Journal of Information Systems Engineering and Management
2025, 10(12s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Model to Improve the Quality of Services and the Skills of Young University Students

Santiago Moquillaza-Henríquez[1], Hugo Vega-Huerta[1], Percy De-la-Cruz-VdV[1], Javier Cabrera-Diaz[1], Ronald Melgarejo Solis[1], Gisella Luisa Elena Maquen-Niño[2], Juan Carlos Lázaro-Guillermo[3]

[1] *Universidad Nacional Mayor de San Marcos, Lima, Perú*
[2] *Universidad Nacional Pedro Ruiz Gallo, Lambayeque, Perú*
[3] *Universidad Nacional Intercultural de la Amazonia, Ucayali, Perú*

ARTICLE INFO

Received: 15 Nov 2024

Revised: 28 Dec 2024

Accepted: 14 Jan 2025

ABSTRACT

Introduction

This study explores how the Computer Laboratory Office (CLO) of the Faculty of Systems Engineering and Computer Science at the University of San Marcos can provide high-quality services and at the same time improve the skills of university students in providing these services. for which an innovative model is created.

Objectives

The research aimed to develop a sustainable model integrating the ISO 9001:2015 standard, Knowledge Management, Information Technologies (e.g., Support Information Systems, Dashboards), Empowerment, and the Servqual model. The objective was to improve service quality, ensure continuous improvement, and analyze user perceptions through a dashboard.

Methods

Over an eight-year period, the study employed a mixed-methods approach, including a literature review, framework development, and empirical testing. The model was implemented in the CLO, gathering user feedback and conducting statistical analyses to evaluate its impact on service quality and the technical and soft skills of students.

Results

The model significantly enhanced the competencies of students providing services and improved the quality of services offered to users. Notably, the CLO achieved ISO 9001:2015 accreditation for three processes. Statistical records demonstrated the model's effectiveness, reinforcing its success. It can be concluded that knowledge management implies better quality of service and in turn positively affects user satisfaction

Conclusions

This research developed an innovative model that enhances service quality and student skills in pre-professional practice. By integrating ISO 9001:2015, ICT, Empowerment, and the Servqual model, it filled a critical gap in the literature and demonstrated its potential for replication in other university training centers, ensuring sustainable quality improvement and student growth.

Keywords: ISO 9001:2015, Key performance indicators, Knowledge management, ICT, ServQual Model.

1. Introduction

The problem in any entity that provides services is how to do it satisfying the user's expectations, in the case of the research it was not only limited to this, but also how to improve the technical and soft skills of the young university students who provide the service. to all users of the Faculty of Systems and Informatics, including students, teachers and office staff, this paper covers this gap in the literature. Motivated by this problem, after analyzing and reviewing the literature, it was decided to apply the ISO 9001: 2008 technical standard, which was subsequently adapted with the 9001: 2015 technical standard, making use of tics and knowledge management. knowledge under an agile and

empowered structure. The scope of this research is useful for university training centers or university production centers. Based on the results, the article intends to serve as a model for other Faculties of various Universities, in order to cover these aspects, which are: providing a quality service and at the same time training young university students in their first work experience, so that their training is not limited to theoretical concepts taken in the classroom; Rather, it is a real work experience, where you put your theoretical knowledge into practice by applying it to solving real problems as well as strengthening soft skills such as ease and leadership.

The SINEACE accreditation standard in Peru, an entity that accredits university degrees, in its article 34 concerning the follow-up of graduates and educational objectives, states that: "The study program maintains an updated record of its graduates and establishes a permanent link with they monitoring their labor insertion and the achievement of educational objectives". [1].

The Faculty or University must have training centers, which serve to apply their knowledge around the studied career, and so that each generation of practitioners maintain the services when experienced young people migrate to the company; knowledge management must be done, which is the administration of the sum of the intellectual capital of the human capital that the entity has and the intangible assets that generate or store knowledge; for this reason it is said that: Knowledge encompasses a dynamic blend of experiences, values, contextual information, and expert insights, serving as a foundation for evaluating and integrating new experiences and information. [2]

The ISO 9001:2015 technical standard, as a way of ordering the processes, serves as a model to document the processes of the Technical of the Computer Laboratory Office, which is very important to be able to induct personnel based on the documented processes and to use the indicators. of each decision-making process.

Beyond the fact that they can carry out their internships in companies, the office of the Faculty's computer center fulfills this objective.

In this investigation several hypotheses were used, including the most important ones: In relation to the results, Section 3.1 shows a dichotomous descriptive survey taken from former interns with respect to the Laboratory area. Normality is developed in section 3.2, and then the related samples are compared with respect to the scores before and after with respect to knowledge regarding information technologies that are used in the area. In section 3.3, the correlation between knowledge management and service quality scoring, in 3.4 The Levene test to observe if there is a difference between the performance between men and women, who work in the Laboratory office. 3.5 observing whether the Quality of Service rating depends on knowledge management, or the friendly attention provided to the user, in 3.6 the linear regression is projected based on a sample of the records crossing the quality of service after of training and user satisfaction, 3.7 shows the correlation between service quality and user satisfaction is demonstrated, Finally, in section 3.8 The influence of having the incident system is compared, observing the before and after..

A brief literature review:

First, a brief study of the existing literature is made, before applying the methodology and verifying the results for which, the following advanced search string was used:

("higher education institution" OR "academic institution" OR "postsecondary education" OR "tertiary education" OR college OR university) AND ("knowledge management" OR "knowledge sharing" OR "knowledge transfer" OR "intellectual capital management" OR "organizational learning") AND ("quality service" OR "service quality" OR "ISO standards" OR "quality assurance" OR "customer satisfaction" OR "process optimization")

In order to investigate more in the existing research, some questions are posed, such as: What is necessary to measure?, What are the benefits of knowledge management, What is necessary, and How implement the knowledge? and why use a methodology to improve quality?.

The String was executed in various repositories such as sholar, scopus, web of science, proquest, Sciencedirect ,finding more articles in google scholar related to the interest of the research.

Create a framework for overseeing and validating the quality of academic and administrative procedures within the Engineering Faculty of a public university. This framework will integrate ISO 9001:2015 standards, knowledge management principles, fuzzy logic techniques, and the ServQual model. [3]

Is important to measure user satisfaction in a university. Assess whether knowledge management, job design, and organizational climate can impact an employee's perception of quality. [4]

Being the knowledge related to service continuity and change management, the following was also found: Information is a crucial asset for any organization. The practice of knowledge management has simplified the process of capturing and sharing information within an organization. This process is aided by a specialized system known as a knowledge-intensive system. [5].

Knowledge Management Systems (KMS) have been created within Engineering Design tasks to enhance productivity in these endeavors. .[6].

It appears that managing knowledge and records within knowledge management systems (KMS) necessitates an Information Professional (IP) equipped with the technical expertise and educational qualifications to address the emerging requirements.[7]

In another investigation, it is proposed: Systematized Knowledge Management model. [8].

In addition; Sequeira, Marques, & Serrano (2019) patented a Public Safety and Security Application that uses a tracking device and a client device that has multiple functionalities.

To adopt a knowledge management strategy that enables them to retain their top employees, thereby ensuring client satisfaction.[9]

The total quality management philosophy seeks to achieve customer satisfaction through the commitment of the leadership of an organization and its workers by a process of continuous improvement of the quality of performance in various aspects of an organization.[10].

About information technologies, our findings show that data-related resource (including data, data systems, and data services) quality is vital to the development of DAC and the enhancement of organizations' business performance.[11], in the model we have tics as a cornerstone.

The results show that information, analysis, and knowledge management is a significant predictor of quality and operational results, and management of process quality and human resource (HR) management significantly influence customer focus and satisfaction, controlling for the firms' year.[12].

The Figure 01 shows the terms found when reviewing the Literature.

Fig. 1 Bibliometric analysis based on the information search chain

2. Methodology

Before narrating the model on which this research works, some important terms that the case study covers are defined.

2.1. Standard Technical ISO 9001:2015

This standard outlines the basic concepts and principles of quality management and contains terminology and definitions applicable to all quality management standards.[13]

A very important section in the ISO 9001:2015 Standard is risk management; prevention is important since there are always factors that could cause non-compliance with the process.

[14] highlighting that: The rise in uncertainty linked with shifts in organizational contexts necessitates fortifying their management systems. This approach aims to mitigate risks that could jeopardize sustainability and enhance overall performance.

2.2. Knowledge Management and Organizational Learning

In the book knowledge management from myth to reality, ,[15], he alludes to Professor Karl Eric Sveiby, who says that Knowledge Management: It involves skillfully leveraging intangible assets to generate value. To do so, one must envision the organization solely as a repository of knowledge and knowledge exchange.

In this investigation, Managing knowledge is managing information. [16] define organizational learning as "a process in which knowledge is captured, shared, and used to change the way the organization responds to fluctuations in the environment, both internal and external."

According to [17] "the learning that takes place within an organization depends on the learning that its members do".

2.3. Information and communication technologies

Also called TIC, they constitute an optimizing element and many times of innovation which help the productive apparatus of the company.

TICS are a dynamic factor capable of generating multiple positive effects on the economic system.[18].

When talking about organization it is almost impossible not to talk about information, without information there is no possible organization; even more so, considering that economic development increasingly depends on information and knowledge, driven by the rapid advance of new information and communication technologies. [19].

2.4. ServQual Model

This scale assesses service quality by comparing customer perceptions to their expectations. Service quality is judged from the customer's viewpoint: if perceived value meets or surpasses expectations, the service is deemed good quality; however, if perceived value falls short of expectations, it indicates service quality deficiencies. [20].

2.5. Key performance indicators

Key Performance Indicators (KPIs) are measurable factors (commonly utilized by both domestic and international enterprises) that aid in tracking and overseeing organizational goals and strategies.[21].

"Key Performance Indicators (KPIs) are business estimates that are used by corporate heads and various directors to track and examine factors that are considered noteworthy in the achievement of a business.". [22].

The key performance indicators are alerts, to make a decision.

2.6. Empowerment

Empowerment consists of enhancing the motivation and results of all employees of a company through the delegation and transmission of power".[23]. In this investigation , delegating responsibilities or empowering employees or the people who work for the entity must be monitored either by objectives, schedules, or the monitoring of services through tics.

2.7. Baseline

There are several Faculties where the practitioners are monitored by their Professors for the commendable attention to the users of their faculties or community in general. It is worth doing the atingence; Before the Faculty processed the ISO 9001:2015 certification, the processes were already managed in an orderly manner under a quality standard that in principle was the ISO 9001:2008 standard, making use of knowledge management as a management tool. change, complemented with ICT and validating the perception with the ServQual model, therefore when the office is aligned with the ISO 9001:2015 standard, it was easier to implement it since ISO 9001:2008 does not differ so much from ISO 9001: 2015, since they normalize processes to provide a quality service to users or clients, currently considering risk management, as a condition of ISO 9001:2015, in all key processes.

Experimental applied research was used, implementing models, methods and techniques regarding the research problem, at first, naturally, literature review was used to see the type of administration according to computer centers

and in turn university training, how to order processes, how to manage knowledge, how to validate the quality of the services that are provided and how to improve the skills of young people.

2.8. Model of the present investigation developed in the office of the information center.

The following Figure 02 summarizes the model that was implemented to achieve the proposed objective.

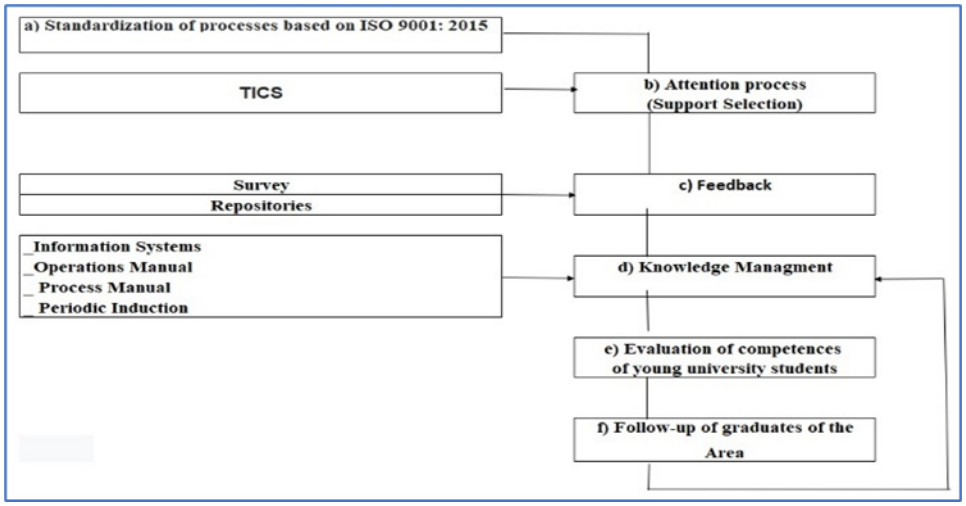


Fig. 2 Model to manage the quality of services and improve skills in the pre-professional practice center

Note: This figure was prepared by the authors

As shown in the figure above, the model can be abbreviated as:

a) *Establishing uniform procedures according to ISO 9001:2015 standards*

The processes are standardized in accordance with the ISO 9001:2015 technical specifications, When new changes arise, adjustments are implemented or new processes are established

b) Service Process or Attention process.

Attendance and support is given according to the level of attention with the most appropriate technical broker, being a technical support area everything revolves around tics.

c) Feedback

Attendance and support is given according to the level of attention with the most appropriate technical broker, being a technical support area everything revolves around tics.

d) Knowledge Management

The induction of the care processes, solutions and new knowledge taught by the oldest young people in the area is done or graduates of the area are invited to give them training.

e) Assessment of competencies of young university students

To aspire to be what are called expert young stockbrokers who acquire a tip from the University for which they take an exam of technical skills and important indicators such as punctuality, responsibility, communication, mysticism, leadership.

f) Follow – up of the graduates of the area.

The traceability of the graduates of the area is made to know their competences in which they work to invite them to give induction talks on motivation and knowledge of what they have learned in the companies that work. The importance is that they serve as a source of motivation for the young people in the area, quite apart from that they teach and expose their knowledge acquired in the company they work for, in this way they have the motivation to enter the area, because the young people know that they will learn more.

Currently it is a routine event, but when the investigation began in 2016, it had to start as shown in the present case study:

CASE STUDY: The Computer Laboratory Office located in the Faculty of Systems Engineering and Informatics at UNMSM. First of all, the laboratory office of the Faculty of Systems Engineering works with a Coordinating Teacher, the young people who provide the services are students of the faculty who do their pre-professional practices, the young people are selected based on a selection contest. Some of the functions and activities performed by the area are described below:

i) ***Organization of area processes***

Based on the ordering of the processes that is part of the entity's Quality Management System, in particular the accreditation processes of the computer center office a), b), c) are shown.

a) The ordering of some of the processes as shown below in Figure 03, which is related to information security.

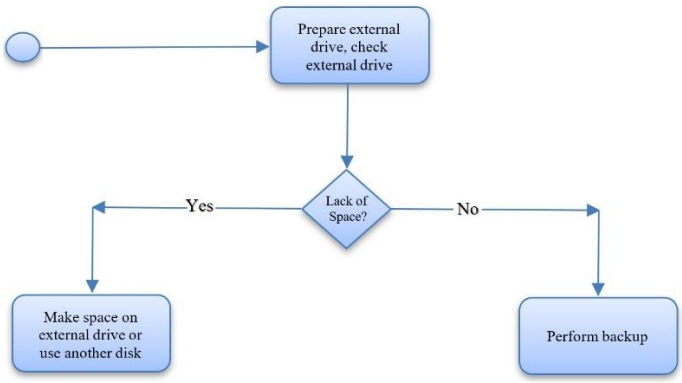


Fig. 3 Information and communication management process -FISI-UNMSM.

Note: This figure was prepared by the authors

These information backup activities must be notified in advance to the user, which obey a schedule, scheduled.

b) **Laboratory maintenance process**, whose procedure can be seen in Figure 04.

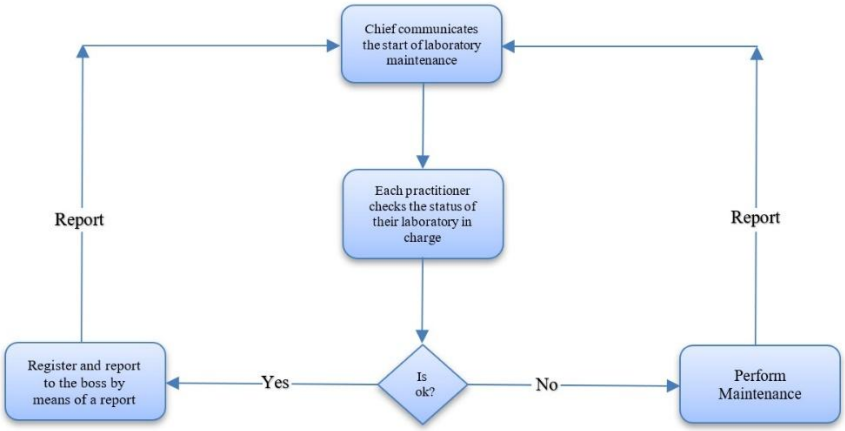
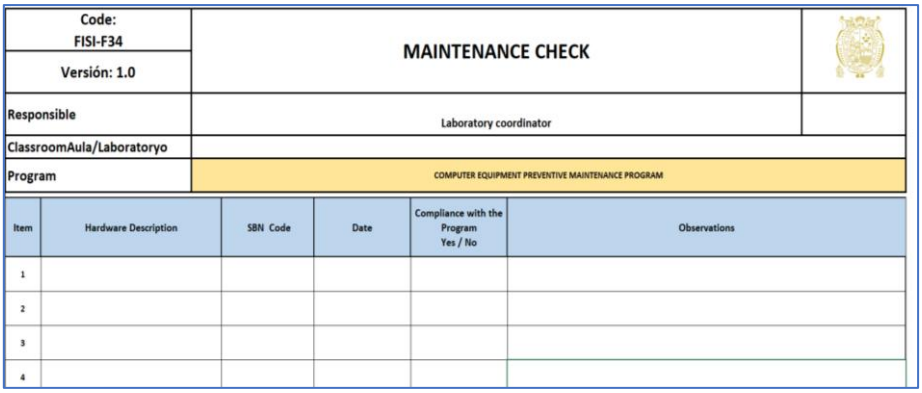


Fig. 4 Laboratory maintenance process

Note: This figure was prepared by the authors

Which must have its control card as seen in Figure 05.



Code: FISI-F34	MAINTENANCE CHECK	
Versión: 1.0		
Responsible	Laboratory coordinator	
ClassroomAula/Laboratoryo		
Program	COMPUTER EQUIPMENT PREVENTIVE MAINTENANCE PROGRAM	

Item	Hardware Description	SBN Code	Date	Compliance with the Program Yes / No	Observations
1					
2					
3					
4					

Fig. 5 Equipment Maintenance

Note: This figure was prepared by the authors

c) Care and service process can be seen in Figure 06.

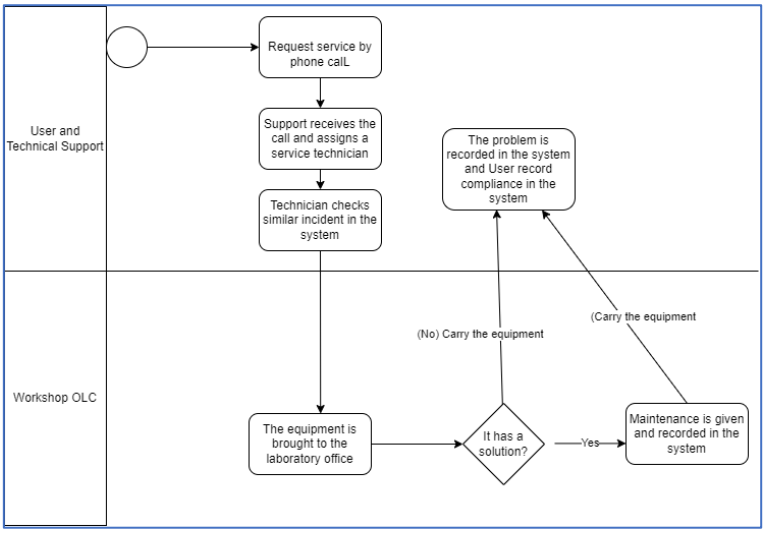


Fig. 6 Customer service diagram

Note: This figure was prepared by the authors

In relation to the process of Figure 06, the problem and the solution are registered in the Incident System for reporting purposes and as a knowledge tool for subsequent solutions when there is a recurrence in the service request,

The machines when the problem is observation are brought to the laboratory office workshop.

Indicators of the processes accredited by the Laboratories office

- Security Management Indicator (backups), which is: Number of folders copied /Total folders concerning the offices. (NCC/TCO).
  The security copy is made automatically, prior notifications to the emails of the users of the Offices.
- Laboratory maintenance indicator:
  Number of machines served/total laboratory machines (NMA/TML)
  The addresses that make use of the laboratories are informed to carry out the respective maintenance each time each cycle ends.
- User service indicator:
  Number of services attended/Total service requests (NSA/TSS).
  It is recorded in user attention and compliance formats.
  The office manages other indicators quite apart from the accredited ones, among them the usability of laboratories, to know the ratio of the use of computers, indicator of use of virtual classroom teachers.

The processes a, b, c seen above are those currently accredited with ISO 9001:2015.

Knowledge management in the case study

[24] point out that:

Organizational knowledge creation involves unlocking and expanding individual knowledge, then solidifying and integrating it into the organization's knowledge structure. For this reason, to maintain the service with quality, existing knowledge must be managed.

In the case study, training is constantly carried out, which can be seen in Figure 07:

Fig. 7 Training of students belonging to the laboratory area.

Note: This figure was prepared by the authors

ii) **Use of free use Tics**

Leaders in IT within higher education institutions (HEIs) are confronted with the task of integrating ongoing technological advancements and their implementation within HEIs to enhance the standard of IT service provision.[25].

"ICTs have performed multiple functions in organizations, some that were considered strategic, have become basic functions to stay in the market".[26]

For this reason, it is always sought to apply new open-source technologies in order to better manage processes, information and communication. And for the follow-up of the services, the trello is used in its free version.

Validating the quality periodically

It is taking a semester, but the survey always takes perceptions about the service.

[27], considers the survey as a blueprint for conducting a quantitative analysis of trends, attitudes, or opinions within a population by studying a representative sample of it.
For his part, [28], defines surveys as data collection methodologies employed to depict, contrast, or elucidate knowledge, sentiments, values, preferences, and behaviors. In this research, the survey method was used, Utilizing the ServQual framework across its diverse dimensions to evaluate service quality, according to the sample drawn from the population of enrolled students. Which is done first by selecting the total sample based on the formula for finite populations:

$$n = \frac{Z^2 pqN}{(e^2(N-1) + Z^2 pq)}$$

Assuming preliminary p and $q = 0.5$

$$Z = 1.96 \quad ; \quad e = 5\%$$

Being $N = 1594$ total enrolled (universe) in the $2019 - II$ cycle, which when operating gives the sample size $n = 384$ surveys, however, since there are 1000 students of Systems Engineering and 594 of Software Engineering, segmenting, it is obtains 241 young people from Systems Engineering and 143 students from the School of Software Engineering, who were surveyed online. The result is shown in a Perceptions Dashboard, Figure 08 shows the ServQual dimensions menu.

Fig. 8 Servqual Dimensions Dashboard Menu

Note: This figure was prepared by the authors

One of the important dimensions shown in Figure 09 is Tangibility, regarding tangibility, which is a dimension of the ServQual model, this Dashboard is Linkey Satisfaction user of the SYSTEM SUPPORT Figure 17

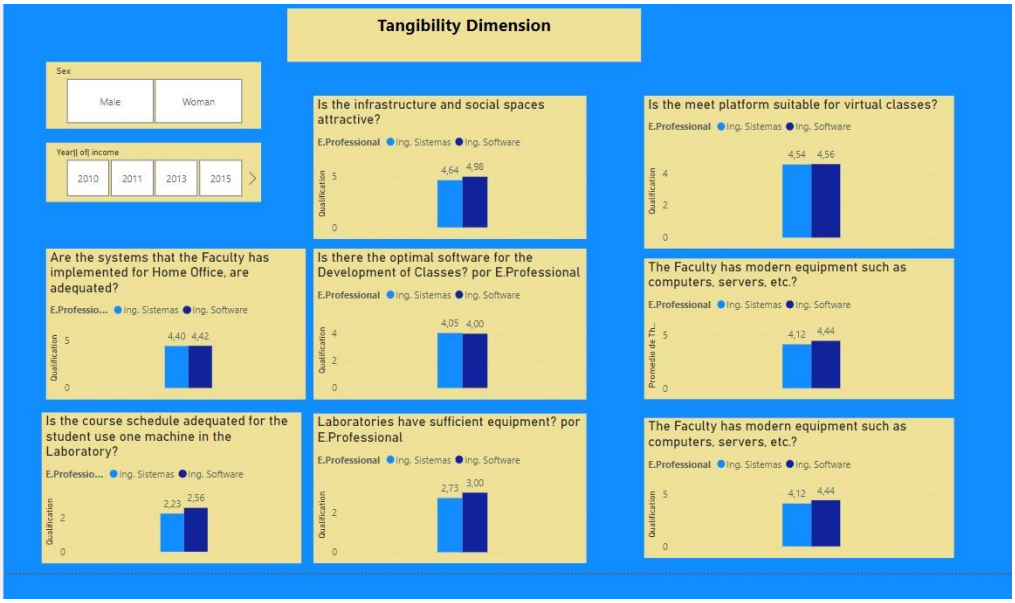


Fig. 9 Dashboard view of the tangibility dimension using Power BI Desktop

Note: This figure was prepared by the authors

The survey is part of a comprehensive study to find out how the quality of services in the Faculty is going, said survey on the web, internal consistency refers to the correlation of each of the questions within the instrument, reliability in the case it was validated with a Cronbach's alpha of 0.93.

According to [29] the Cronbach's alpha coefficient should not fall below 0.7 to ensure adequate internal consistency of the scale being used; values lower than this indicate a lack of reliability.

iii) Organizational Structure

The Computer Laboratory Office, also called the Support and Development office, within the Faculty of Systems Engineering and Informatics (FISI) at the Universidad Nacional Mayor de San Marcos (UNMSM), collaborates with the organizational framework.,

The mission of the office is to provide quality services to users and, in turn, to train students by solving technical support problems, networks, servers, wireless, cameras, virtual classroom administration, software development and maintenance. (According to internal regulations). Also, success is not achieved if monitored Empowerment is not used, which is done in order to promote leadership among young people, thus reinforcing their soft skills. During the inductions, they talk about the importance of their service and the legacy of example that must be given to the new generations of practitioners (students of the Faculty) , about mysticism in the area, discipline, punctuality and being proactive to learn for their own benefit, the team and area. Made up of the laboratory coordinator, with the support of the sysadmin and the oldest technical students who trained the new interns, so that when they go to other jobs, continuity management remains intact with respect to the quality of services.

3. Results

3.1. Knowledge management at Information Center Office

The most important thing is the personal development of the student who applies the knowledge learned in their theoretical classes, innovating and developing their skills, this can be done when there is synergy and leadership based on a relationship of trust, teamwork, managing values and Commitment to your area of work. Regarding the improvement of young people's skills, it follows from the success that the office achieved in getting the office's key processes accredited; However, this is also carried out surveys to observe the feelings of the young after their practice in relation to the strengthening of their soft and technical skills, Figure 10 there is a representative question taken from 43 former practitioners, where one hundred percent consider that the CLO is very important to apply their theorical knowledge.

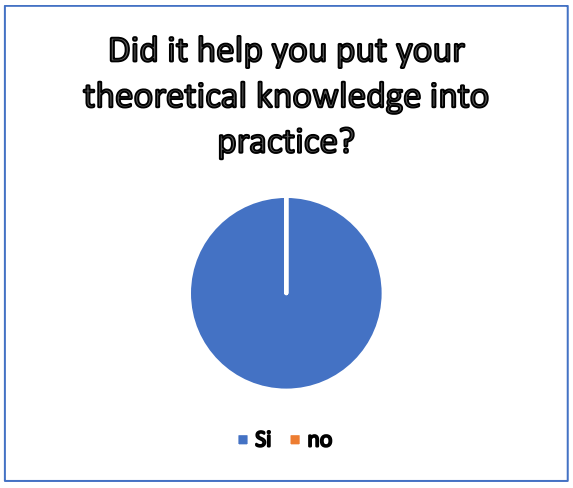
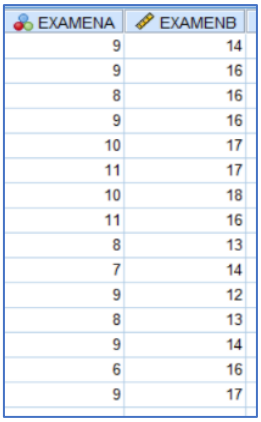


Fig. 10 Theoretical knowledge applied to practice.

Note: This figure was prepared by the authors

3.2. Qualification of practitioners before and after knowledge management

A longitudinal quasi-experimental investigation is followed, to prove that students improve their skills, for this the experiment is carried out with each young practitioner who accesses the IC, who takes an exam upon entering and when he finishes his practice. This is done with all the young people. Figure 11 shows a dataset of the many evaluated with related samples.



EXAMENA	EXAMENB
9	14
9	16
8	16
9	16
10	17
11	17
10	18
11	16
8	13
7	14
9	12
8	13
9	14
6	16
9	17

Fig. 10 Dataset showing the grades before and after in 15 students

Note: This figure was prepared by the authors

Seeing in the first place if the normality is fulfilled.

H0: Does not behave with a normal distribution.

H1: It behaves with a normal distribution.

In the case of normality, the level of significance is 0.334 and 0.176, which are greater than 0.05, which is the default error, then, since it is greater, the null hypothesis is discarded and we are left with the alternative, that is, the hypothesis is accepted. alternative H1, the results can be seen in Table 1, for which the IBM-SPSS software was used.

Table 1. Significance of normality

Statistical Indicator	**gl**	**Sig.**
	15	,334
	15	,176

In other words, the dilemma can be introduced:

H0: There is no notable variance in conducting their practices at the CLO.

If the probability acquired is below 0.05, H0 is dismissed and H1 is embraced

H1: There is a marked contrast when undertaking your internship at the CLO..

If the probability obtained is greater than 0.05, H0 is not rejected, that is, H1 is rejected.

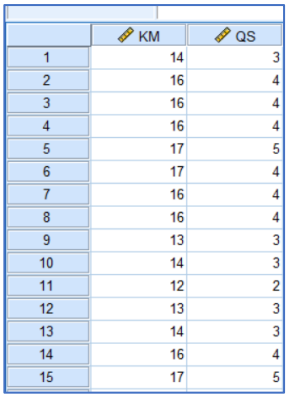
In this instance, the significance level for the related samples dataset is 0.000, which is less than 0.05. Thus, the null hypothesis H0 is rejected, as indicated in Table 02, following the processing of the dataset using the software.

Table 2 Significance to rule out hypotheses.

	Media	**gl**	**Sig. (bilateral**
Part1 EXAMENA-EXAMENB	-6,400	14	,000

3.3. Proof of Correlation between knowledge management and services qualification

From the existing records throughout the investigation, a dataset was taken that considered 15 practitioners, Where KM is the average grade of the students evaluated throughout the training sessions and qs is the average grade for the services performed in a period of time. The Figure 12 is the dataset.



	KM	QS
1	14	3
2	16	4
3	16	4
4	16	4
5	17	5
6	17	4
7	16	4
8	16	4
9	13	3
10	14	3
11	12	2
12	13	3
13	14	3
14	16	4
15	17	5

Fig. 11 Dataset qualifications of Knowledge Management and Qualifications of Quality service.

Note: This figure was prepared by the authors

To do this, the normality is first applied to the dataset, to see what statistical test to apply. The following Table 03 shows the test of normality for a sample of 15 student worker.

Table 3 Normality Test

Normality Test		
Shapiro-Wilk		
Statistical indicator	gl	Sig
0,866	15	0,030
0,812	15	0,049

Being the sample of 15 practitioner or student worker, Shapiro-Wilk is taken, because the sample is a little , if we observe the significance, we conclude that the data is not normal and they are also quantitative variables for which an asymmetric test corresponds.

We propose the following hypothesis to correlate the variables.

A) Regarding the training in the area and the results in the service.

H0: There is no degree of afinity between knowledge management and service quality

H1: There is a degree afinity between knowledge management and service quality.

As they are quantitative variables: we use Spearman's correlation as it is not a normal distribution.

In Table 04, we observe the numerical outcomes indicating the correlation between knowledge management grades and service quality..

Table 4 Correlation coefficient between Quality Service and Qualifications after Knowledge Management

Rho de Spearman		Qualifications-KM	Quality Service
Qualifications(km)	Correlation Coeficient	1,000	0,807**
	Sig(Bilateral)		0,000
	N	15	15
Quality Service	Correlation Coeficient	0,807**	1,000
	Sig.(Bilateral)	,000	

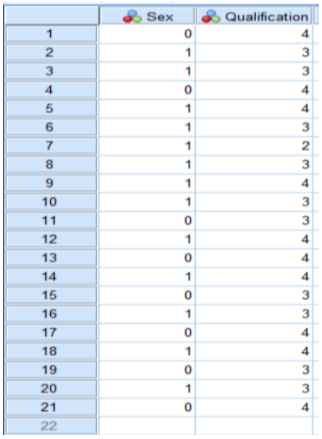
	N	15	15

**. La correlación es significativa en el nivel 0,01 (bilateral).

We notice a robust correlation between knowledge management and service quality. It is 0.807 which is a strong value. Spearman was used since the data taken as a sample does not have a normal distribution. Figure 13 shows the performance ratings between men and women, with 1 being men and 0 being women.

3.4. Performance test male vs. female

In the office there are always more young men than women, the study was done in relation to performance.



	Sex	Qualification
1	0	4
2	1	3
3	1	3
4	0	4
5	1	4
6	1	3
7	1	2
8	1	3
9	1	4
10	1	3
11	0	3
12	1	4
13	0	4
14	1	4
15	0	3
16	1	3
17	0	4
18	1	4
19	0	3
20	1	3
21	0	4
22		

Fig. 13 Dataset of performance by sex

Note: This figure was prepared by the authors

Below is the average performance of males and females in the Table 05, the data is not normal.

Table 5 Dataset normality

	Normality Test		
	Shapiro-Wilk		
Statistical indicator		gl	Sig.
Qualification	Women	8	0,000
	Male	13	0,004

The following Table 06. shows the average performance for the sample

Table 6 Average performance of Men and Women

Sex	N	Media	Standard Deviation	Standard Deviation error
Women	8	3,63	,518	,183
Male	13	3,31	,630	,175

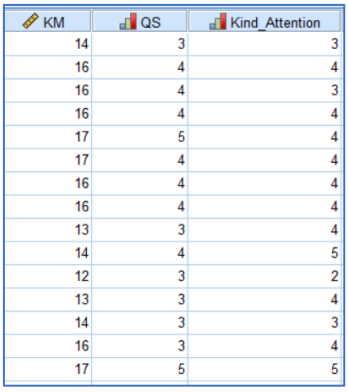
A good average is observed in terms of the performance of men and women when giving the service, being 0-1 deficient, 1-2 bad, 2-3 regular, 3-4 Good, 4-5 Very good. Below is shown in the Table 05, the significant difference, and the p-value. From Levene's test we observe that the p-value 0.247 greater than 0.05 means that there is no significant difference, that is, the performance of women and men is similar, there is no significant difference between the performances of men and women; in other words, the equality of means is not rejected, As shown in the Table 7

Table 7 Significant relationship men vs women

	Levene's test of equality of variances	Sig	Sig(bilateral)
Qualification	Equal variances are assumed	0,579	0,247
	Equal variances are not assumed		0,227

3.5. Knowledge management (KM) and Quality service (QS) and Kind Attention

On the other hand, it was shown that the quality of service (QS) for this investigation only depended on of the technical support personnel (KM), providing a good service is what matters to the user, Kind attention does not influence the quality of service. Figure 14 shows the data to be evaluated:



KM	QS	Kind_Attention
14	3	3
16	4	4
16	4	3
16	4	4
17	5	4
17	4	4
16	4	4
16	4	4
13	3	4
14	4	5
12	3	2
13	3	4
14	3	3
16	3	4
17	5	5

Fig. 12 Factors KM, QS, Kind Attention

Note: This figure was prepared by the authors

First, normality is observed, which is observed to be not normal since both factors are greater depending on the quality of service, less than 0.05 on the various scales. As can be seen in the Table 8.

Table 8 Normality KM, Kind Attention for Service Quality

	QS	Statistical	gl	Sig
KM	3	,927	6	,554
	4	,719	7	,006
Kind_Attention	3	,822	6	,091
	4	,777	7	,024

Next, the Anova is calculated of 2 factors , to find out if the quality of service (QS) depends on knowledge management(KM) , the kind attention of the technician or both: Calculating the Anova of 2 factors, to find out if the quality of service (QS) depends on knowledge management and/or the kind attention of the technician or both, As shown in the Table 9.

Table 9 Anova of km and Kind Attention and its impact on the quality of service(QS)

Dependent variable: QS			
Origin	gl	F	Sig
Corrected model	7	4,333	,036

Intersection	1	669,278	,000
KM	3	5,675	,027
Kind_Attention	2	2,023	,203
KM * Kind_Attention	1	,628	,454
Error	7		
Total	15		
Corrected total	14		

It is observed that only knowledge management (KM) is significant, since the significance is less than 0.05 (0.027),this is influence on the quality of service, it does not depend on the kind attention, nor does the attention or treatment of the support personnel interact with the competences in the quality of the service.

3.6. Linear regression function between service quality and knowledge management

There is a relationship between the qualification of the quality of service(QS) and the qualification after the Knowledge Management(KM), taking the dataset of Figure 14, is obtained the prediction function which can be seen in Figure 15.

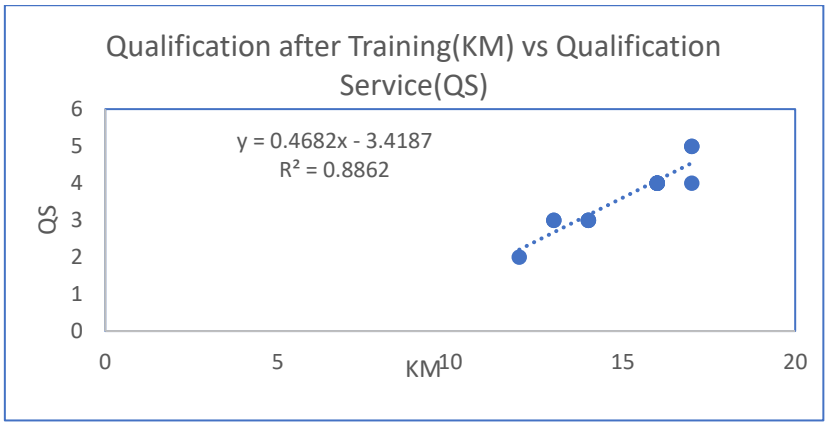


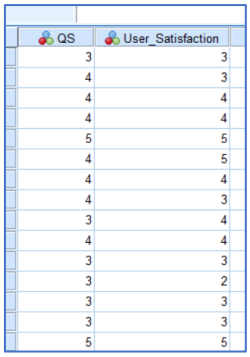
Fig. 15 Linear regression relating the rating of service quality and the rating after knowledge management

Note: This figure was prepared by the authors

Analyzing Figure 15, it can be concluded that to have an adequate service, considering that bad service is 0-1.99, regular service is from 2 to 2.99, and good service is from 3 to 3.99 and excellent service is from 4 to 5 ; if we consider to give a good service , the qualification it must be at least 15 after the student receive the knowledge management. The coefficient of determination that it is good to be greater than 0.8862, this is almost 89% of the variation of the quality of services is explained by the knowledge management variable (KM).In this case the R^2 is a strong value.

3.7. Service Quality vs. User Satisfaction

Sample of one of the many groups that are handled in the office records, a satisfaction study was carried out versus the quality of service, as shown in the Figure 16.



QS	User_Satisfaction
3	3
4	3
4	4
4	4
5	5
4	5
4	4
4	3
3	4
4	4
3	3
3	2
3	3
3	3
5	5

Fig. 16 Quality Service vs User Satisfaction

Note: This figure was prepared by the authors

The data is not normal as shown in Table 10:

Table 10 Normality Quality service(QS) vs User satisfaction

	Shapiro -Wilk		
	Statistical	Gl	Sig.
QS	0,798	15	0,03
User_satisfaction	0,881	15	0,049

Likewise, it can be seen, the correlation between the quality of service (QS) and user satisfaction, being 0.733, as shown in Table 11.

Table 11 Correlation QS vs User_Satisfaction

	Rho de Spearman	Qualifications-KM	Quality Service
QS	Correlation Coeficient	1,000	0,733
	Sig(Bilateral)		0,002
	N	15	15
User_Satisfaction	Correlation Coeficient	0,733	1,000
	Sig.(Bilateral)	,002	
	N	15	15

It is evident that there exists a noteworthy (0.733) connection between service quality and user satisfaction. It is represented in Figure 17.

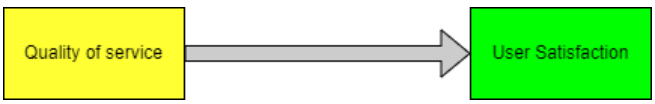


Fig. 17 Quality of service influences User Satisfaction

Note: This figure was prepared by the authors

3.8. Systems and speed to resolve incidents

The follow-up to record the problems and the detail of the solutions optimize the time and at the same time the services are monitored, the Figure 18 shows a snapshot of the System being used.

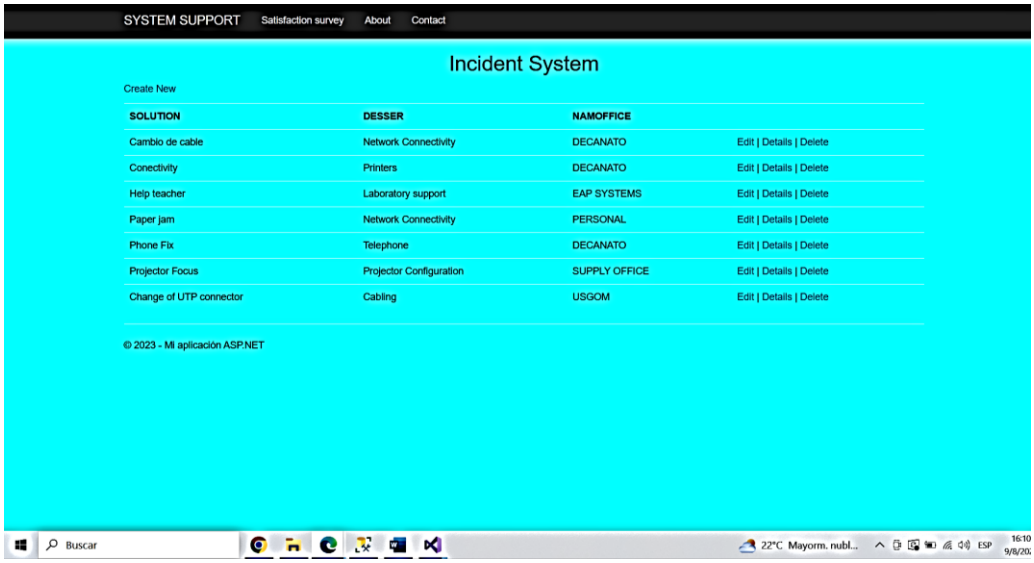


Fig. 18 Maintenance of services performed

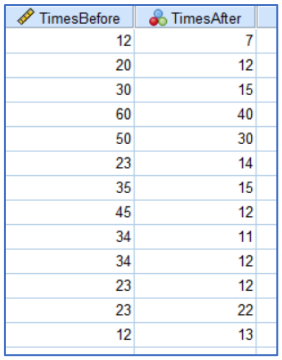
Note: This figure was prepared by the authors

traceability of services to the various user areas is more easy with the System, for that reason is very import to have an incident systems .The Figure 19 shows the traceability of the services, from the Satisfaction Survey of the SYSTEM SUPPORT is linked to the Dashboard developed in Power Bi Figure 8.

Fig. 19 Traceability of services through the System

Note: This figure was prepared by the authors

The speed of the services is optimized by the Incident Information System in the case of recurring incidents, since now before providing the service the type of incident in the System is reviewed, many times the problems are similar or repetitive, therefore it is It is easier to solve the problem, but we demonstrate it, according to the records observed before and after the System developed in the area was implemented, the historical records in the recurring problems were reviewed, the significance. The times analyzed (duration in minutes) have to do with printer configuration services, computer problems, network cabling, with telephones, which are often repeated. A historical record of times before the System and a posteriori with related samples is shown below, which is shown in Figure 20.



TimesBefore	TimesAfter
12	7
20	12
30	15
60	40
50	30
23	14
35	15
45	12
34	11
34	12
23	12
23	22
12	13

Fig. 20 Times in minutes before and after using the System

Note: This figure was prepared by the authors

The table 12 show the Normality between TimesBefore the system And TimesAfter the System.

Table 12 Normality Test.

	Shapiro -Wilk		
	Statistical	gl	Sig.
Timesbefore	0,943	13	0,496
Timesafter	0,757	13	0,002

It is a non-normal distribution,for which a non-parametric distribution is used, in that case Wilcoxon is applied, and the result is appreciated in the table 13.

Table 13 : Significance Timesbefore the system and after the system

test statistics	
Wilcoxon	Times_After - Times_Before
Z	-3,080[b]
Sig. asymptotic (bilateral)	,002

It is observed that the significance is less than 0.05, therefore it is significant, this implies that the System helps to solve the most frequent problems in less time.

4. Discussion

The statistical results coincide with the review of the Literature in which knowledge management affects productivity, thus ensuring customer satisfaction, on the other hand, given that the model creates processes to improve productivity, this research shows the Systems and Dashboard both to streamline support and to have indicators through the Dashboard about user Satisfaction.

On the other hand, the model that implements process management based on ISO 9001:2015 ICT, through the incident information system and the DashBoard to know the perceptions, added to this Empowerment and knowledge management, not only generates Satisfaction for the user also raises the level of competence of the young university students who carry out their internships in this office, which constitutes a contribution to making it portable to other work scenarios of pre-professional internships.

It should be noted that this model has been created for Faculties that provide Information Technology services, whether in Software or Hardware.

5. Conclusions

The proposed model is fulfilled, which is shown in Figure 21 which has been developed throughout the paper.

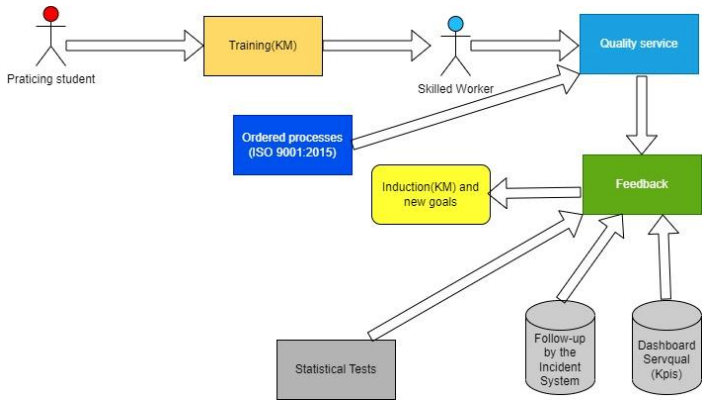


Fig. 13 Outline of the achieved model

Note: This figure was prepared by the authors

It was possible to demonstrate that, making use of the normalization of processes (ISO 9001:2015), the correct use of Tics (Information System and Intelligence Business) ,with the adequate knowledge management to have continuity in the service regardless of the people, adding to it a work environment in a culture of empowerment and work and Added to it with a feedback based on the Servqual methodology. As a team, quality services can be provided to users and at the same time improve the skills of university students who do their pre-professional practices in the case study Faculty.

It is observed by statistical test that the quality of services affects user satisfaction, therefore it is verified that the Model affects user satisfaction.

The information systems allow the traceability of the services and through the opinion surveys of the users that serve as feedback to know if the services improve.

6. Recomendations

It is recommended always automate office processes, as part of the digital transformation taking place at the University. As for the organizational, recognition should be given congratulating both the practitioners and applicants, either for innovation, responsibility or punctuality.

7. Acknowledgments

To all the young people who carried out their tests in Computer Laboratory Office, the service and the authorities are supported by the training center based on them.

Refrences

[1] Sineace. “Modelo de Acreditación para Programas de Estudios de Educación Superior Universitaria”, 2016.
[2] Davenport, T., Prusak, L. “Working Knowledge: How Organizations Manage What They Know”. *EE. UU. Harvard Business School Press*, 1997.
[3] Moquillaza, Cabrera, Morales. “Framework to manage academic administrative processes,validating it from the students' perspective”. *Proceedings of the International Conference on Industrial Engineering and Operations Management,* Sao Paulo, Brazil, April pp. 5 - 8, 2021.
[4] Mark S. Phillips. “Knowledge management, job design, and organizational climate’s influence on employees’ perception of quality”.
[5] Casper g. Kaun, n. Z jhanjhi,.goh wei wei1, sanath Sukumaran. “Quality model for knowledge intensive systems and a thematic review of the literature”. *Journal of Engineering Science and Technology,2021*.
[6] Mickaël Gardoni (1) , Aurélie Dudézert (2). “Valuing Knowledge Management impact on engineering design activities”. *Proceedings of the International Conference On Engineering Design ICED 05 MELBOURNE*, pp. 15-18, 2006.

[7] Anderson, Daniel. “Knowledge Management (KM) Requires Records Management: The Role of Retention Schedules in Businesses with KM”, *Programs.Carolina digital Repository*, 2019.
[8] Elaine Lucia da Silva, Paula Xavier dos Santos. “ELEMENTOS CRÍTICOS PARA UM MODELO DE GESTÃO DO CONHECIMENTO: UM OLHAR SOBRE A FUNDAÇÃO OSWALDO CRUZ”. *International journal of knowledge Engineering and Management,* 2019.
[9] Bernardete Dias Sequeira, João Filipe Marques, António Serrano. “The Role of Knowledge Transfer in Open Innovation”. *Gi Global publisher of timely Knowledge*, 2019.
[10] Shehabat, Issa Mahmouda ; Berrish, Mohammadb.. Integration between knowledge management and total quality management in Jordanian universities: Empirical study. Research Anthology on Preparing School Administrators to Lead Quality Education Programs, 2020
[11] Prashanth Madhala., Hongxiu Li., Nina Helander. Developing data analytics capabilities: integrating the information systems success model and the resource-based view.Industrial Management & Data Systems Volume 124 Issue 7,2024
[12] Parast, Mahour Mellat, Safari, Arsalan. Improving Quality and Operational Performance of Service Organizations: An Empirical Analysis Using Repeated Cross-Sectional Data of U.S. Firms. IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT, VOL. 71, .2024

[13] López, P. “Novedades de ISO 9001:2015”.España: Fundación Confemetal. 2015
[14] Roque, R., Guerra, R. y Escobar, A. “Aplicación de un Sistema de Gestión de la Calidad NC-ISO 9001 a la dirección del posgrado académico”. Ciudad de la Habana: *Educación Médica Superior Cultura*, 2016.
[15] Valhondo, D. “Gestión del conocimiento del mito a la realidad*”*. Madrid- España. Ediciones Diaz de Santos S.A., 2010.
[16] Watkins, K. y Marsick, V. “Sculpting the learning organization: The art and science of systematic change*”*. San Francisco: Jossey-Bass, 1993.
[17] Vargas, J. “La organización aprendiente”. *Hitos de ciencias económico-administrativas*, 2001.
[18] Katz, R. “El papel de la TIC en el desarrollo”. *Propuesta de América Latina a los retos económicos actuales*. España. Editorial Ariel S.A., 2009.
[19] Pérez, Y., Coutín, A. *“*La gestión del conocimiento: Un nuevo enfoque en la gestión empresarial”. Ciudad de la Habana: Acimed, 2005.
[20] Miranda, F., Chamorro, A., y Rubio, S. “Introducción a la Gestión de la Calidad”. España: Delta Publicaciones, 2007.
[21] Maria Júlia Eyng Werner,Ana Paula Louise Yamada,Enzo Gabriel Nascimento Domingos,Luciana Rosa Leite &Carla Roberta Pereira. “Exploring Organizational Resilience Through Key Performance Indicators”. *Journal of industrial and Production Engineering. Brazil. Department of Production and System Engineering, State University of Santa Catarina*, Joinville, Brazil, 2021.
[22] Saranya, M.; Anithaashri, T. **“**Novel approach to enhance network security using key performance indicator in business analytics*”. India: IOP Conference Series: Materials Science and Engineering Volumen 992. 4th International Conference on Design, Analysis, Manufacturing and Simulation*, ICDAMS 2020, 2020.
[23] Chiang, M., Martín, J., Núñez, A. *“*Relaciones entre el clima organizacional y la satisfacción laboral”. Universidad Pontificia impreso Editorial Comillas, Madrid, 2010.
[24] Nonaka, I, Von Krogh, G. “Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theor”. Tokio- Japón. *Perspective Organization Science*, 2009.
[25] Sliep, C., Marnewick, C. “The quest in delivering quality IT services: The case of a higher education institution”. *University of Johannesburg: Education and Information Technologies*, 2020.
[26] Vera, P., Labarcés, C., Chacón, E. “Influencia de las TIC en las organizaciones: Cambios y aparición de nuevas formas organizativas”. *Clío América:Universidad de Magdalena*, 2011.
[27] Creswell. “Research design: Qualitative, quantitative and mixed approaches” (3a Ed.). Thousand Oaks, CA, EE. UU, 2009.
[28] Fink, A. G. “How to conduct surveys: A step by step guide*”* (4a Ed.). Thousand Oaks, CA, EE. UU, 2008.
[29] Celina H. y Campo A. “Aproximación al uso del coeficiente alfa de Cronbach”, *Revista colombiana de psiquiatría*, vol. XXXIV, no. 004, *Asociación Colombiana de Psiquiatría, Bogotá, Colombia*, pp. 572 – 580, 2005