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Artículos Científicos

Validación del instrumento de evaluación de desempeño de un sistema de gestión de calidad en una institución de educación superior

Validation of the performance assessment instrument of a quality management system at a higher education institution

Validação do instrumento de avaliação de desempenho de um sistema de gestão da qualidade em uma instituição de ensino superior

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Resumen

En el entendido de que una institución educativa es también una organización cuya tarea sustantiva es la proporción de un servicio que busca el aprendizaje del estudiante a través de las actividades que en su totalidad ofrece, la percepción de los trabajadores al respecto es base para la maduración de un sistema de gestión de la calidad que trascienda en sus procesos con la intención de generar mejores resultados. Bajo este tenor, el objetivo de este estudio radicó en diseñar y validar una herramienta para el monitoreo del estatus que guarda una institución de educación superior, en ese sentido y alineado a los estatutos de la norma de calidad ISO 9001:2015.

Para ello, se elaboró un instrumento para conocer la percepción de los trabajadores con respecto a lo mencionado, de tal forma que el resultado obtenido anule los sesgos derivados de la aplicación de otras herramientas, tales como las listas de cotejo que la misma norma provee, las cuales no están alejadas del todo del criterio y otros contaminantes, como marcos de referencia o disposición y ánimo del que audita o mide. El diseño de la investigación se clasificó en el tipo instrumental, y el documento de medición en la tipología escala. Se definieron sus propiedades métricas de contenido, constructo y confiabilidad a una muestra de 133 trabajadores universitarios. La estructura final de dicho instrumento se conformó por 42 ítems, distribuidos en cinco dimensiones, como resultados se obtiene que el instrumento diseñado después de su validación estadística cumple con los criterios establecidos siento este un instrumento válido para su aplicación en la práctica.

Palabras clave: calidad en el servicio, educación superior, medición, norma de calidad ISO 9001:2015.

Abstract

In the understanding that an educational institution is also an organization whose substantive task is the proportion of a service that seeks student learning through the activities that it offers in its entirety, the workers perception of it is the basis for the maturation of a Quality Management System that transcends its processes with the intention of generating better results. Under this tenor, the objective of this study was to design and validate a tool for monitoring the status of an institution of higher education, in that sense and aligned with the statutes of the ISO 9001:2015 Quality Standard.

An instrument was then developed, whose purpose is to know the worker's perception regarding the aforementioned, in such a way that the result obtained annuls the biases derived from the application of other tools, such as checklists that the same standard provides, and that are not far from the criteria and other pollutants such as frames of reference or disposition and spirit of the auditor or measure. The research design was classified in the instrumental type, and the measurement document in the scale typology. Its metric properties of content, construct and reliability were defined to a sample of 133 university. The final structure of this instrument was made up of 42 items, distributed in five dimensions, results you get that the instrument designed after its statistical validation meets the established criteria I feel this a valid instrument for its application in practice.

Keywords: quality standard, higher education, measurement, service quality.

Resumo

No entendimento de que uma instituição educacional também é uma organização cuja tarefa substantiva é a proporção de um serviço que busca a aprendizagem do aluno por meio das atividades que oferece em sua totalidade, a percepção dos trabalhadores a esse respeito é a base para o amadurecimento. de um sistema de gestão da qualidade que transcende seus processos com a intenção de gerar melhores resultados. Sob esse teor, o objetivo deste estudo foi projetar e validar uma ferramenta para monitorar o status de uma instituição de ensino superior, nesse sentido e alinhada aos estatutos do padrão de qualidade ISO 9001: 2015.

Para isso, foi desenvolvido um instrumento para conhecer a percepção dos trabalhadores em relação ao mencionado, de forma que o resultado obtido anule os vieses derivados da aplicação de outras ferramentas, como as listas de verificação que o mesmo padrão fornece, que não estão distantes dos critérios e de outros contaminantes, como quadros de referência ou disposição e espírito de quem audita ou mede. O desenho da pesquisa foi classificado no tipo instrumental e o documento de medida na tipologia da balança. Suas propriedades métricas de conteúdo, construto e confiabilidade foram definidas para uma amostra de 133 trabalhadores universitários. A estrutura final deste instrumento foi composta por 42 itens, distribuídos em cinco dimensões, obtendo-se que o instrumento elaborado após sua validação estatística atende aos critérios estabelecidos, e considero que este é um instrumento válido para sua aplicação na prática.

Palavras-chave: qualidade de serviço, ensino superior, medição, padrão de qualidade ISO 9001: 2015.

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Introduction

Currently, a discursive wave can be seen in terms of offering quality services, despite the fact that in many cases there is no clear idea of the meaning of the word quality. In section 9 of the ISO 9001: 2015 standard, emphasis is placed on performance evaluation and the importance of continuing with the analysis based on what the client suggests should continue to be reproduced and what should be eliminated.

For Cruz, López and Ruiz (2017), the ISO 9000 family of standards addresses various aspects of quality management and provides guidance and tools for companies and organizations that want to ensure that their products and services consistently meet the requirements of the customer and with constant improvement. For this reason, performance evaluation is important because, according to these authors, it refers to monitoring, performance measurement, and analysis and evaluation of both processes and customer opinion in order to implement the necessary actions. to achieve the planned results and the optimization of said processes. For this, the design of experiments can contribute to the synthesis of results, since when analyzing changes in the system under investigation and statistically evaluating the effect, some characteristics are validated or the influence of one or more factors on some characteristics of a process, system or organization.

Justification

Despite the fact that the advantage presented by the conformation of these dimensions into a quality standard and the satisfaction and quality that it seeks to provide to its users has been recognized, it is usually far from the application of the best strategies. Therefore, the elaboration of instruments that account for an objective measurement is necessary to avoid generating biased results in the final values. This should be promoted because the determination of its metric properties are key to achieving the objective in question: an impartial measurement of its development from the determination of its dimensions.

The interest of measurement lies in obtaining accurate and objective data that allows making sound decisions regarding various situations. When talking about the establishment of quality standards for compliance (according to what is perceived as desired by your workers, since it is linked to the theory established in this regard), it is necessary to determine the contribution to

the learning of workers , in addition to clearly defining the extent to which this contribution is being reflected and then consistently applying or intervening in improving the context.

Problem statement

Having service measurement tools in organizations will lay the foundations for growth, wealth and productivity, since it is the clients who directly provide the input information for decision-making and change, in the search for the objective maturation of the systems. quality management. That is, the basis lies directly in the results that the client provides, when making assertions about the role that is exercised in the service provision processes, which supports the following research question.

Research question

What are the dimensions that make up an instrument capable of objectively measuring the level of application of section 9 of the ISO 9001: 2015 standard on which it can be useful in the provision of quality in an institution of university educational level?

Investigation objectives

Design and validate an instrument that measures performance evaluation in a higher education institution in accordance with point 9 of ISO 9001: 2015.

Literature review

The performance evaluation of a quality management system (QMS) is the preliminary point at the end of the improvement cycle addressed by ISO 9001: 2015, in which the results of the processes are analyzed in a determined period to be evaluated through indicators, instruments, surveys, audits and committee meetings.

The QMS based on the ISO 9001: 2015 standard incorporate an easily understood language, with supporting standards (such as ISO 9000: 2015), of foundations and vocabulary for quality management systems, where they define the terms used in the ISO 9001: 2015 certifiable standard for organizations that want to improve their global performance.

In order to present clarity to the reader regarding the fundamental terminology for understanding the approach in this section, below are some essential concepts for opening to the

topic. The ISO 9000: 2015 quality management systems-Fundamentals and vocabulary defines the following:

> 3.7.8 Performance
>
> Measurable result
>
> Note 1 to entry: Performance can be related to quantitative or qualitative findings.
>
> Note 2 to entry: Performance can be related to the management (3.3.3) of activities (3.3.11), processes (3.4.1), products (3.7.6), services (3.7.7), systems (3.5.1) or organizations (3.2.1).
>
> Note 3 to entry: This is one of the common terms and essential definitions for management system standards that are provided in Annex SL of the Consolidated ISO Supplement to Part 1 of the ISO / IEC Directives. The original definition has been modified with the modification of note 2 to the entry (ISO, 2015).
>
> 2.2.2 Quality management systems
>
> A QMS comprises activities through which the organization identifies its objectives and determines the processes and resources required to achieve the desired results.
>
> The QMS manages the interacting processes and resources that are required to deliver value and achieve results for relevant stakeholders.
>
> The SGC enables senior management to optimize the use of resources, considering the consequences of their decisions in the long and short term.
>
> A QMS provides the means to identify actions to address expected and unanticipated consequences in the provision of products and services (ISO, 2015).

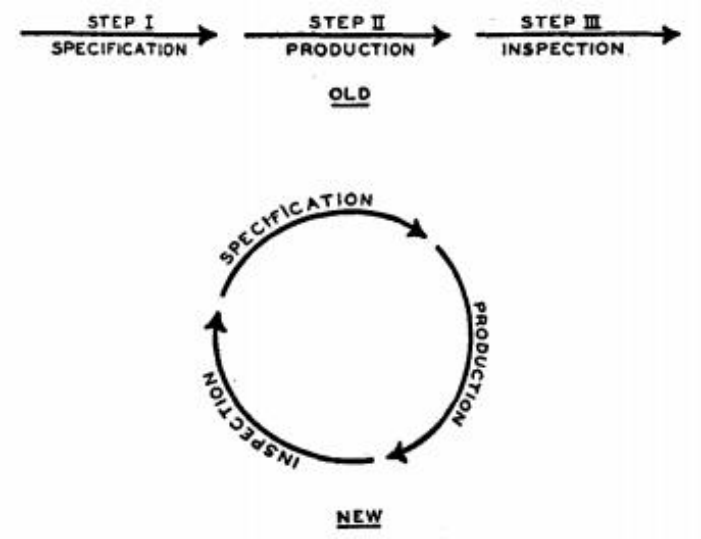
It can be said that the evaluation of the performance of a QMS constitutes the monitoring of the state of the organization in its processes, through the analysis and review of the results to take the actions that ensure the achievement of the objectives.

For Yar (2018), the self-evaluation of the performance of the SGC will be carried out once a certain period has elapsed, with the system implemented, the mechanism or tool to be used to internally evaluate the processes will be the audit in accordance with the provisions of the standard ISO 9001: 2015.

The performance evaluation (chapter 9 of the ISO 9001: 2015 standard) of the QMS state is the stage in which the effects occurred in the QMS during the first two stages (planning and doing the PHVA cycle) of the cycle are verified and observed of improvement or Shewhart cycle adopted in the structure of the ISO 9001: 2015 standard. This "is a valuable procedure that helps to pursue improvement at any stage" (Deming, 1989, p.67).

The three-step cycle proposed by Shewhart (1939) "constitutes a dynamic scientific process of knowledge acquisition that allows feedback to achieve continuous improvement" (p. 45), and is made up of three steps: 1) specification, 2) production and 3) inspection. This was the model from which the Deming improvement cycle started, later adapted by the QMS based on the ISO 9001 standard (Figure 1).

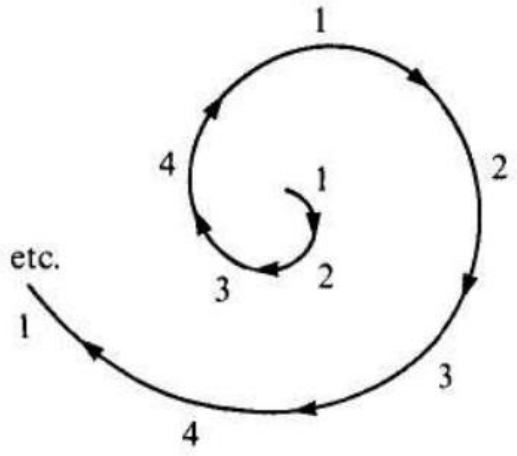
Figura 1. Ciclo de tres pasos de Shewhart



Fuente: Shewhart (1939)

This was subsequently addressed by Deming (1989), who added a fourth step to Shewhart's three-phase cycle: testing it after-sales, discovering what the user thinks of it, and why the non-user has not bought it. Likewise, he comments that “following the four steps we reach a helix of continuous improvement in customer satisfaction, at increasingly lower costs” (Deming, 1989, p. 141) (figure 2).

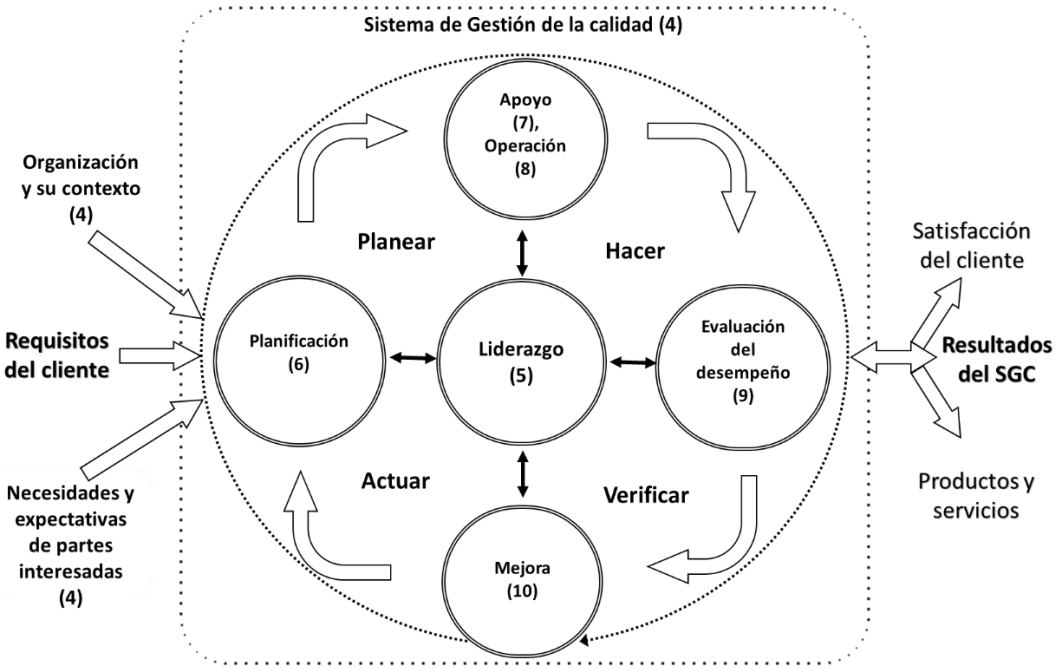
Figura 2. Hélice de Deming



Fuente: Deming (1989)

As can be seen in figure 3, this cycle was subsequently adapted by ISO.

Figura 3. Representación de la estructura de la norma ISO 9001:2015



Fuente: Elaboración propia a partir de la norma ISO 9001:2015 (ISO, 2015)

Representation of the structure of ISO 9001: 2015 with the PHVA cycle (improvement cycle).

The PHVA cycle can be briefly described as follows:

- Plan: Establish the objectives of the system and its processes, as well as the resources necessary to generate and provide results in accordance with customer requirements and organization policies, and identify and address risks and opportunities.
- Do: Implement what was planned.
- Verify: Track and (where applicable) measure processes and resulting products and services against policies, objectives, requirements, and planned activities, and report on results.
- Act: Take actions to improve performance, when necessary (ISO, 2015 p.10).

In the performance evaluation stage, the monitoring and measurement of processes, products and services is verified within the framework of the policies, objectives, requirements inherent to the ISO standard and those of the organization and to all the planned activities of the QMS.

Monitoring, measurement, analysis and evaluation of a quality management system

In education, evaluation practices are inherent in the search for quality training, which is essential to promote the progressive improvement of learning; that is, the evaluation allows identifying deficiencies, which must be corrected, and recognizing strengths, which must be consolidated (National Institute for the Evaluation of Education, 2018). In effect, an adequate evaluation of educational practices will detect and correct weaknesses, take advantage of opportunities, confront threats and weaknesses, and maintain and exploit strengths.

Having indicators that measure the performance of the plans is a great achievement to know the situation in which the objectives derived from national planning are and their progress; In addition, the information generated facilitates decision-making (National Council for the Evaluation of Social Development Policy, 2017

. In other words, measuring the performance of the activities of an educational institution allows gathering the information necessary to make decisions that improve its current conditions.

Chapter 9 of ISO 9001: 2015 (2015) mentions that the organization must determine that it needs monitoring and measurement, the monitoring, measurement, analysis and evaluation

methods necessary to ensure valid results, when to carry out the monitoring and measurement, and when monitoring and measurement results should be analyzed and evaluated. Also, evaluate the performance and effectiveness of the quality management system. For this, the ISO 9000: 2015 support standard Quality management systems-Foundations and vocabulary defines the following:

> 3.11.3 Tracing
>
> Determination (3.11.1) of the state of a system (3.5.1), a process (3.4.1), a product (3.7.6), a service (3.7.7) or an activity
>
> Note 1 to entry: Critical verification, monitoring, or observation may be required to determine status.
>
> Note 2 to entry: Tracking is generally a determination of the state of an object (3.6.1) being tracked, carried out at different stages or at different times.
>
> Note 3 to entry: This term is one of the common terms and essential definitions for management system standards provided in Annex SL of the Consolidated ISO Supplement to Part 1 of the ISO / IEC Directives. The original definition and footnote 1 to the entry have been modified, and footnote 2 has been added" (ISO, 2015).
>
> 3.11.4 Measurement
>
> Process (3.4.1) to determine a value
>
> Note 1 to entry: According to ISO 3534-2, the value determined is generally the value of a quantity.
>
> Note 2 to entry: This term is one of the common terms and essential definitions for management system standards provided in Annex SL of the Consolidated ISO Supplement to Part 1 of the ISO / IEC Directives. The original definition at the entry has been modified and note 1 has been added to the entry" (ISO, 2015).

The existence of a series of specific indicators to measure the participation of the personnel during the implementation and the role of the QMS is the adequate way to guarantee an adequate measurement with respect to the requirements of the standard for personnel matters (Giuliano, Moroncini, & Depounti , 2012). At this stage of the QMS, it is important to define the appropriate methods to obtain valid and reliable results on the performance of the system, an input for the analysis carried out and for the subsequent decision-making that closes the improvement cycle.

User satisfaction of a quality management system

The satisfaction of users of a QMS is essential to improve their performance, hence Surdez, Sandoval and Lamoyi (2018) affirm that "valuing student satisfaction contributes to making sound decisions in management oriented to university quality" (p.9). User satisfaction surveys measure their perception dimensions with respect to the QMS requirements, a decisive factor in the analysis to establish actions aimed at continuous improvement. The user will be satisfied when the services meet or exceed their expectations. If the user's expectations are low or if the user has limited access to any of the services, they may be satisfied with receiving relatively poor services, so it is necessary to constantly measure their perceptions to obtain information that helps improve the QMS. .

To this end, satisfaction surveys are applied when offering certified processes in a QMS, either to provide a service or to deliver a product, and they are analyzed at certain periods to know the degree to which user expectations are met. endings.

The ISO 9000: 2015 quality management systems-Fundamentals and vocabulary defines the following:

> 3.9.2 Customer satisfaction
>
> Customer perception (3.2.4) of the degree to which customer expectations have been met
>
> Note 1 to entry: The customer's expectation may not be known by the organization (3.2.1), or even by the customer, until the product (3.7.6) or service (3.7.7) is delivered. To achieve high customer satisfaction, it may be necessary to meet a customer's expectation even if it is not stated, nor is it generally implied, nor is it mandatory.
>
> Note 2 to entry: Complaints (3.9.3) are a common indicator of low customer satisfaction, but their absence does not necessarily imply high customer satisfaction.
>
> Note 3 to entry: Even when the customer's requirements (3.6.4) have been agreed with the customer and these have been met, this does not necessarily ensure high customer satisfaction (ISO, 2015).

For Surdez et al. (2018), "the progress of a country depends largely on the educational quality provided by the universities, and the satisfaction of workers is an indicator to evaluate it" (p.12). In this sense, having systems that incorporate measurements to assess user satisfaction and

perception becomes an important factor in achieving the comprehensive improvement of the educational system in Mexico.

Analysis and evaluation of a quality management system

Quality management models have some aspects in common: they are aimed at improving the results of organizations through continuous optimization, they require the commitment of management and customer orientation, and they can be used both to carry out a self-evaluation (situation analysis that allows knowing the starting point and establishing improvement plans) to undergo external evaluations (verification, accreditation and certification) (Martínez, Pérez and Martínez, 2018).

In these stages, evaluations of staff performance, work climate, user satisfaction, indicators and internal and external audits are analyzed to determine the status of the QMS and make decisions that correct unwanted deviations from the goals and objectives of the organization. Table 1 corresponds to Chapter 9 of ISO 9001: 2015 and quality engineering techniques and tools.

Tabla 1. Correspondencia entre el capítulo 9 de la norma ISO 9001:2015 y las técnicas y herramientas de ingeniería de calidad

Numeral ISO 9001:2015	Técnicas/herramientas ingeniería de calidad
9.1 Seguimiento, medición, análisis y evaluación	Diseño de experimentos, prueba de hipótesis, metrología, análisis de la capacidad del proceso, análisis de regresión, análisis de confiabilidad, muestreo, gráficos de control estadístico de procesos, análisis de series de tiempo, indicadores.
9.2 Auditoría interna	Muestreo, estadística descriptiva, hoja de verificación.
9.3 Revisión por la dirección	Análisis de la capacidad del proceso, muestreo, gráficos de control estadístico de procesos, hoja de verificación, histograma, diagrama de pareto.

Fuente: Elaboración propia a partir de la tabla de correspondencia entre los numerales de la norma ISO 9001:2015 y las técnicas y herramientas de ingeniería de calidad (Cruz *et al*., 2017).

Likewise, Cruz et al. (2017) mention that the improvement constitutes the point of the PHVA cycle where decisions are made around the mitigation of the causes of the failures in the system; therefore, the quality engineering tools to comply with the last number of ISO 9001: 2015 are the same as those described for operation and performance evaluation, since having the causes of non-quality quantified, the following it is the formulation of strategies that minimize them or, if possible, eliminate them.

For this reason, and to reach this last chapter of ISO 9001: 2015 (10; improvement), it is necessary to go through chapter 9 (performance evaluation), since the causes of deficiencies in the QMS have been identified and assessed, it is possible to proceed to the determination of the strategies to correct the causes that originate said deficiencies.

Internal audit of a quality management system

Velázquez (2019) points out that "through the audit exercise there is an opportunity to obtain information (facts and data) relevant to the organization and to make decisions, but if the results are flawed, it is not possible to obtain benefits" (p.154). SGC audits are supported by ISO 19011; guidelines for management systems auditing, which provides guidance on managing an audit program on planning and conducting management systems audits, as well as on the competence and evaluation of an auditor and an audit team (ISO, 2018).

Quality audit is the systematic examination of a quality system carried out by an internal or external quality auditor, or by an audit team. It is an important part of an organization's quality management system and is a key element in the ISO quality system standard, ISO 9001 (Mauch, 2010). This process should be planned at certain intervals, establishing the objective of each audit, its scope, those involved, the specific plan, the criteria and methods to evaluate the QMS in a systematic and standardized way.

In the case of internal feedback, it corresponds to internal audits —also called first-party audits—, generally carried out by the organization's own personnel with the appropriate competencies as defined by the company itself (Vásquez and Torres, 2018). Internal auditors must be trained and gain experience to be able to conduct the QMS audit process impartially and objectively, retaining evidence of their training, evaluation, and participation in audits within and outside the organization.

Velásquez (2019) comments that if internal auditing is to be truly a mechanism to promote learning, reflection and improvement of the organization, the way we carry it out must be adjusted, considering that based on the interaction between Auditors and auditees can emerge knowledge that benefits everyone and have a genuine intention to take advantage of their results.

Viewed in this way, auditing can also be a learning mechanism to enhance the conditions of the organization, by exchanging opinions and experiences between auditors and auditees of the same organization, which allows enriching the information to be analyzed and led to improvement. from your QMS.

In the Quality Management Systems-Foundations and Vocabulary standard (ISO, 2015), it is mentioned that auditing is a means of evaluating the effectiveness of a QMS, to identify risks and to determine compliance with the requirements. But for audits to be effective, tangible and intangible evidence needs to be collected that will serve to take corrective and improvement actions. In this way, the knowledge acquired could lead to innovation, taking the performance of the QMS to higher levels.

Within this process, evidence must be collected to support the findings, identifying potential situations of deviation from the requirements established by the ISO 9001: 2015 standard or from the organization itself. Likewise, the information and knowledge acquired can be used to feed back the QMS and enhance its performance.

The standard for quality management-quality of an organization-orientation to achieve sustained success (ISO, 2018) establishes that internal audits are an effective tool to determine the levels of conformity of the organization's management system with its selected criteria, the which provide valuable information to understand, analyze and improve the performance of the organization. Internal audits must evaluate the implementation, effectiveness, and efficiency of the organization's management systems. This may include auditing more than one management system standard, as well as addressing specific requirements related to specific stakeholders, products, services, processes, or issues.

An audit can have different objectives, from a comprehensive review of the requirements of the ISO 9001 standard in the QMS, a review of external suppliers, a specific process or an area with recurring problems.

Management review of a quality management system

Tarí (2000) He states that for managers to be able to verify, on the one hand, the results achieved and, on the other, compliance with quality objectives, they need to have information that supports both the planning process and the quality control process.

In order to carry out the reviews by the management, the information corresponding to the period to be evaluated must invariably be collected, and this should be as clear and timely as possible for its analysis. In a study on ISO 9001: 2015 in public universities in Mexico (González, Abreu and Araiza, 2018) it is mentioned that the direction of the organization is a determining factor, since if it is not considered a strategic factor, the implementation of a The quality

management system would not have positive effects on the organization, making the relevance of the quality of the information for the processes crucial.

In this sense, for the purposes of conducting the review by the management, it is essential that the management of the organization have the precise information on the period to be evaluated, since it is strategic for the improvement of the organization to be able to analyze this information in periods established.

However, for Velásquez (2019), when people have not understood the system or participated in its definition, the results of the audits are also foreign to them, since they do not know the meaning of the findings and, therefore, do not know what to do. to take actions. For this reason, it is essential for the efficiency of a QMS to integrate the direction of the organization in its implementation, maintenance and improvement.

In other words, the involvement of senior management is essential not only for their participation and commitment to the QMS, but also for the designation of roles and responsibilities so that the members in charge of the processes are informed of the meaning of the findings of the audits and thus being able to make decisions that reflect the improvement of the QMS. Therefore, communicating information related to the evaluation of the organization's performance in a clear and transparent manner is essential for decision-making focused on continuous improvement.

Methodology

The methodological design represents a fundamental part of the research, since it represents the guide to generate a structured inquiry that supports the fidelity of the results obtained. Therefore, it constitutes a structured route that allows the bias to be removed and, consequently, to support the findings. According to Ato and Vallejo (2015), two types of validity determine the quality of the design: internal validity, which refers to the ability to control the effect of the foreign variables that could confuse the effect of the experimental variables, and the external validity, which refers to the ability to generalize the research results to other participants, contexts and moments.

For Punch (2014) "the research design corresponds to the research plan and structure to obtain the answers to the established research questions" (p. 264), while for Supo (2016) a research design is a methodological and statistical strategy to achieve the purpose of the study that is specifically translated into the objective of the work or research in question. Following these ideas, Montero and León (2007) establish a classification of research methodologies in psychology for

the study of social behaviors, which define guidelines to guide their use; These include a) theoretical studies, b) quantitative empirical studies and c) qualitative empirical studies.

However, the present investigation falls into the last category, which —according to the aforementioned authors— is represented by descriptive studies of populations by means of surveys with probability samples, experiments, quasi-experiments, ex post facto studies, single-case experiments and studies. instrumental. In these the creation and validation of instruments are positioned, since they are aimed at the development of tests and devices, including both the creation and study of the psychometric properties of the existing ones. Explained this, it can be said that the present investigation has been designed based on a quantitative, experimental, cross-sectional and explanatory model.

Measurement tools

According to Hernández, Fernández and Baptista (2014), "a measurement instrument is a resource that the researcher uses to record information or data on the variables he has in mind, and without which it is not possible to classify observations" (p. 199). For its part, Supo (2016) points out that there are three different types of documentary measurement instruments: questionnaires, inventories and measurement scales, and emphasizes that the difference between each of these must be recognized in order to apply the most appropriate strategies for their validation.

For this study, measurement scales have been considered, which are represented by instruments made from questions that allow the intensity of a response to be graded in relation to people's behaviors, attitudes, or opinions through examples such as mild, moderate, and severe; high, medium, low, among others (Supo, 2016).

Aiken (2003) establishes that scales represent the most popular method of measuring attitudes, consisting of a set of positive and negative statements concerning a specific concept (a group of people, an institution, a concept). In this type of instrument, the score is determined from the aggregate responses of the examinees to the statements, with the specific scoring method that depends on the type of scale.

Validation process

According to Supo (2016), in order to carry out the validation process of an instrument, the research phases that all studies require (either qualitative or quantitative) must be accurately considered. This is essential because otherwise the validity of the instrument will not be effectively concluded.

According to Escobar and Cuervo (2008), validity receives special attention when applied in different situations, of which the two most frequent are a) the design of a newly created test and b) the validation of an instrument. Nunnally (1991) and Hernández et al. (2014) refer to validity as the degree to which an instrument measures what it has to measure. However, Aiken (2003) points out that a disadvantage of this definition is the implication that an instrument only has a validity when in fact there are several classes of it, which are executed based on situations such as the purpose of its design and the population under study.

Given these points, validation corresponds to the elaboration of an own design generated by a set of particular needs, understanding that for each research need there is an own plan, so each instrument is validated in a different way considering elements such as the variable a measure, the dimensions of the variable, the reagents and the precision or accuracy that the researcher wants to achieve.

Therefore, it is necessary to comment that the instrument used in this work was classified in the scale category and was built through the application of the qualitative and quantitative phases by validating the content in the first instance and subsequently by determining the Metric properties referring to construct validity and reliability, which are detailed below.

- *Content validity:* Content validity was established through consultation with experts in the field of quality management, specifically on the monitoring process required in an audit. Once reviewed, the situations deemed necessary were corrected and other elements that should integrate an instrument of this nature were added.
- *Construct validity:* Construct validity was established through an exploratory factor analysis, for which the theory states that the questionnaire must be applied to a sample of between four and five times the number of the items considered. For this reason, the sample with which we worked for this first analysis corresponded to 133 workers who are part of a quality management system in a higher education institution certified by the ISO 9001-2015 standard. When performing the analysis, it was determined that there were five the

number of dimensions among which the items should be distributed (see annex 1. ISO 9001: 2015 measurement instrument).

- *Stability validity:* Reliability was established through Cronbach's Alpha which reflected 0.969 (this figure indicates that the items defined in the instrument are quite reliable).

Determination of content validation

The qualitative phase of instrument validation is called content validity, and is made up of three important aspects: expert judgment, response validity, and rational validity. The support of expert judgment is necessary to determine the sufficiency and relevance of the items that make up said instrument. In this process, through the contributions of the judges, irrelevant items were eliminated, those that had not been integrated into the questionnaire (and that were an important part of the conceptualization of the variable to be measured) were added, and those that were thus modified they required it.

The objective of content validity is to determine whether the instrument produces a range of responses representative of the entire domain or universe of skills, understandings, or other behaviors intended to be measured. If experts in the field agree on the relevance and sufficiency of the items formulated, then the instrument has content validity (Aiken, 2003). In addition, it is necessary to remember that the quantitative phase of the validation of an evaluation instrument corresponds to the evaluation of its metric properties. "Content validity describes a judgment regarding the adequacy of sampling that tests for behavior representative of the behavioral universe from which the test is designed to take a sample" (Cohen and Swerdlik, 2001, p. 186). On the other hand, the quantitative phase of the validation of an instrument corresponds to the evaluation of its metric properties.

Determination of construct validity

Regarding construct validity, Aiken (2003) explains that it refers to the degree to which an instrument measures a variable or concept. This is not determined in a single way or by an investigation; in fact, among the evidences that show its manifestation are the judgments of the experts and the analysis of the internal consistency of the instrument, among others. Internal consistency is linked to the degree to which each item is shown as its basic constituent part, that is, an adequate equivalence with the rest of the items. If there is a high correspondence between the items, their responses will be highly correlated, while the different parts into which the

instrument can be divided will show a high covariation (Meneses et al., 2013). "The statistical techniques used to check this validity are traditionally exploratory factor analysis" (Campbell and Fiske, 1959, p.90), and more recently, evidential factor analysis.

According to Meneses et al. (2013), the exploratory factor analysis is based on determining a distribution of items in a particular number of dimensions, for which it brings together different procedures that pursue the initial reduction of multiple variables in a smaller number of factors, included in a measurement instrument , which for the case in question refers to a type of scale, since —according to Cronbach and Meehl (1955) - in this "the construct to be measured is faithfully represented, as well as the relationships expected between the different constructs, therefore, it is considered valid for said task "(p. 8).

For their part, Kerlinger and Howard (2002) point out that factor analysis examines a set of variables and determines which ones go together. Those that manage to get together acquire the name of factor, which constitutes a construct, a hypothetical entity or a latent variable that supports measurements of any type.

On the other hand, confirmatory factor analysis allows us to contrast a model built in advance, in which the researcher establishes a priori the total set of relationships between the elements that make it up. In this analysis, the researcher needs to confirm that this structure can also be obtained empirically.

Analysis and interpretation of results

Next, the study results are presented in the order in which they were defined in the section referring to the study design, that is, the elementary guidelines in an instrument validation process, which consider expert judgment and factor analysis exploratory.

Regarding the determination of content validity

In relation to the content of the reagents, these were established according to the information provided by the literature on the quality standard ISO 9001: 2015, in its section 9. For the expert judgment, elements raised by Escobar and Cuervo (2008) were considered. , who suggest working the information both qualitatively and quantitatively; However, taking into account Supo's (2016) approaches, regarding the differentiation of the phases of scientific research, the qualitative elements were taken into account to start the process:

a. The objective of the expert judgment was defined, which consisted of ruling the relevance or insufficiency of the items included in the tentative structure of the instrument.
b. Three expert judges in the educational field were selected. These are members of the staff of research professors at the Universidad Juárez del Estado de Durango, with extensive experience in the field of applying quality standards.
c. Finally, the distribution of the items that made up each of the dimensions that gave rise to the existing theory was presented to said group of judges, which allowed the breakdown of the study variable.

It is important to mention that the judges were given an instrument made up of six dimensions, made up of 42 items, to which the existence of qualities such as sufficiency and relevance were reviewed, in addition to situations regarding the wording with an intention of clarity in the item (It is worth mentioning that in this opinion no item was removed). The quantitative phase was then carried out, beginning with the determination of construct validity.

Regarding the determination of construct validity

Regarding the determination of construct validity, the first step consisted of applying the instrument - made up of the 42 items approved in the content validation - to a sample of 133 workers who are part of a quality management system in a higher education institution certified by the ISO 9001-2015 standard, which meet the necessary characteristics to carry out the validation of this instrument. In other words, in this first moment, the workers' perceptions were collected to determine the probable dimensions of the instrument.

The statistical tool used corresponded to the predictive analytical software SPSS (version 23), while the extraction of the factors or components of the variable was carried out with the principal components technique.

According to the statistical parameters, the first rule to determine the factor analysis or the dimension structure of the instrument in question consisted of verifying that the data matrix presented the quality of rectangular, that is, that there were more cases than variables, so The KMO test and Bartlet's sphericity coefficient were subsequently determined.

The significance coefficient of the Bartlet sphericity test, .000 starts from the null hypothesis that the items are not correlated with each other, since it evaluates if the correlation of the observed matrix adjusts to the correlations of an identity matrix , in which there are zero values on both sides of the diagonal, indicating that there is no correlation between the items.

Therefore, if the observed p value is less than the significance level (which in the social sciences is 0.05), the indication is fulfilled and the exploratory analysis can be carried out. In other words, the nullity hypothesis is rejected, referring to the correlation matrix being an identity matrix.

On the other hand, the KMO coefficient —or Kayser, Mayer, Olsen sample adequacy coefficient— is based on the fact that if the variables or items start from common factors, the partial correlations between pairs of items should be small if the effects of the other items are controlled or eliminated. This measure serves to contrast the magnitude of the correlation coefficients observed with the magnitude of the partial correlation coefficients, yielding coefficients ranging from zero to one, establishing that coefficients less than 0.60 reveal that the factor analysis is not applicable, since that the correlations between pairs of items cannot be explained by other items.

Therefore, this coefficient is included as an additional technique (since Bartlett's sphericity test is sensitive to the sample), showing a value above 0.60, corresponding to 0.927, that is, the relationships between the items can be explained by other items, a situation that indicates that the factor analysis is applicable (Table 2).

Tabla 2. Prueba de KMO y Bartlett

Medida Kaiser-Meyer-Olkin de adecuación de muestreo		.927
Prueba de esfericidad de Bartlett	Aprox. Chi-cuadrado	7086.123
	Gl	861
	Sig.	.000

Fuente: Elaboración propia

The next step was to determine the table of communalities. Communality refers to the proportion of variance that is capable of reproducing the factorial model of an item; for example, the following table shows that the model is capable of reproducing 0.716 of 100% of the variability of the first item, then 0.687 of the second item, and so on. These values express that the model reproduces the variability of these variables close to its entirety (Table 3).

Tabla 3. Comunalidades

	Inicial	Extracción
Se tienen identificados los procesos que necesitan seguimiento y medición.	1.000	.716
Existen métodos de seguimiento para la evaluación de los procesos.	1.000	.687
Se tienen identificadas fechas en las que se tiene que realizar evaluación de los procesos.	1.000	.801
Se tiene definido cuándo se debe de realizar la evaluación de resultados de seguimiento y la medición.	1.000	.841
Se cumple con las necesidades y expectativas del servicio que se presta a los usuarios.	1.000	.781
Los métodos para obtener y realizar el seguimiento de la prestación de los servicios que se brindan son los adecuados.	1.000	.741
Se analiza la información obtenida de la prestación del servicio que se brinda para retroalimentar al usuario.	1.000	.791
Considero que estoy conforme con el servicio que se brinda.	1.000	.752
Considero que el usuario se siente satisfecho con el servicio que presto.	1.000	.731
Considero que existe un buen desempeño en el proceso relacionado con el servicio que se presta.	1.000	.813
Considero que el servicio que se brinda se lleva a cabo de manera eficaz.	1.000	.675
Se tiene eficacia dentro de la implementación del proceso mediante el cual se presta el servicio.	1.000	.808
Se percibe que en el departamento que se brinda el servicio se toman acciones eficaces para abordar riesgos y oportunidades.	1.000	.619
Percibo que se evalúa el desempeño de los proveedores externos dentro del departamento que se brinda el servicio.	1.000	.636
Considero que existe necesidad para mejoras en el sistema dentro del servicio que se brinda.	1.000	.613
Se tiene planificado a intervalos planificados llevar a cabo auditorías internas para el sistema de gestión de la calidad.	1.000	.713
El sistema de gestión de la calidad es conforme con los requisitos de la organización.	1.000	.777
El sistema de gestión de la calidad es conforme con los requisitos de la norma de calidad.	1.000	.664
Considero que es eficaz la implementación y mantenimiento del sistema de gestión de la calidad.	1.000	.588
Considero que la organización planifica, establece, implementa y mantiene programas de auditoría.	1.000	.754
Los programas de auditoría incluyen métodos, responsabilidades, requisitos considerando los procesos involucrados.	1.000	.862
Considero que se tienen definidos los criterios y alcance para cada auditoría.	1.000	.835
Considero que existe objetividad e imparcialidad de los auditores para llevar a cabo la auditoría.	1.000	.699
Considero que los resultados de las auditorías se informan a la alta dirección.	1.000	.730
En la organización se realizan las correcciones y se toman las acciones correctivas sin demora injustificada.	1.000	.652

	Inicial	Extracción
En la organización se conserva la información documentada como evidencia de la implementación del programa de auditoría y de los resultados de las auditorías.	1.000	.771
Dentro de la organización la alta dirección revisa el sistema de gestión de la calidad a intervalos planificados.	1.000	.817
La alta dirección en la revisión por la dirección considera el estado de las acciones de las revisiones por la dirección previas	1.000	.798
La alta dirección en la revisión por la dirección considera los cambios en las cuestiones externas e interna que son pertinentes al sistema de gestión de la calidad.	1.000	.866
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a la satisfacción de usuarios y la retroalimentación de las P.I.	1.000	.854
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a el grado en el que se han logrado los objetivos de la calidad.	1.000	.885
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas al desempeño de los procesos y conformidad de los P/S	1.000	.844
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a las no conformidades y acciones correctivas.	1.000	.868
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a los resultados de seguimiento y revisión.	1.000	.837
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a los resultados de las auditorías.	1.000	.833
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas al desempeño de los proveedores externos.	1.000	.836
La alta dirección en la revisión por la dirección considera la adecuación de los recursos.	1.000	.809
La alta dirección en la revisión por la dirección considera la eficacia de las acciones tomadas para abordar los riesgos y las oportunidades.	1.000	.818
La alta dirección en la revisión por la dirección considera las oportunidades de mejora.	1.000	.813
Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con las oportunidades de mejora.	1.000	.849
Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con cualquier necesidad de cambio en el sistema de gestión de la calidad.	1.000	.874

	Inicial	Extracción
Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con las necesidades de recursos.	1.000	.812

Fuente: Elaboración propia (método de extracción: análisis de componentes principales)

Once this was done, we proceeded to expose the percentage of variance that explains each factor; the software automatically shows the eigenvalues greater than one, so the penultimate column is considered, in which the percentages of variability that explain each factor are observed. The first factor explains 29,065% of the variance of the original data or the information collected, the second 18,374%, the third 17,840%, the fourth 7,593% and the fifth 4,414%. The last three columns correspond to the variance after the rotation of the factors, while the first three correspond to the variance before the rotation. After the rotation, there was a redistribution of the variability between the factors, where 5 factors manage to explain 77.286% of the variability of the original data, which is adequate, given that some authors suggest between 60% and 50% as an acceptable value for the measurement of behavior in the social sciences, while for the natural sciences the threshold is usually greater than or equal to 95% (table 4).

Tabla 4. Varianza total explicada

	Autovalores iniciales			Sumas de rotación de cargas al cuadrado		
Componente	Total	% de varianza	% acumulado	Total	% de varianza	% acumulado
1	24.059	57.282	57.282	12.207	29.065	29.065
2	3.253	7.745	65.027	7.717	18.374	47.438
3	2.448	5.828	70.854	7.493	17.840	65.279
4	1.422	3.386	74.241	3.189	7.593	72.872
5	1.279	3.045	77.286	1.854	4.414	77.286
6	.905	2.156	79.441			
7	.856	2.038	81.479			
8	.638	1.519	82.998			
9	.589	1.401	84.400			
10	.563	1.341	85.740			
11	.523	1.245	86.985			
12	.473	1.126	88.111			
13	.430	1.025	89.136			
14	.388	.923	90.059			
15	.346	.823	90.882			
16	.332	.791	91.673			
17	.313	.746	92.419			
18	.305	.725	93.144			
19	.289	.687	93.831			

20	.252	.600	94.432			
21	.222	.529	94.961			
22	.210	.499	95.460			
23	.188	.448	95.908			
24	.175	.418	96.325			
25	.170	.404	96.729			
26	.161	.384	97.113			
27	.156	.371	97.485			
28	.137	.327	97.811			
29	.122	.290	98.101			
30	.116	.277	98.379			
31	.101	.241	98.619			
32	.093	.221	98.840			
33	.088	.209	99.049			
34	.071	.169	99.218			
35	.060	.142	99.360			
36	.057	.136	99.496			
37	.052	.125	99.621			
38	.051	.120	99.741			
39	.037	.089	99.830			
40	.034	.080	99.910			
41	.023	.054	99.964			
42	.015	.036	100.000			

Fuente: Elaboración propia (método de extracción: análisis de componentes principales)

As for the rotated component matrix, each column is a factor, and the observed variables appear in each row; the coefficients that appear here are the factor loads, also called factor coordinates, which express the magnitude of the correlation between the variable and the factor. It can be seen that the adequacy of resources by senior management, information on the performance and effectiveness of the quality management system, in addition to changes in external and internal issues relevant to the quality management system have high positive factor charges with the first factor, that is, they strongly correlate with this factor. If the factor loads are negative, it implies that the lower the score on the variables, the higher the factor score or vice versa (Table 5)..

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Tabla 5. Matriz de componente rotado

	1	2	3	4	5
La alta dirección en la revisión por la dirección considera la adecuación de los recursos.	.850	.188	.179	026	.138
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a la satisfacción de usuarios y la retroalimentación de las P.I.	.825	.247	.314	.115	-.024
La alta dirección en la revisión por la dirección considera los cambios en las cuestiones externas e interna que son pertinentes al sistema de gestión de la calidad.	.804	.266	.275	.229	-.144
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a el grado en el que se han logrado los objetivos de la calidad.	.799	.320	.350	.065	-.132
Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con cualquier necesidad de cambio en el sistema de gestión de la calidad.	.796	.329	.191	.100	.292
La alta dirección en la revisión por la dirección considera las oportunidades de mejora.	.794	.323	.167	.157	.160
Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con las oportunidades de mejora.	.782	.307	.213	.026	.313
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a las no conformidades y acciones correctivas.	.767	.236	.341	.227	.235
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas al desempeño de los proveedores externos.	.765	.230	.321	.305	.048
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas al desempeño de los procesos y conformidad de los P/S	.763	.365	.331	.129	-.047
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a los resultados de seguimiento y revisión.	.762	.161	.404	.259	.020
Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con las necesidades de recursos.	.761	.322	.156	.006	.323
La alta dirección en la revisión por la dirección considera la eficacia de las acciones tomadas para abordar los riesgos y las oportunidades.	.745	.315	.375	.152	-.003
La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a los resultados de las auditorías.	.734	.171	.379	.285	.203

La alta dirección en la revisión por la dirección considera el estado de las acciones de las revisiones por la dirección previas	.676	.161	.336	.431	-.125
Dentro de la organización la alta dirección revisa el sistema de gestión de la calidad a intervalos planificados.	.665	.136	.353	.476	-.069
Considero que es eficaz la implementación y mantenimiento del sistema de gestión de la calidad.	.474	.362	.431	.075	.201
Percibo que se evalúa el desempeño de los proveedores externos dentro del departamento que se brinda el servicio.	.446	.392	.374	.308	-.219
Existen métodos de seguimiento para la evaluación de los procesos.	.436	.305	.345	.426	.323
Se tiene eficacia dentro de la implementación del proceso mediante el cual se presta el servicio.	.148	.789	.020	.251	.317
Considero que existe un buen desempeño en el proceso relacionado con el servicio que se presta.	.290	.783	.213	.160	.211
Considero que estoy conforme con el servicio que se brinda.	.337	.769	.195	.042	.089
Se analiza la información obtenida de la prestación del servicio que se brinda para retroalimentar al usuario.	.370	.759	.215	.081	-.157
Considero que el servicio que se brinda se lleva a cabo de manera eficaz.	.180	.759	.078	.224	.104
Considero que el usuario se siente satisfecho con el servicio que presto.	.221	.756	.280	.069	.166
Considero que se cumple con las necesidades y expectativas del servicio que se presta a los usuarios.	.280	.731	.172	.352	-.118
Se percibe que en el departamento que se brinda el servicio se toman acciones eficaces para abordar riesgos y oportunidades.	.222	.706	.256	.060	.049
Los métodos para obtener y realizar el seguimiento de la prestación de los servicios que se brindan son los adecuados.	.390	.602	.351	.318	-.048
Se tienen identificados los procesos que necesitan seguimiento y medición.	.195	.588	.207	.512	.165
Los programas de auditoría incluyen métodos, responsabilidades, requisitos considerando los procesos involucrados.	.294	.276	.817	.169	.055
Considero que se tienen definidos los criterios y alcance para cada auditoría.	.357	.190	.809	.128	-.002
Considero que la organización planifica, establece, implementa y mantiene programas de auditoría.	.320	.155	.768	.173	.093
Considero que existe objetividad e imparcialidad de los auditores para llevar a cabo la auditoría.	.136	.404	.712	.080	-.064

Considero que los resultados de las auditorías se informan a la alta dirección.	.500	.080	.683	.071	.039
El sistema de gestión de la calidad es conforme con los requisitos de la organización.	.382	.206	.667	.227	.304
En la organización se conserva la información documentada como evidencia de la implementación del programa de auditoría y de los resultados de las auditorías.	.356	.190	.665	.243	.327
Se tiene planificado a intervalos planificados llevar a cabo auditorías internas para el sistema de gestión de la calidad.	.312	.134	.646	.388	.172
El sistema de gestión de la calidad es conforme con los requisitos de la norma de calidad.	.304	.189	.622	.063	.382
En la organización se realizan las correcciones y se toman las acciones correctivas sin demora injustificada.	.455	.410	.506	.133	-.054
Se tienen identificadas fechas en las que se tiene que realizar evaluación de los procesos.	.211	.327	.264	.744	.158
Se tiene definido cuando se debe de realizar la evaluación de resultados de seguimiento y la medición.	.242	.407	.338	.657	.267
Considero que existe necesidad para mejoras en el sistema dentro del servicio que se brinda.	.097	.219	.283	.244	.645

Fuente: Elaboración propia (método de extracción: análisis de componentes principales; método de rotación: Varimax con normalización Kaiser. A. La rotación ha convergido en 7 interacciones)

The 42 items of the questionnaire were distributed according to their identification with the five different factors or resulting dimensions. The rule for deciding whether a reagent loaded on a factor was that the resulting factor was greater than 0.40 or more. This explains quite well how close the variable is to a particular factor. Also, it had to be at least 0.10> than the second place, or the second factor generated.

This method of rotation assumes that the factors are independent of each other, and what it does is minimize the number of variables with high factor loads in a factor, making the component matrix easier to interpret. To name each resulting factor, according to what was shown by the rotated factor component matrix, the conceptual and / or theoretical similarity of the variables that correlate with it was considered; therefore, the factors or dimensions were named as follows:

1. For the first factor: Perception of the responsibility of senior management with the quality management system.
2. For the second factor: Perception of the server regarding the effectiveness of the quality management system.
3. For the third factor: Perception of the organization regarding the design and execution of the quality management system.

4. For the fourth factor: Perception of the evaluation of the quality management system.
5. For the fifth factor: Perception regarding the improvement of the quality management system.

Regarding the determination of reliability

Reliability is related to the precision with which a measuring instrument measures what is desired. It can be defined as the relative absence of errors in a measuring instrument. If the reliability and validity of the data itself is unknown, there may be little faith in the results obtained and the conclusions drawn from them (Kerlinger and Howard, 2002).

One of the most used coefficients to determine reliability is Cronbach's alpha, which expresses the internal consistency of an instrument based on the covariation between its items. The higher the proportion of the covariance between these items with respect to the total variance of the test, the higher the value of the Cronbach's alpha coefficient, and the higher its reliability (Cronbach, 1951). Reliability varies according to the number of specific indicators or items included in the measurement instrument. The more items there are, the greater this will tend to be, which is logical.

There are different formulas for obtaining Cronbach's alpha. The most widely used is that derived from the calculation of the variances of each item and the variance of the total scores on the instrument. Another is from the quotient between the mean of the covariances and the mean of the variances of the different items of the instrument. For this study, its calculation was performed using the SPSS statistical software (version 23). The result was represented by a value of 0.981 (table 6).

Determination of reliability with Cronbach's alpha

Tabla 6. Estadísticas de fiabilidad

Alfa de Cronbach	N.° de elementos
.981	42

Fuente: Elaboración propia

Various researchers have established as a reliability parameter a figure of 0.70 (that is, as acceptable or not acceptable reliability); however, there is no evidence that this should be the case, so that the instruments or tests that have been carried out so far and that have yielded similar results can be taken as a reference. As Ebel and Frisbie (1991) explain, the most published standardized

tests have been shown to produce results that have reliabilities in the range of 0.85 to 0.95, values considered as highly acceptable.

Other authors such as Nunnally (1978) establish that "a satisfactory level depends on how the measure is used" (p. 34). In some other cases a reliability value of 0.50 or 0.60 is acceptable, while in others a value of 0.90 is barely acceptable. However, most of the considerations fall on the type of decision made when using the measuring instrument. If the decision is important, final, irreversible, unconfirmable, concerns individuals or has lasting consequences, then a high level of reliability is necessary (Kerlinger y Howard, 2002).

Discussion

This work represents a start for the development of a series of measurement tools aligned with the ISO 9001: 2015 standard, since it has only covered section 9 of said standard. Even so, it can be considered as a guide for its complete integration in a following bibliographic source, in which all the quality measurement instruments will be incorporated and improved, which when applied in the various higher education institutions will contribute to the determination of an objective quality status, removed from all criteria and from any intention of appearance.

Likewise, it is important to mention that although statistics represent a tool with a strong contribution towards psychometry and behavior in different fields of knowledge, it should not be considered as the ultimate purpose of learning, since it is a tool that continues Demonstrating itself as a means to achieve more ambitious objectives, such as offering solutions to certain problems and improving performance contexts. Therefore, it can be considered as an ally for improving measurement.

Conclusions

Developing instrumental-type tools aimed at the measurement of various variables represents the application of a set of efforts by those involved in the organizational and institutional work, although it is worth commenting that there are the resources to carry it out, which constitutes a responsibility for optimizing organizations.

In recent times, carrying out audits has become a kind of fashion, under the pretext of complying with what is established by various quality standards, some of which claim that quality is achieved by achieving certification in any of these . However, the reality is aligned with the

appearance of belonging to the compliance group of various institutions in an effort not to present findings during an audit, but far from the true purpose, which is oriented towards the provision of quality service. However, the fact of being unharmed in an audit does not guarantee that purpose, so then there is no guarantee of a quality service provision to the workers, who, being the clients, will invariably always be right about the level of service offered.

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Anexo

Presentación: Este cuestionario tiene como objetivo principal obtener información que apoye en el desarrollo del Instrumento para medir la evaluación de desempeño con base en el capítulo 9 de la norma ISO 9001:2015.
Este cuestionario tiene una naturaleza confidencial. Se le solicita cordialmente dar su opinión sobre la veracidad de los siguientes enunciados según su experiencia en esta institución. Le agradecemos su colaboración.
Puesto: _____ Sexo: _____ Nivel de estudios: _____
Área: _____ Edad: _____ Antigüedad: _____

No.	Ítem	Muy de acuerdo	De acuerdo	Indiferente	En desacuerdo	Muy en desacuerdo
1	Se tienen identificados los procesos que necesitan seguimiento y medición.					
2	Existen métodos de seguimiento para la evaluación de los procesos.					
3	Se tienen identificadas fechas en las que se tiene que realizar evaluación de los procesos.					
4	Se tiene definido cuando se debe de realizar la evaluación de resultados de seguimiento y la medición.					
5	Considero que se cumple con las necesidades y expectativas del servicio que se presta a los usuarios.					
6	Los métodos para obtener y realizar el seguimiento de la prestación de los servicios que se brindan son los adecuados.					
7	Se analiza la información obtenida de la prestación del servicio que se brinda para retroalimentar al usuario.					
8	Considero que estoy conforme con el servicio que se brinda.					
9	Considero que el usuario se siente satisfecho con el servicio que presto.					
10	Considero que existe un buen desempeño en el proceso relacionado con el servicio que se presta.					
11	Considero que el servicio que se brinda se lleva a cabo de manera eficaz.					
12	Se tiene eficacia dentro de la implementación del proceso mediante el cual se presta el servicio.					
13	Se percibe que en el departamento que se brinda el servicio se toman acciones eficaces para abordar riesgos y oportunidades.					
14	Percibo que se evalúa el desempeño de los proveedores externos dentro del departamento que se brinda el servicio.					
15	Considero que existe necesidad para mejoras en el sistema dentro del servicio que se brinda.					
16	Se tiene planificado a intervalos planificados llevar a cabo auditorías internas para el sistema de gestión de la calidad.					
17	El sistema de gestión de la calidad es conforme con los requisitos de la organización.					
18	El sistema de gestión de la calidad es conforme con los requisitos de la norma de calidad.					
19	Considero que es eficaz la implementación y mantenimiento del sistema de gestión de la calidad.					

20	Considero que la organización planifica, establece, implementa y mantiene programas de auditoría.					
21	Los programas de auditoría incluyen métodos, responsabilidades, requisitos considerando los procesos involucrados.					
22	Considero que se tienen definidos los criterios y alcance para cada auditoría.					
23	Considero que existe objetividad e imparcialidad de los auditores para llevar a cabo la auditoría.					
24	Considero que los resultados de las auditorias se informan a la alta dirección.					
25	En la organización se realizan las correcciones y se toman las acciones correctivas sin demora injustificada.					
26	En la organización se conserva la información documentada como evidencia de la implementación del programa de auditoria y de los resultados de las auditorias.					
27	Dentro de la organización la alta dirección revisa el sistema de gestión de la calidad a intervalos planificados.					
	(aplicación específica para cada área que realiza revisión por la dirección)					
28	La alta dirección en la revisión por la dirección considera el estado de las acciones de las revisiones por la dirección previas					
29	La alta dirección en la revisión por la dirección considera los cambios en las cuestiones externas e interna que son pertinentes al sistema de gestión de la calidad.					
30	La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a la satisfacción de usuarios y la retroalimentación de las partes interesadas pertinentes.					
31	La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a el grado en el que se han logrado los objetivos de la calidad.					
32	La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas al desempeño de los procesos y conformidad de los procesos y servicios.					
33	La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a las no conformidades y acciones correctivas.					
34	La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a los resultados de seguimiento y revisión.					
35	La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas a los resultados de las auditorias.					
36	La alta dirección en la revisión por la dirección considera la información sobre el desempeño y la eficacia del sistema de gestión de la calidad, incluidas las tendencias relativas al desempeño de los proveedores externos.					
37	La alta dirección en la revisión por la dirección considera la adecuación de los recursos.					
38	La alta dirección en la revisión por la dirección considera la eficacia de las acciones tomadas para abordar los riesgos y las oportunidades.					
39	La alta dirección en la revisión por la dirección considera las oportunidades de mejora.					
40	Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con las oportunidades de mejora.					
41	Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con cualquier necesidad de cambio en el sistema de gestión de la calidad.					
42	Las salidas de la revisión por la dirección incluyen las decisiones y acciones relacionadas con las necesidades de recursos.					

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