification but a recognition that companies have before third parties (Goleman, 2013).

**Quality management process**

The integration of the company's management system is a process of alignment of the organization's energies in pursuit of its mission, so that this alignment is made from the strategic exercise of the organization; it is the fusion between all subsystems with the company's strategy, a balance between the main activity of the company and its subsystems: practices, procedures and behaviors from each subsystem ensure compliance with the future-oriented business object (Alfonso, 2007).

For some years now, studies have been carried out on management systems (quality, environment, occupational health and safety), how they have evolved and have been successfully implemented in organizations, with the intention of proposing management models that help to ensure the satisfaction of the different stakeholders, albeit separately (Abad, Dalmau & Vilajosana, n.d.).

There are management systems based on quality, environment and safety, occupational health; there are others based on international standards, developed by the International Organization for Standardization (ISO). Some are developed jointly by ISO and the International Electrotechnical Commission (IEC) and currently ISO 50001: 2011, an energy management system, which is becoming a necessity in the organizational sector. Annual statistics reveal a healthy growth of certifications in all areas (Gasiorowski, 2013).

Currently, there is a fairly generalized worldwide trend towards the integration of management systems in organizations as a strategic factor to successfully face the challenges of this century. This concept has emerged as a result of the need to approach with common sense the satisfaction of different requirements derived from the market, environmental authorities and society in general, concluding that the best way for an organization to ensure that all these requirements are effectively and efficiently met is by integrating them into a single Management System for process quality (Arias, 2014).

Decree Law 281 (2007), refers in its Article 55 that: when applying the system, each company or higher management organization shall be studied as an integral whole, encompassing all the systems that compose it such as: General Organization System, Management Methods and Styles System, Goods and Services Production Organization System, Quality Management System, Human Capital Management System, Environmental Management System and Innovation Management System.

**Quality management procedures**

According to Isaac (2005), in his proposal for an Integrated Management Model, he proposes the so-called first level, second level and third level integration models. The first are wrongly called integrated systems, where isolated systems operate and integrate certain procedures and records. In them the integration itself is null and framed in simplifying documentation. The second ones integrate requirements and documentation and how to control it, with a single management manual, some integrated processes, as well as integrated procedures and records. The third level has an integrated policy and addresses planning, implementation, measurement, analysis and improvement in an integrated way. There are two growing trends towards the integration of management systems by organizations.

On the other hand, Delgado (2006), proposes an implementation plan for an integrated management system that reflects the phases of: design and development, implementation, operation and continuous improvement.

ISSN-On line: 2531-2995

The first stage of the process is conceived as the way in which the system will be able to handle all managerial and operational aspects. It has the explanation of all the phases identified in the proposal in a summarized form and in a clear way for the understanding of the readers.

According to Medina (2010), in his proposal for a Quality Management System as an index to measure the effectiveness of organizational performance. It has as its starting point the customers, and the main components that should be related to the satisfaction of their products or services. It has six components, among which the quality management system stands out, which maintains the relationship with all the identified components. It has an input which governs the requirements and as an output the satisfaction of the service provided to the customer.

On the other hand, Gutiérrez (2010), in his proposal for an Integrated Management System in the Empresa de Investigaciones y Proyectos Hidráulicos de Ciego de Ávila. The proposal has 10 components of which four are stages and the other six are steps, the stages are conception, design, monitoring and continuous improvement, which are interrelated. The main axis is a software for the control of the integrated management system, which has the general activities that are developed in the system implementation process and provides the output for obtaining data.

**Organizational performance**

The use of individual performance measures has a long history. At the beginning of the last century, performance metrics based on the calculation of times and movements and their comparison with standardized measures, whose values obeyed a flow of procedures within a predetermined process or model, were common. The business environment, the internal organizational climate and competition, fundamentally, encouraged theoreticians and managers to inquire about performance measures that went beyond the static of conventional measures (Del Castillo & Vargas, 2009).

In turn, the International Society for Performance Improvement (ISPI) defines performance improvement as "a systemic approach to improving productivity and competence, which uses a series of methods and procedures for the realization of opportunities related to people's performance". That is, it is a process of selecting, analyzing, designing, developing, implementing, and evaluating programs to achieve influence behavior and outcome in the most efficient way possible (Navarro, 2014).

Performance measurement can help organizations improve their performance by identifying good practices and learning from others. On the other hand, it helps to ensure that organizations focus on their key priorities, and allows the identification of areas with poor performance regardless of the approach or philosophy on which the management system is based in the entity, which helps to make decisions for continuous improvement (Medina, 2010).

Organizational performance, generally refers to the variable; performance, to address the results generated by the dynamics of an organization, this goes beyond financial data, quality, customer satisfaction, innovation, market shares and measuring impact on society, among others; they reflect more comprehensively the performance of the organization (Pérez & Cortés, 2009).

The forms of measurement constitute a fundamental element to account for organizational performance, in this regard it is identified that a measure is the instrument used to quantify the efficiency and effectiveness of the action, therefore, a performance measure is both quantifiable and verifiable (Melnyk, Bititci, Platts, Tobias & Andersen, 2014).

To measure are used indicators that are composed of three elements that make them more than a performance measure (Salgado & Calderón, 2014), the first element is that it is a performance measure quantifies what happens, the second element is that it constitutes a performance standard that considers whether the performance obtained is bad or good, this makes it a tool to guide the management of the organization; and finally it establishes the negative consequences of being below or above the goals.

Cuesta, Fleitas, García, & Hernández (2015), emphasize that, as part of organizational performance, the perception of workers is recognized, where the consideration of subjectivity, of the intangible, is precisely. It is not only individual, group and organizational results (concrete or tangible), but also the consideration of the intangibles expressed through the perception of workers.

That is why it is necessary to increase productivity and increase performance, seen from the improvement of performance, which can be translated into the generation of sustainable competitive advantages (Almanza, Calderón, Vargas, Casas & Palomares, 2016).

**Methodology to be developed**

In the first place, a plan was made to carry out the research in which the scope, general method, tools, procedures for data collection and analysis were determined, then through a meeting with the director the plan was presented and permission was obtained to begin the study, obtaining also the commitment to cooperate openly in the process. In turn, the director made this news known to all the company's personnel, with favorable results, since the members of the organization cooperated in the research.

The scope of the study covered the areas of the company such as: generation, distribution and commercialization of energy, which included the activities, work processes, available resources and existing documentation of the same. The method used was an exploratory and descriptive type of study, since it was necessary to know in detail the operation of the organization and thus be able to relate some variables. This study is also characterized by being prospective and longitudinal, according to Hernández, Fernández & Baptista (2014), since the information was recorded as the phenomena occurred throughout the research period.

The data collection period, comprises the year 2017, covering each work week according to the schedule it handles, through the review of existing documentation, interviews and non-participatory observations, with which the objective evidence was obtained.

The results were analyzed based on the ISO 9001:2015 standard, subsequently the variables that negatively impact the organization and that are related to the decrease in sales were identified, through these points the solution was determined, which gave rise to the implementation of a quality management system.

Finally, after the analysis, the report of the results was elaborated, which was presented to the director and quality specialist of the company, subsequently through the active participation of the same, the quality management system is realized as a proposal to solve the problems that affect the organization. It is worth mentioning that the research is of a propositional nature, therefore the company will decide on the implementation of the proposal presented.

**Description of the parts of the proposal contents**

**Introduction of the manual**

Describes in a general way the mission, vision, corporate purpose of the company, in addition to declaring by the top management the commitment and the need for implementation and implementation of the quality management system.

**Objective and scope of the quality manual**

This section specifies in general terms, the quality management system in the business system, according to the requirements established in the Cuban standard NC-ISO 9001:2015 and consequently with the Quality Policy and Objectives established by the top management of UNE. Its scope is established to apply to all units of Empresa Eléctrica Isla de la Juventud in the fulfillment of their specific functions, as appropriate, for the development and implementation of the QMS and the continuous improvement of its effectiveness.

**Management Responsibility**

The top management of EEIJ declares and establishes its commitment to develop, implement, maintain and continually improve the effectiveness of the quality management system, which evidences:

– Communicating and promoting awareness on the part of workers and management in general of the importance and contribution of their activities to the satisfaction of customer requirements and applicable legal and regulatory requirements.

– Ensuring that the Quality Policy is established and communicated.

– Ensuring the establishment, monitoring and measurement of quality objectives for the QMS, and their compatibility with the context and strategic direction of the EEIJ.

– Promoting the use of the process approach and risk-based thinking.

– Ensuring the successful management and availability of the necessary resources for the QMS.

– Ensuring that the QMS achieves the intended results and that the processes are generating and delivering the intended outputs.

– Promoting continuous improvement of QMS effectiveness and organizational performance.

– Supporting other relevant management roles to demonstrate leadership as it applies to their areas of responsibility.

**Management Responsibility**

The scope states that the QMS developed and implemented at EEIJ, through its business system, covers all processes, both those of product/service realization and those that facilitate management. To determine the scope, the following have been considered:

– The external and internal issues that are relevant to the EEIJ's purpose and strategic direction, and that affect its ability to achieve its intended results (Organizational Context).

– Relevant stakeholder requirements.

– Types of products/services covered.

In the case of processes outsourced to an external supplier, the type and scope of control to be applied to them is defined and declared in the QMS through the supplier-organization contract.

**Scope of the quality management system**

The scope states that the QMS developed and implemented at EEIJ, through its business system, covers all processes, both those of product/service realization and those that facilitate management. To determine the scope, the following have been considered:

– The external and internal issues that are relevant to the EEIJ's purpose and strategic direction, and that affect its ability to achieve its intended results (Organizational Context).

– Relevant stakeholder requirements.

– Types of products/services covered.

In the case of processes outsourced to an external supplier, the type and scope of control to be applied to them is defined and declared in the QMS through the supplier-organization contract.

**Documentary structure of the quality management systems**

In general, the documented information for the EEIJ's QMS comprises:

– Documented Information of Internal Origin (IDOI).

– Documented information from external sources (IDOE).

– Legal and regulatory documents.

– Regulatory documents.

The company ensures the legibility, identification and access availability of the current versions at the points of use of documented information, legal and regulatory documents, as well as normative documents.

The hierarchical levels of the documented information for EEIJ's QMS are shown below:

ISSN-On line: 2531-2995

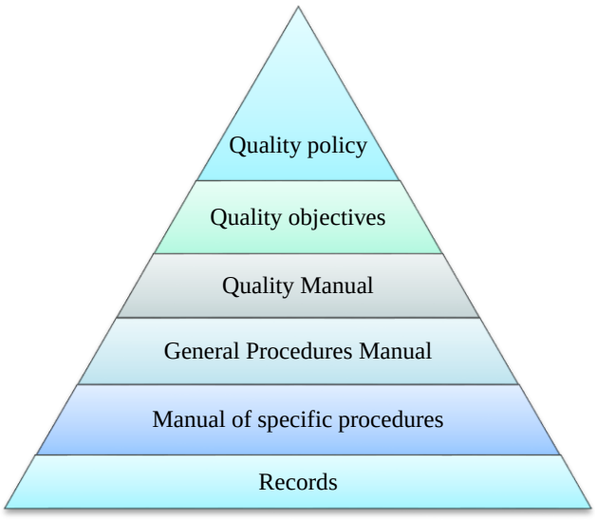


**Figure 1** Hierarchical levels of documented information for the EEIJ's QMS
*Source: Own Elaboration*

## Documented procedures for quality management systems

The documented information (manuals, procedures, instructions) for the QMS constitutes Documented Information of Internal Origin. (IDOI).

EEIJ's QMS ensures harmonious alignment with the provisions set forth in the constituent IDOIs of the UNE corporate system, including the following IDOIs:

| Quality Policy | |
|---|---|
| Quality Manual | OI-MG 0201 |
| General procedure for the control of documented information | OI-PG 0200 |
| General procedure for process management | OI-PG 0201 |
| General procedure for the control of nonconformities and corrective actions | OI-PG 0202 |
| General procedure for internal audits | OI-PG 0204 |
| General instruction for management review of the management system | OI-IG 0200 |
| General instruction for measuring the performance and effectiveness of the management system | OI-IG 0201 |

**Table 1** Documented information of internal origin
*Source: Own Elaboration*

## Implementation of the quality management system and its procedures

The implementation of the QMS was structured following the Plan-Do-Check-Act (PHVA) cycle, which is described below:

### Phase I - Planning

Planning establishes the objectives and resources needed to generate and deliver the expected results. In this phase, information and ideas are collected for decision making and to outline the way forward, the project leader is defined and the work team is formed, composed of specialists and technical representatives of the different processes, supported by the mission, vision and social purpose, carried out in the entity under study.

Techniques and tools: meeting with the management; group work; conferences and workshops; talks and interventions before the workers in the morning and dissemination in murals.

### Phase II - Doing

This phase involves all the people, with the effective and efficient use of resources; the success of the previously projected plans depends on it. For the execution of the system to achieve more effectively the implementation of the plan and promote the achievement of the objectives.

Techniques and tools: surveys; interview; document review, checklist, SWOT matrix; observation of processes and activities, workshops with the diagnostic team, on-the-job training; observation of processes and activities; document review; use of ICT; document control procedure**.**

### Phase III - Verify

In this phase, monitoring and measurement is carried out through audits and checking of effectiveness indicators by process, the results are reported to ensure compliance with the plans and achieve what was planned.

Techniques and tools: group work; meeting with the board of directors; brainstorming; flow chart and document review.

### Phase IV - Act

In this phase, feedback on the results of audits, supervisions and other control actions is established, which allows performance improvement, adjustments and improvement actions.

ISSN-On line: 2531-2995

Techniques and tools: documentary review; course on management system documentation; brainstorming; group work; workshops of the implementation group with the management.

**Actions taken for the transition**

The Cuban Standard NC-ISO 9001 of 2008, has been replaced by the Cuban Standard NC-ISO 9001 of 2015, by Resolution No. 129 dated September 18, 2015 issued by who resolves, in line with the similar replacement made by the International Organization for Standardization (ISO) of the corresponding international standard for incorporating new requirements, for better efficiency in the implementation of the management system and greater compatibility with other management systems.

A period of coexistence of both versions of these standards was established by ISO, which ends on September 18, 2018, with the National Bureau of Standardization determining in Resolution 1- 2016 that certifications will not be valid after three years from the publication of ISO 9001: 2015.

**Initial diagnosis**

This diagnostic stage took into account the results obtained in the audits of the different processes, the level of implementation of the QMS using the checklist of the NC ISO 9001: 2008 as a measuring instrument, which allowed us to identify the requirements of the standard that are not met and those that are met, but should be improved.

– The context of the organization was not taken into account for the achievement of objectives.

– Quality criteria, specifications and indicators are not established in all processes and structure of the company.

– Evaluation of externally supplied processes.

– Roles and responsibilities were not defined, ensuring that they were communicated or understood in the organization.

– Risk management was carried out in a corrective manner, not considering the management system as a preventive tool.

– The risk assessment does not take into account the limitations that affect the fulfillment of objectives and effectiveness of the processes.

– Documented information (procedures, manual, instructions) is not at the place of use, or within the reach of all workers.

**Formation of a work team and training**

At this stage the work team was formed, declaring by means of a resolution signed by the general director, the group of managers of the quality management system, made up of representatives of the processes, who were trained in the standards and regulatory documentation in force and applicable to the system.

– A course was given on the interpretation of the standard NC ISO 9001:2015

– Training on the development of system documentation and process management was provided to all management system specialists and technicians.

– A course on the interpretation of the NC ISO 9001: 2015 standard is being organized for process managers.

**Strategic design**

A review was made of the processes necessary to manage compliance with the organization's objectives, analyzing the external and internal context. The scope of the system was reviewed.

The organization's risk management was reviewed and determined for each process, taking into account compliance with the quality objectives.

The responsibilities and authority of all personnel involved in the management system were determined and communicated.

The process diagram, their sequence and interaction were updated and the externally supplied processes were identified.

ISSN-On line: 2531-2995

The stakeholders applicable to our services and their requirements were reviewed and the Management Policy was reviewed by the Board of Directors.

**Design of documented information**

The necessary documentation for the management system is identified, being elaborated, reviewed and adapted to the requirements of the regulatory, applicable and current documentation. It is made up of:

- Quality Manual,
- General procedure for documented information management,
- Process management procedure,
- General procedure for the control of nonconformities and corrective actions,
- General procedure for internal audits,
- General instructions for the review of management systems by management,
- General instruction for measuring the performance and effectiveness of the management system.

**Implementation and implementation of documented information**

The necessary actions for the implementation (Approve/Distribute/Train) and implementation of the documentation were executed and approved by the general management of the company, implemented by agreement of the board of directors and implemented in the quality committee.

**Training of internal auditors**

At this stage, the group of company managers was trained as internal quality auditors, with the objective of having a pool of auditors evaluated by the new standard to carry out internal audits of the system.

- Internal quality auditor endorsement courses were given by the quality management center.
- Basic tools for quality management course.

**System testing and adjustment**

In this stage, control actions (internal audits, inspections, control visits, etc.) were carried out on the system and the results were used as a source for improving the system, executing corrective actions when necessary.

**Management review**

The management review was carried out at the Company level, resulting in:

- Results of the diagnosis of the quality management system in the first quarter of 2018.

The entity has identified the necessary processes in the management system. The documentation governing the quality management system is in line and consistent with NC 9001:2015 and the ISO 9000 family of NCs. The quality policy is updated, disclosed and approved by the company's senior management, which is in line with the entity's strategy. The quality criteria, specifications and indicators are established throughout the company's structure, reflected in the process sheets. The company has a Quality Council with a quarterly section. In the nine UEBs, functional directorates and integrated project directorates there are QMS managers who have defined their responsibilities to advise and manage the system in each process, recording and maintaining the improvement relationship.

In the first half of 2018 the company is in stage VII of (System Testing and Adjustment), in which control actions (internal audits, inspections, supervisions, management review, checking of the different indicators) are carried out on the system and according to the results corrective actions are executed, and the activities of the entity are organized based on the achievement of the objectives.

- The distribution of responsibilities in the entity with respect to the management system is documented in the job profiles, which communicate and define the following.

- There is no contradiction between the purchasing policy and the quality policy, both are part of the company's work and development strategy.

ISSN-On line: 2531-2995

– The main limitations that could stop the processes or the fulfillment of objectives are defined, which are reflected in the risk assessment of each process.

– Quality discrepancies arising from customer complaints are processed and evaluated according to the steps established in the relevant procedures.

– The mechanisms established in the organization that allow to know the needs and criteria on the quality of the service provided is through the Integral Customer Service Center, which is in charge of attending and processing complaints in an efficient manner.

– The satisfaction index of external customers and stakeholders is measured.

## Results

The behavior of the work objectives in the period 2015-2017 was evaluated, with which an analysis of the balance of the work carried out in those periods was made. Table 2 refers to the behavior of the indicators of the work objectives from 2015 to 2017. For the determination of the difference, the year 2015 as control and 2017 as implementation phase are taken as a reference.

| Obj. | Variables | Indicadores | U/M | 2015 | | 2016 | | 2017 | | Dif. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Plan | Real | Plan | Real | Plan | Real | |
| 1 | Reducir las pérdidas de distribución | Pronóstico de pérdidas | % | 10.90 | 10.58 | 10.84 | 11.37 | 11.79 | 11.08 | -0.50 |
| | | Índice de quejas x 1000 c | % | 2.90 | 1.90 | 2.20 | 1.70 | 2.50 | 1.00 | 0.90 |
| | | Quejas que proceden x 1000 c | % | 1.00 | 0.30 | 1.00 | 0.10 | 1.00 | 0.10 | 0.20 |
| | | Fallas de energía en clientes con EM (cl 0.3 y 04) x 1000 c | % | 0.85 | 0.00 | 0.85 | 0.00 | 0.85 | 0.00 | 0.00 |
| 2 | Plan de inversiones | Cronograma para la ejecución | % | 90.00 | 90.00 | 95.00 | 99.70 | 92.00 | 98.00 | 8.00 |
| 3 | Explotación de las unidades y equipos auxiliares en el sistema | Generación bruta | MWh | 135903.70 | 137797.01 | 121935.54 | 113391.15 | 145819.13 | 139164.67 | -1367.66 |
| | | Disponibilidad | % | 80.40 | 86.40 | 82.91 | 86.48 | 80.70 | 88.70 | -2.30 |
| | | Consumo específico bruto | g/kWh | 229.70 | 224.80 | 229.50 | 225.70 | 230.37 | 226.80 | -2.00 |
| | | Factor de insumo | % | 4.60 | 4.25 | 4.54 | 3.90 | 4.70 | 4.00 | 0.24 |
| | | Consumo específico de aceite | l/MWh | 2.00 | 1.87 | 2.10 | 1.64 | 2.23 | 2.07 | -0.20 |
| | | Ejecución de mantenimientos capitales Tecnología Fuel-Oil | Uno | 5.00 | 3.00 | 3.00 | 2.00 | 6.00 | 2.00 | 1.00 |
| 4 | Rehabilitación y modernización de las redes eléctricas | Tiempo de interrupción usuario | h | 14.68 | 14.52 | 23.80 | 22.95 | 22.00 | 21.64 | -7.12 |
| | | Interrupciones en la sub-transmisión | Uno | 5.00 | 4.00 | 4.00 | 6.00 | 6.00 | 6.00 | -2.00 |
| | | Interrupciones en la distribución primaria | Uno | 97.00 | 112.00 | 100.00 | 96.00 | 85.00 | 85.00 | 27.00 |
| | | Interrupciones en la distribución secundaria | Uno | 380.00 | 419.00 | 372.00 | 456.00 | 390.00 | 340.00 | 79.00 |
| | | Interrupciones de servicio | Uno | 828.00 | 825.00 | 829.00 | 789.00 | 765.00 | 713.00 | 112.00 |
| 5 | Validación, certificación y reposición del combustible mensual | Disponibilidad del parque eólico los canarreos | % | 90.00 | 84.00 | 66.70 | 77.90 | 74.00 | 79.10 | 4.90 |
| | | Disponibilidad parques fotovoltaicos | % | 95.00 | 99.90 | 95.00 | 100.00 | 95.00 | 100.00 | -0.10 |
| | | Disponibilidad de GEE por concepto de combustible | % | 98.00 | 100.00 | 98.00 | 100.00 | 75.00 | 80.00 | 20.00 |

**Table 2** Balances of work objectives
*Source: Own Elaboration*

The first element is variable 1 on reducing distribution losses, where the loss forecast indicator is affected by 0.5 % more than in the base year, mostly influenced by the business sector. Regarding the index of complaints per 1,000 citizens, it decreased by 0.9 %, an aspect that is positive because it reflects the satisfaction of the customers with the service provided both to the user at home and in the business and private sector, as well as the complaints that proceed with a decrease of 0.2 %. The second element is referred to the investment plan where the execution schedule is higher in 2017 with 8 % more execution of activities as part of the business improvement system and the implementation of the implementation of the quality management system in all processes of the entity.

The operation of the units and auxiliary equipment in the system is the third indicator evaluated, where there are six variables, it is noteworthy in this regard that it is higher in 2017 compared to 215 in 2.3 % availability, despite the non-execution of capital maintenance of Fuel-Oil technology, an aspect of significant since it is a limiting factor in almost all generating companies today.

The fourth variable is the rehabilitation and modernization of the electrical networks, where it is observed that the user interruption time indicator (UTI) dropped to -7.12 hours, which is a reflection of the good execution of energy utilization and generation. Evaluating the service interruptions indicator also shows a decrease of 112 interruptions in 2017, less than 2015. These results are in accordance with the fulfillment of the entity's investment plan with emphasis on the modernization and improvement of electrical networks.

Finally, variable five is determined corresponding to the validation, certification and replenishment of monthly fuel, aspects that require greater customer satisfaction with emphasis on the availability of the photovoltaic park, in this sense Los Canarreos has a decrease of 4.9% less in 2017 compared to 2015. In summary, it was possible to establish the weaknesses that the company has against the requirements of the standard, likewise the strengths that should be exploited within the organization to carry out the implementation of the quality management system based on ISO 9000:2015 were detected.

## Conclusions

From the analysis of the literature consulted in the framework of this research, positive elements of the theory in this field were diagnosed, which were taken as references for the conformation of the quality management system and its procedures for the process of improving organizational performance, as well as the existence of insufficiencies in relation to theoretically supported methods to manage quality in the business sector.

The application of the diagnosis made it possible to verify the feasibility and effectiveness of its use as a methodological instrument, since it was verified: the regularities that in a general way are in the order of problems with the delivery of information to the fluctuation of the personnel, being these the process managers.

The quality management system constitutes a methodology that applied by the work group contributes to the improvement of the organizational performance and has repercussions in the increase of the results seen from the development of activities by the key processes for the fulfillment of work objectives, which provide the fulfillment of the fundamental processes.

The implementation of the Quality Management System from its procedures and manual resulted in the collection of information and ideas for decision making, establishing feedback on the results of audits, supervisions and other control actions, which allowed improving performance, making adjustments and improvement actions.

## References

Alfonso Robaina, D. (2007). Modelo de dirección estratégica para la integración del sistema de dirección de la empresa. Tesis presentada en opción al grado científico de Doctor en Ciencias Técnicas.

Arias, Maira. (2014). Integración de los Sistemas de Gestión de Calidad, el Medio Ambiente y la Seguridad y Salud del Trabajo. Holguin : s.n., 2014. ISSN 1027-2127.

Banguela Villavicencio, Z. (2009). Diseño de un procedimiento para la mejora continua en la empresa industrial de instalaciones fijas. Tesis en opción por el título académico de Master en Calidad. Instituto Superior Politécnico José Antonio Echeverria.

Cruz Hernández, Y. (2004). Procedimiento de implantación del Sistema de Gestión Integrado en la Organización Empresarial de Base Mecanización (TICONS). Tesis presentada en opción al Título Académico de Master en Calidad Total.

DECRETO- LEY NO 281: 2007. Reglamento para la implantación y consolidación del Sistema de Dirección y Gestión empresarial estatal. In: Gaceta oficial de la república de Cuba, 16 August 2007.

De La Nuez Hernández, D. (2005). Modelo de gestión de la calidad basado en el liderazgo como valor instrumental aplicado en empresas de proyectos. Tesis presentada en opción al grado científico de Doctor en ciencias. Universidad "Hermanos Saiz Montes de Oca", Pinar del Río, Cuba.

Duque Gibernau, N. (2006). Diseño del proceso de construcciones modulares, con un enfoque integrado. Trabajo de Diploma en opción al título de Master en Calidad Total. Instituto Superior Politécnico José Antonio Echeverría.

García, E. (2010). Costo de la calidad, en ¿Cuba?, necesidad y realidad. In: Le actualiza, publicación interna de la Oficina Nacional de Normalización [en línea]. Disponible en www.inin.cubaindustria.cu/ docs /NC- le-actualiza.pdf. 15 de marzo de 2016.

García Moreno, A. I., González Barbosa, J. J., Hurtado Ramos, J. B., Ornelas Rodríguez, F. J., & Ramírez Pedraza, A. (2016). Análisis de la sensibilidad en un modelo de calibración cámara LiDAR. Revista Internacional de Métodos Numéricos para Cálculo y Diseño en Ingeniería, 32(4),193-203. Recuperado de http://www.scien-cedirect.com/science/article/pii/S021313151500053X

ISSN-On line: 2531-2995

González Navarrete, M. (2004). Procedimiento para la Implantación de un Sistema de Gestión Integrada. Trabajo de Diploma en opción al título de Master en Calidad Total, Instituto Superior Politécnico José Antonio Echeverría.

González Freire, L. R. (2009). Procedimiento para el diseño e implantación del Sistema de Gestión de la Calidad en el Proceso Atención Telefónica a Clientes Externo. Tesis presentada en opción al grado científico de Máster en Calidad Total. Instituto Superior Politécnico José Antonio Echeverría.

Hernández, R., Fernández, C. & Baptista, M., (2014). "Metodología de la investigación", 4ta. ed., *Editorial McGraw-Hill/Interamericana* editores, S. A. de C.V., impreso en México, pp. 1-656. Recuperado de www.FreeLibros.com

Maya Mendoza, J. (2014). Método para lograr la calidad en las organizaciones. Punto de Vista, Vol. V, No. 8, enero-junio de 2014, pp. 77-100

Medina Negrín, L. N. (2010). El Sistema de Gestión de la Calidad como índice para medir la eficacia del desempeño organizacional. Centro de Información y de Gestión Tecnológica de Cienfuegos.

Melnyk, S., Bititci, U., Platts, K., Tobias, J. & Andersen B. (2014). Is performance measurement and management fit for the future? Management Accounting Research Issue 2. Vol. 25. pp. 173–186. Recuperado de: https://www.sciencedirect.com/science/article/pii/S1044500513000723

NC ISO 9001. (2015). Sistemas de gestión de la calidad. [En línea] disponible en: www.nc.cubaindustria.cu. Consultado el: 15 de junio de 2016.

Pérez, E. (2011). Implementación del modelo de Gestión de la Calidad basado en el Liderazgo como valor instrumental, en la Unidad Básica de Servicios Técnicos de TRD Caribe División Pinar del Río". Tesis presentada en opción al título académico de Máster en Dirección. Universidad Hermanos Saiz Montes de Oca, Pinar del Río, Cuba.

Pérez Zapata, J. & Cortés Ramírez, J.A. (2009). Medición y validación del desempeño organizacional como resultado de acciones de aprendizaje. Ciencias Estratégicas. Vol 17 - No 22. Medellín-Colombia. Jul-Dic de 2009 - ISSN: 1794-8347. pp. 251-271.

Salgado Castillo, J. A. & Calderón Pinzón, L.T. (2014). Sistemas de control de gestión y desempeño organizacional: una revisión conceptual Área de investigación: Teoría de la administración. pp. 1-17. Recuperado de: http://congreso.investiga.fca.unam.mx/docs/xix/docs/17.05.pdf

.