

ICT advantages in quality management systems

Ventajas de las TIC en los sistemas de gestión de calidad

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Received: November 09, 2021
Approved: December 12, 2021

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ABSTRACT

The main purpose of this research is to highlight the importance of an Information System within organizations, even more so when they have one or more Management Systems, which require certain guidelines, documentation, and minimum parameters for compliance. The benefits of its implementation and proper use are shown by the authors.

KEY WORDS: ICT – Information and communication technology, Managing Systems, Information Systems

RESUMEN

El propósito principal de esta investigación es resaltar la importancia de un Sistema de Información dentro de las organizaciones, más aún cuando estas cuentan con uno o más Sistemas de Gestión, los cuales requieren de ciertos lineamientos, documentaciones y parámetros mínimos para el cumplimiento. Se muestran entonces las bondades, y beneficios

que trae consigo su implementación y adecuado uso.

Palabras clave: TIC Tecnología de la información y la comunicación, Sistemas de gestión, Sistemas de información.

Introduction

In the world of telecommunications and advanced technologies, changes must be generated by companies in terms of thinking and innovation by companies, but also in the management systems that help guide the reins of the organization. The present investigation brings a case of a Colombian industry, which outsources different businesses focused on providing services to more than seventy clients, and which is certified in different management systems; however, it lacks an efficient and effective information backup mechanism that allows the organization to be controlled 100% reliably and in real time. Performing the validation within its employees, reliable metrics are generated, while initial solutions are proposed to solve existing problems.

Materials and methods

The research method of this writing is based on the fundamentals of generating questions and answers according to the experiences lived with the Management Systems, and the needs experienced in terms of the absence of having Information Systems that generate the adequate affirmation of the tasks required for the dynamism of the interrelated processes. The foregoing carries with it the elements of maieutic, which allows formulating endless questions until obtaining the hidden "truth".

The methodology used for this research is Quantitative Non-Probabilistic; The population that will be analyzed in the present investigation, are the collaborators of a company that outsources tangible and intangible BPO services, called Synerjoy1, with different transversal positions within that intervene directly in the Integrated Management Systems in which it is certified. To understand better the population sample that was taken to obtain the results presented in this research, each position, and the role it plays within the Management System is broken down:

Table 1 Positions surveyed within the company Synerjoy.

Position	
Quality Analyst	Monitor total of generated interactions by the operation. In other words, this position audits the missional process of the company.
Internal Auditor	Responsible of internal audits inside the transversal processes of the company (Missional, strategic and support)

The authors thank Synerjoy and all its collaborators for participating in the sampling exercise and allowing this information to be provided.

Coordinator	Responsible of executing activities within the missional process of the company. In other words, responsible of the operation.
Director	Directors of different processes that form the company. They oversee the strategy. That means they constantly monitor KPI, goals and other results.
Formator	It is the socializing area of the company. This area oversees supervising that all the information is transmitted on time and in the correct form. It also focuses on how information is understood under the premises of concept and purpose.
Chief	Direct responsible of all the different management systems of the company. For this study case the company chiefs divide as it follows: • Quality system area • Information security area • SST area • Environmental system area.
Reporting or Data analysts	In charge of gathering all the results obtained from measuring or from tasks developed to build scorecards with its correspondent KPI.

The mechanism used for the investigation was through a survey conducted in the Microsoft Forms tool, where the questions presented in the following section were formulated.

Before being able to identify the importance of ICT in Quality Management systems, it is necessary to detail the concept of Information and Communication Technologies (ICT), and everything that it encompasses.

Let us start by specifying the definition of Min TIC towards:

“Information and Communication Technologies (ICT) are the set of resources, tools, equipment, computer programs, applications, networks, and media; that allow the compilation, processing, storage, transmission of information such as: voice, data, text, video, and images” (Min TIC, 2009).

On the other hand, Quality Management systems require elements that allow easy and agile management of all the requirements that they demand. The management of both physical and digital documentation, the consolidation of management indicators and their measurement, the adjustments made to the processes of each organization, must always be monitored; They must maintain a constant review and follow-up to comply with the continuous improvement to which these practices invite. To make decisions quickly and effectively, it is necessary to have technological tools that allow, not only the system administrators, the operators, but also the senior management, the visual of each item included in the Quality System Management. These tasks should not be cumbersome, complicated, or difficult to manage, otherwise any Management System or several Integrated Management Systems will become obsolete and will only be supported on paper and not in constant operation or in practice.

The authors have been auditors and administrators of Integrated Management Systems for five years, which allows them to show how complicated it is to keep Management Systems up to date, aligned with the reality of Organizations, creating awareness on the importance and advantages that these structures and good practices bring to the different businesses, not only for recognition before a certification, but on the contrary, the economic benefits that come with the optimization of the processes; not only in terms of profitability, but also in mitigating the materialization of risks, which not only have to do with financial consequences, but also legal, reputational, technological, etc. Based on the foregoing, the greatest obstacles for Management Systems (Differentiator, n.d.) are listed:

1. Total or partial absence in time and dedication from personnel with knowledge and responsibility for the preparation, updating and publication of what concerns the documentary subject of the system; We talk about everything related to policies, procedures, manuals, instructions, bulletins, formats, record keeping, among others.
2. Lack of total or partial disclosure of the system documentation, which supports what, how, when, where, who does things within the organization, which leads to a lack of coherence between what is said and what is done.
3. Procedures incorrectly stated, elaborated, or even explained in a wrong way. Likewise, inadequate and/or obsolete formats where incorrect and/or incomplete information is recorded.
4. Lack of knowledge towards indicators, measurements at the wrong time and Key Performance Indicator (KPI), without follow-up, which generates poor decision-making, decision-making at the wrong time, or absence of these.
5. Absence of parameters that allow methodologies homologation applied within the organization; Each collaborator executes tasks and/or documents according to what they consider to be good for themselves, but not following parameters established by a documentary or Quality policy.
6. Activities that do not complement each other, generating disarticulation within the processes, or in many cases inefficiency in the processes, due to duplication, failures, absences of tasks not correctly identified.
7. Lack of leadership, involvement, and interest from senior management, or even process leaders; This is always a consequence that is invisible from the benefits of the implementation of the management system, whatever it may be, in terms of efficiency, efficacy and effectiveness, have not been made visible to them.
8. Total or partial absence of education, training, reinforcements, and certifications in matters related to Management Systems; within these we find that topics such as:
 - a) Roles and responsibilities
 - b) Position profiles
 - c) Organization chart
 - d) Approach, monitoring, analysis of management indicators for decision making.
 - e) Identification of risks.

- f) Analysis of internal and external contexts.
 - g) Adequate maintenance of physical and digital documentation.
 - h) Diligence and custody of records.
 - I) Poor education towards the PDCA cycle (Plan, Do, Check, Act) and continuous improvement.
9. Inadequate allocation of resources for the implementation and/or maintenance of the Management System. Ailments may occur in the following resources:
- a) Time
 - b) Finances
 - c) Materials
 - d) Staff
 - e) Information
 - f) Infrastructure
10. Excessive interest in the certificate, but not in the proper functioning of the processes based on thinking about risks and optimizing resources and tasks.
11. Resistance to change; cultural issues of the organization; lack of awareness, disinterest.
12. Lack of a clear objective that clearly ends the why and what for the organization has decided to implement a Management System.

However, having already identified the potential causes of breakdowns in the implementation and maintenance of Management Systems, it is necessary to evaluate how ICTs can contribute to this strategic objective of Organizations. To do this, we will analyze each requirement established in the ISO 9001: 2015 Standard, which we will take as a reference for the Quality standard, applied to any Service Provider Organization in the Communications Sector:

With the above, it is easier to detect the specific needs that the administration of the Management Systems have; not only in administration, as mentioned above, but in what it represents for the promising future of an organization which is obtaining information from customers and/or end users regarding the products and/or services provided, and how data analytics is carried out in favor of multiplying economic benefits, reputations, business and others. A clear example of this is how organizations can seek, through the implementation of ICT, a Data Analytics scheme in favor of improving the Customer Experience (CX).

1. Data analytics allow companies to identify:

2. Moments of truth
3. Knowledge regarding some types of clients' vs goods and services.

Customer perception of the organization, in terms of administration, customer service, infrastructure, human capital, quality of products and services, competitors, among others.

Due to the above, it is understood that the aim is not simply to implement and manage Management Systems in favor of a certification, but rather to homogenize processes, automate them and subsequently exploit the consolidated data by applying analytics based, for example, on artificial intelligence, leading to innovative results (Ahmad Zakaria Siam, 2012) (UKessays, 2021).

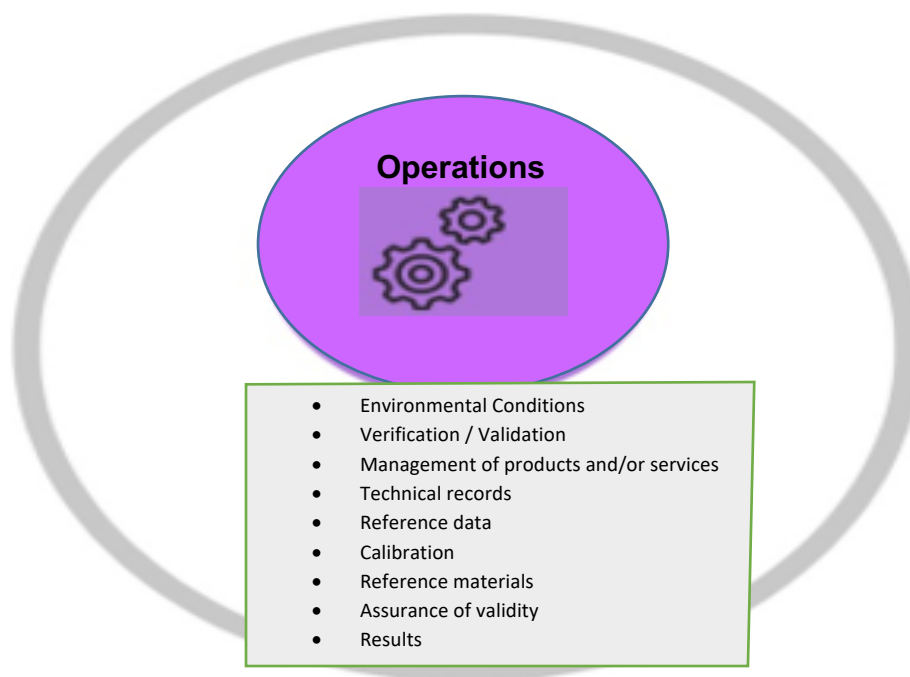
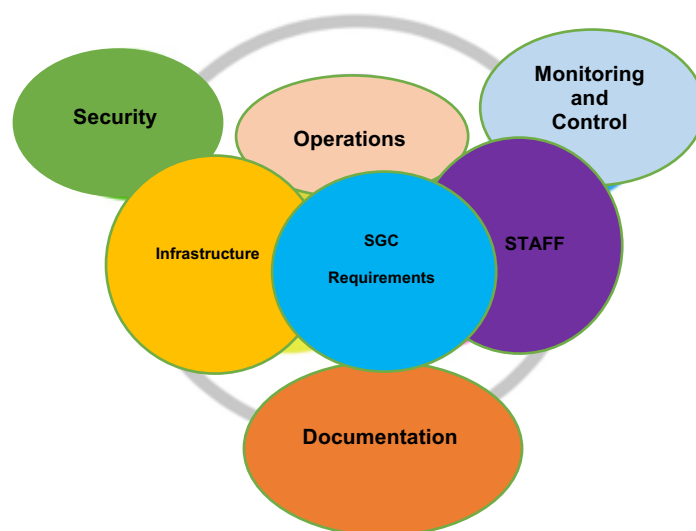
However, as mentioned by Pablo Gorraiz Martín, Director of Innovation and Projects at Luis Simoes Logística Integrada S.A in his article - ICT IN QUALITY MANAGEMENT -

“The impact of ICT in the Supply Chain has been one of the greatest contributors to the increase in quality in all processes, the reduction of delivery times, the optimization of stocks and the improvement in demand forecasting, sales commitment to customers through online access to product availability information and order delivery management through computerized messages, through interfaces between the different companies and elements involved in the supply chain, reducing errors and improving the quality of product traceability”. (Pablo Gorraiz Martin, 2011).

The approach developed is that all ICT elements must be highly developed and used by Management Systems. One of these elements is the Information Systems, which help the entire PDCA cycle of the system. Here are some of its benefits:

Image 1. Information systems applied within a management system – Done by author.

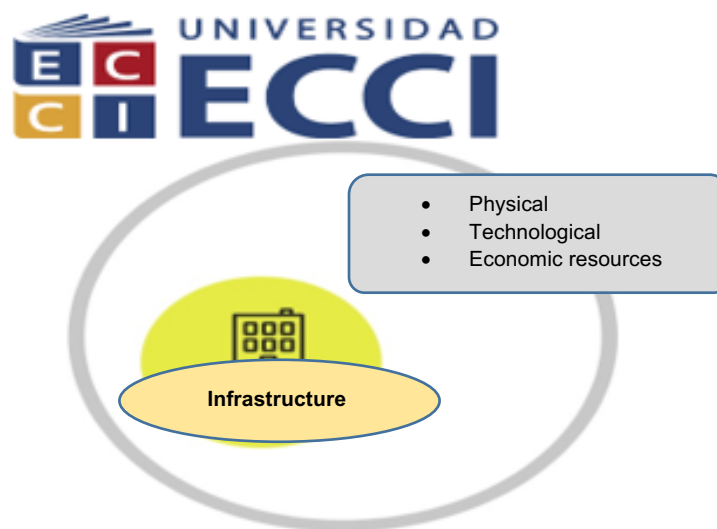
Information Systems Applied in a Management System



The previous image shows the scheme and infrastructure of an Information System that integrates the minimum elements required by any Management System. Let us then develop its functionality one by one:

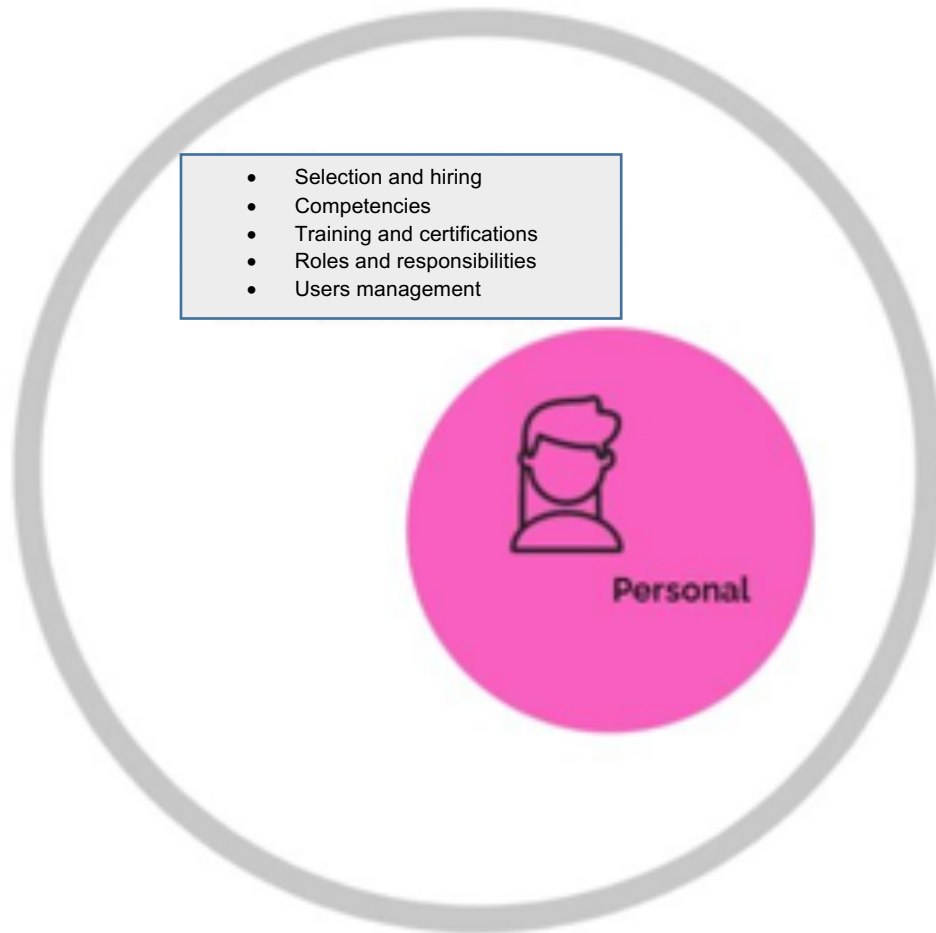
For the Operational issue, Information Systems play a crucial role, since it allows the user to enter all the information required for their work. This information is consolidated and protected in databases, allowing a to build a statistical compendium that can later be used for quantitative analysis and the generation of indicators.

In this part, the Information System must work by simulating a "check list" of tasks or steps that the operator must enter, to guarantee the protection of minimum data for each product or service that is working. Below, and based on the configuration made, the indicators that have been set will be calculated.



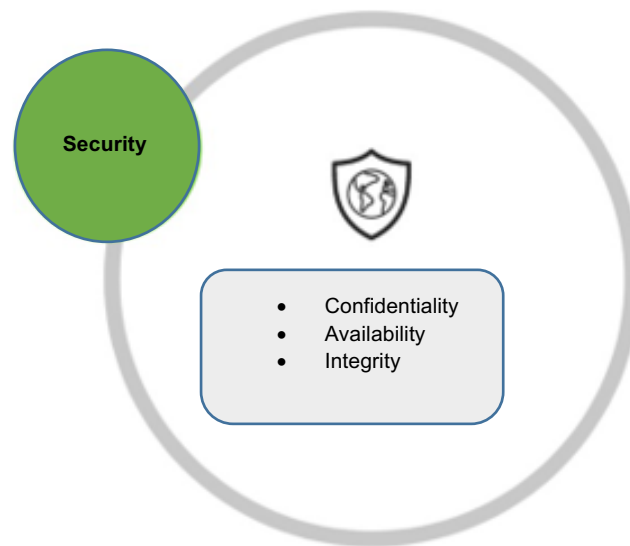
Infrastructure refers to all the logistics that must be considered for the implementation, start-up, and maintenance of an Information System. The organization must consider the physical and/or virtual space that the Information System will require, as well as all the logistics that this entails. Of course, tied to this, you must pay for the necessary investment, to finance the project from end to end, and

do not stop any task due to lack of resources derived from inadequate financial planning.



Information Systems must contain Human Talent information, from the moment of the definition of the functions manuals. These requirements must address topics such as the identification of the positions, the description of the essential functions of the job, the basic knowledge, the skills, experience, and other requisites that the person or people who will perform these functions must have, as well as academic training. With the previous definition, the Information System must generate the necessary keys to open or deny permits to certain sites and/or activities within them according to the fulfillment of these characteristics. The foregoing must be done through administration and users, which are generated, classified, and granted the corresponding permissions, roles, privileges, etc. At the end they will be removed if

required. A simple example of this administration is when the differential permissions between an administrator user and an operator or query user are similar; the privileges are completely different.

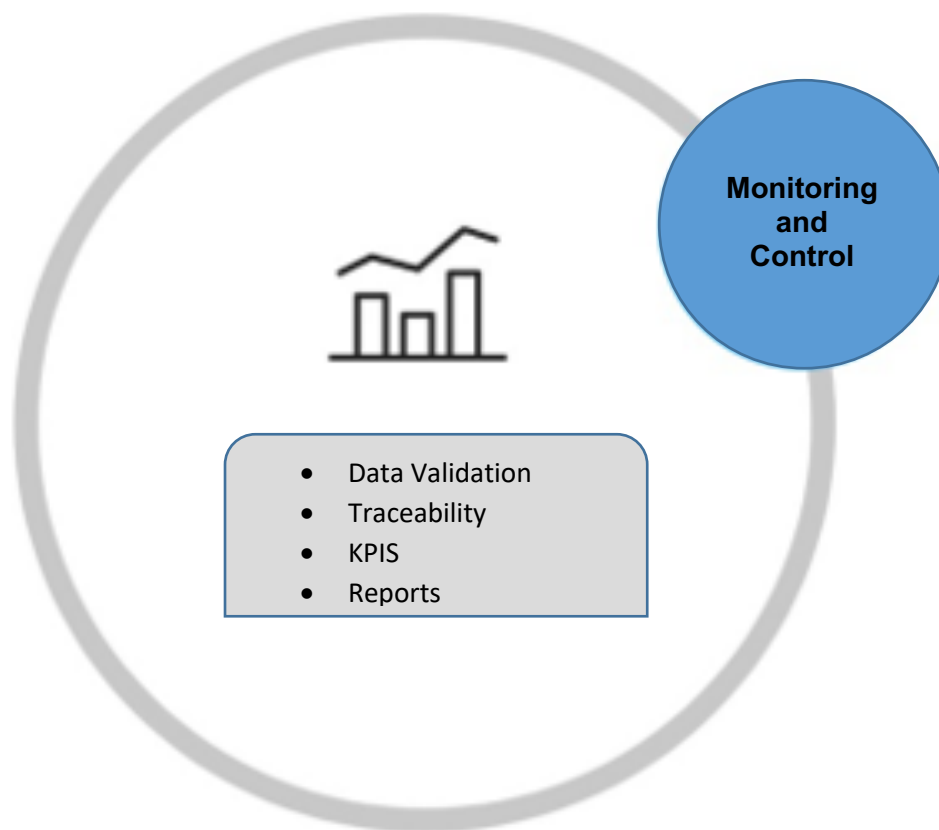


Information security in these systems plays a crucial role, especially when it is accessed from various places. Likewise, vulnerabilities must be identified from all the roles and privileges that the system has. Confidentiality of the information must be guaranteed from the moment the user is authenticated, until the end of the session, preventing information from being extracted without the parameters defined by the organization.

When it comes to availability, the Information System must not only be enabled per se but must also have all the data available in real time. The issues of unavailability of information can generate the loss of opportunities and money, by not allowing organizations to access data in real time and make timely decisions at crucial moments.

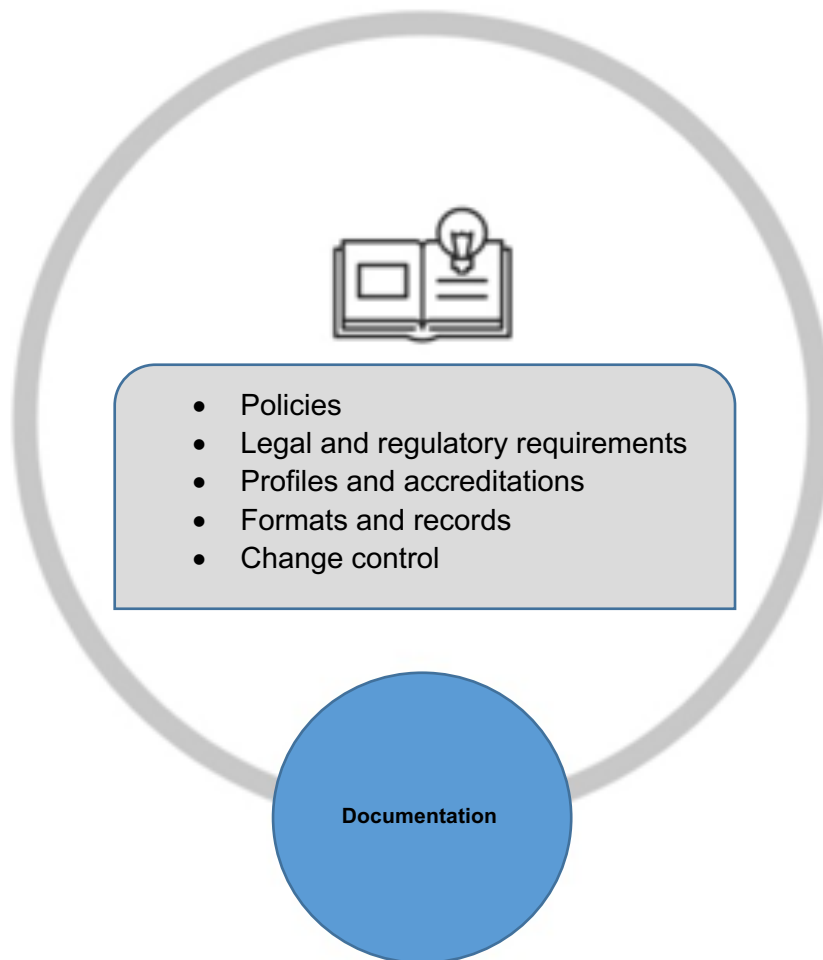
Regarding the integrity of the information, the system must guarantee that the data managed, stored, processed, and generated is complete according to the parameterization of the organization; There cannot be data without the quality

needed, since with these, decisions will be made in real time, and using them to the same extent can generate direct consequences.



Derived from data collection and processing, the Information System must have a Dashboard that allows the display of metrics required by each user who consults it. The reports must have traceability in terms of time of data collection, the statistics that are generated and the results obtained. In the same way, a trend and forecast of information, hopefully based on Information Analytics is crucial for decision making to be successful.

It is also important to have an alarm system that alerts users, as appropriate, when the indicators are about to exceed the permitted levels (either up or down). This would generate added value in terms of control and prevention of the materialization of risks.



As is well known, documentation is necessary within a management system, from its creation, its modifications, and its validity. That is why the Information System can contribute to maintaining control of changes in formats, procedures, policies, manuals, among others. Likewise, the records will be completed and kept preserving the traceability that the systems require.

In this module it will also be important that the System allows the disclosure of new documentation, tied to a validation of understanding and acceptance that certifies that the users accessed the shared information, that it was understood and that it was accepted. This will guarantee continuous training, updating and permanent dissemination in all senses, taking with it the records corresponding to said activity.

Results

Image 2. Survey's question 1 – Graphic automatically generated by Microsoft Forms

The population surveyed were sixty-seven workers of the organization distributed as it follows:

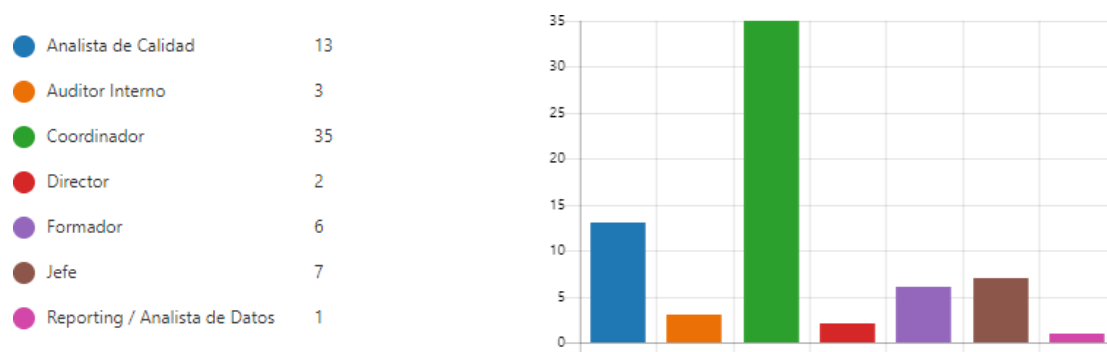
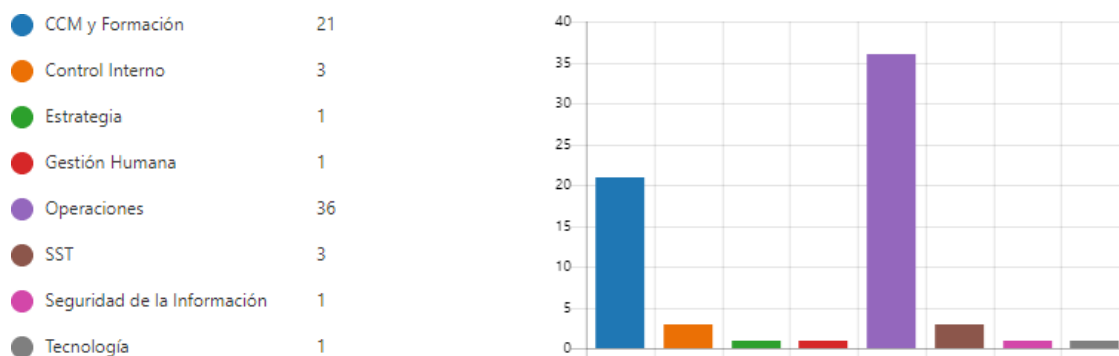


Image 3. Survey's question 2 – Graphic automatically generated by Microsoft Forms

The areas and processes surveyed had the following participation within the study:

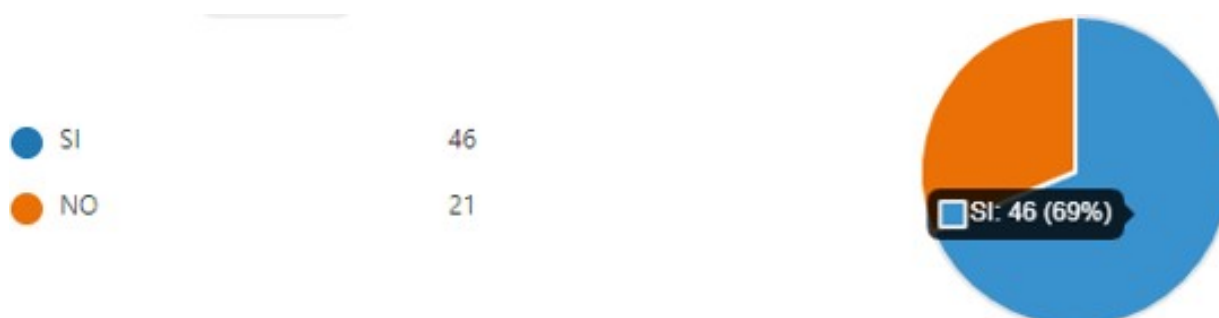


According to the above it is important to mention that:

1. All the chiefs, Quality Analysts and Internal Auditors of the company participated, who are the direct administrators of the Management Systems.
2. The Coordinators show a major participation in the survey; however, they are the ones who do a considerable number of tasks in the company as they work directly in the missional process (the operation) serving corporate clients.

The questionnaire contains the following questions where the analysis of each of its results will be conducted:

Image 4. Survey's question 3 – Graphic automatically generated by Microsoft Forms



Do you think that in an office tool (Excel) you can keep track of the system's results?

Being a company that does not have an Information System implemented, a culture of managing different files is present. That not only makes it difficult to manage the consolidation and analysis of indicators generated, but also requires investing in human resource that generates said task and subsequently performs the comparisons that each process or area requires. The 31% of people who indicate that they do not feel comfortable with follow-ups in tools such as Excel for action plans, compared to 69% of acceptance due to duplication of files, shows how complex it is to change the organizational culture. An example of this is that within the company there is a Reporting position, whose function is to consolidate all the information that is generated in Excel files, to later generate graphs, tables, and other elements necessary for analysis.

Image 5. Survey's question 4 – Graphic automatically generated by Microsoft Forms

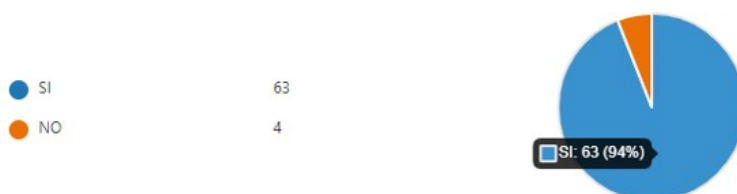
Is it efficient and effective to conduct audits of the management system through office automation tools, without centralizing the company's information?



Even so, when 66% of people are asked about the centralization of information, they are aware that the crossing of data generates reprocesses within the day to day of all procedures. However, it is surprising to see that 34% (not insignificant percentage) are used to do manual work.

Image 6. Survey's question 5 – Graphic automatically generated by Microsoft Forms

Is it productive for you to centralize all the process and information in an application?

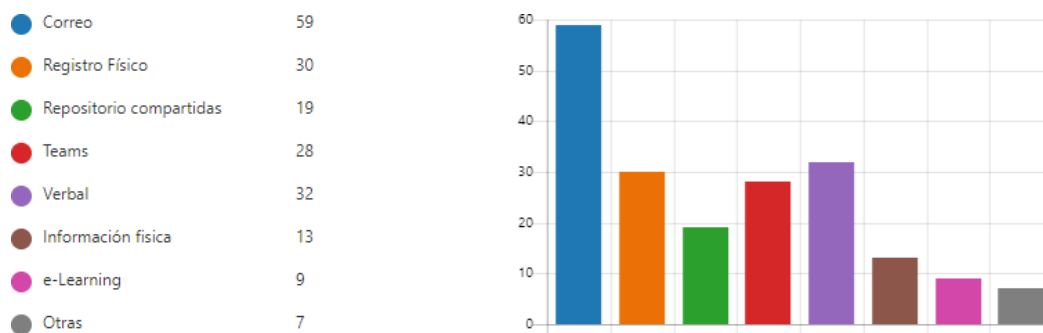


When reviewing the positions corresponding to that 6% that indicate that it is NOT productive to integrate all the information, one Trainer and three Coordinators are evidenced; In the future, it leads to the idea of highlighting another interesting exercise in which it is possible to investigate the concept they have from their work

and professional approach, why they consider that their productivity will not be tied to the automation and centralization of data.

Image 7. Survey's question 6 – Graphic automatically generated by Microsoft Forms

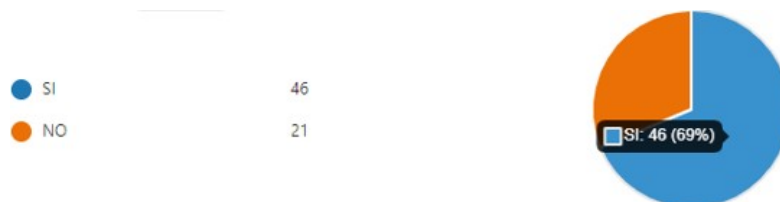
How do you communicate your findings?



The communication channels mentioned previously are official, corporate channels to conduct different processes. It is interesting to see how people consider email to be a reliable channel for transmitting alerts, indicators, action plans, results, feedback, among others.

Image 8 Survey's question 7 – Graphic automatically generated by Microsoft Forms

According to the previous question, is the channel you use to disseminate the findings effective?



The cultural change that must be generated, in addition to showing the benefits of an Information System, is that people understand that, although emails with some types

of information are sent and received, this does not guarantee that people read the messages. on time or have them interpreted as required. These channels should be used for other types of procedures and communications, but it is not recommended that they be useful for the monitoring and/or results of the Management systems. In addition, it must be remembered that, within an Information System, not only metrics are shared, but they also intend to contain information regarding profiles, authentication, certifications, skills, and competencies, among other topics which are not usually disclosed by the channels described above.

Image 9. Survey's question 8 – Graphic automatically generated by Microsoft Forms

Do the action plans have measurable and easy-to-consult traceability?



Results found to this question were quite even. Reviewing the results in more detail we could find:

Table 2. Question 6 answers detailed where these are correlated to each position.

Options	Quality analyst	Internal auditor	Coordinator	Director	Format or	Chief	Reporting	Total	Percentage
There is no traceability		3	7			1	1	12	18%
It is consultable but not measurable	2		4			2		8	12%
it is measurable and easy to consult	4		16		4	2		26	39%
it is measurable, but it is not easy to consult	7		8	2	2	2		21	31%
Total	13	3	35	2	6	7	1	67	

According to the table above, several analyzes emerge:

- There is a notable disparity between the officials who oversee auditing the operating processes and the company in general (Quality Analysts and Internal Auditors). The same happens among the team of Coordinators, who in first instance are the ones who monitor indicators such as goals and productivity daily. In addition, it is remarkably interesting to see that the direct managers responsible for the Management Systems divide their opinions between the options given in this question.
- The directors are aware that there are indicators that can be measurable, but that the non-consolidation of these makes it difficult to consult them just in time.

Image 10. Survey's question 9 – Graphic automatically generated by Microsoft Forms

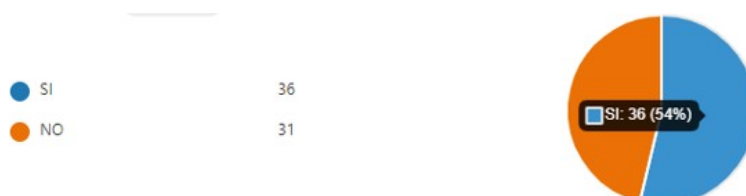
Do you currently have updated real-time reporting for operational alerts or to take improvement measures?



The division observed in the responses continues to be marked by the coordinators, who consider that the “online” concept is attributed to an Excel that is exported or downloaded. This can be confirmed when it is the directors who ensure that information is not available in real time.

Image 11. Survey's question 10 – Graphic automatically generated by Microsoft Forms

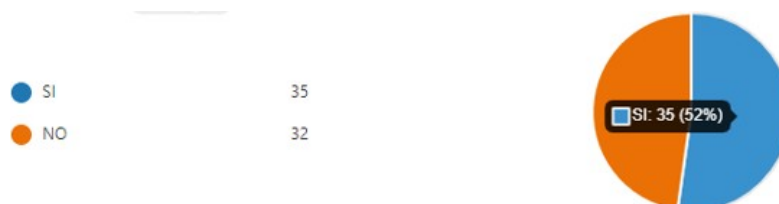
Do you think that the current information repository is useful and effective for the administration of information records?



These results are clearly linked to question number 4 and corresponds to the culture of consulting and transmitting all information via email. It is even interesting to see how the option of shared folders, an official repository, guarded by Technology and to which the files stored there are backed up, is not considered.

Image 12. Survey's question 11 – Graphic automatically generated by Microsoft Forms

With the current methodology, do your findings reach all the stakeholders of the process to conduct the action plans needed?



This question is key to this research, since the directors, solely responsible for the maintenance of the Management Systems, do all agree that these forms of safeguarding and disseminating information are NOT useful when sharing findings. This makes it clear that, at the time of surveying the staff, they were told to "Understand executives, coordinators, directors, bosses, quality analysts, trainers, any Synerjoy collaborator, and even Corporate Clients, ARL, among others as an interested party"

Image 13. Survey's question 12 – Graphic automatically generated by Microsoft Forms

Do you think that the company has the ideal technological and communication tools for the proper administration of a management system?



As a conclusion, there is an organization where almost half of the staff indicate that they do not have adequate communication tools to transmit all this type of information; however, they have gotten used to operating this way.

Discusión

There are different information systems on the market, and options to choose from with specific characteristics for the organization whose parameterization can come from the option of hiring a developer team that generates these use cases; In any of the cases, this will depend on the decision-making based on the awareness that the High Directives have of understanding that the Management System is easily manageable with these mechanisms. Now, the above not only to obtain and/or maintain a certification of any international standard; its functionality goes even further, since it allows companies to be organized and involved in each one of the procedures it performs, allowing end-to-end engagement with all officials and their tasks.

Conclusions

Companies that suffer from Information Systems create a culture focused on manual work and the reprocessing of activities. The non-automation leads to not only incurring in the cost of additional personnel, but also the generated indicators can be affected, since the manipulation of databases and the crossing of information generate susceptibility to information modification. The foregoing confirms the urgent need to implement Information Systems that allow the administration of the Integrated Management Systems of the companies, from their planning, their execution, their controls and finally to trace the necessary continuous improvement.

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