# Accreditation and the Deming Cycle in the faculties of the National University of Education-2022

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#### Abstract

The general objective of this research was to determine the relationship between Accreditation and the Deming Cycle in the Faculties of the National University of Education-2022. According to the results obtained through the use of Pearson's R test, it was found that the Accreditation Variable is related to the Deming Cycle Variable (r = 0.62). Therefore, the significance value is equal to 0.000 (p<0.005). This means that there is a direct, moderate and significant relationship between the variables studied. The sample is probabilistic and consisted of 150 teachers. The results obtained were analyzed at the descriptive level, using frequencies and percentages. Likewise, at the inferential level, parametric statistics were used and, therefore, Pearson's R was used, at a level of 0.05. The data are normally distributed. The results also indicate that Accreditation and the Deming Cycle are predominantly expressed at a medium level. Finally, it is shown that there is a direct, high and significant correlation between the variables "Accreditation" and "Deming Cycle".

Keywords: Accreditation, Deming Cycle, Pedagogical Action.

### Introduction

The research describes the relationship between Accreditation and the Deming Cycle, which configures the possibility of a possible future scenario, establishing a process of continuous improvement in the different Faculties of the National University of Education, which should align the action plans, guided by a vision to achieve the purposes towards a competitive advantage and the quality of its processes.

The Deming Cycle, which allows optimizing productivity, is the most appropriate system to implement a continuous improvement plan. Although Deming was not the creator of this Quality System, he was its main promoter, also known as the PDCA Cycle, which stands for Plan, Do, Check and Act and its 14 points of organizational development. This implementation of continuous improvement leads to a new proposal of policies, programs and strategies for the improvement of educational quality, as well as the proper functioning of the operating bodies of the various faculties of the National University of Education.

The definition of the new educational changes seeks to establish the educational quality assurance established in the Political Constitution of Peru, in Article 2, where it is established as a general objective:

To ensure that all young people in the country have the opportunity to access a quality university educational service, which offers comprehensive training and continuous improvement, focused on the achievement of competent professional performance and, in the incorporation of citizen values that allow an academic reflection of the country, through research. (Minedu, 2015)

In this process of quality assurance policy, a formative evaluation is decisive to indicate the current situation and where a continuous improvement plan can lead to in the construction of a possible future scenario. Therefore, it is essential to build this possible future scenario, but for this to happen we must have a quality model in accordance with the context we are investigating. For this reason, the Quality System based on the Demig Cycle and the 14 points of organizational development, allow a process of continuous improvement, and also requires the use of improvement tools such as the Value Analysis, the Kaizen Method, the 5S method, the Affinity Diagram and the Five Whys. This leads to consider the ISO 9001 standard as in ISO 14001 explicitly names the PDCA Cycle when talking about the improvement of continuous quality management and environmental management respectively. The Deming Cycle is, in conclusion, a fundamental help for an institution such as the different faculties of the National University of Education that wants to develop a management and continuous improvement system to be accredited and that contributes to prosper

by building a possible future. These assertions lead us to formulate the following question: What is the relationship between Accreditation and Deming Cycle in the Faculties of the National University of Education-2022? and its objective, to determine the relationship between both variables.

The methodological justification of the research work has considered the rigorousness required by scientific research, obtaining reliable results to describe the influence of one variable on the other. Likewise, it was sought to become aware of the importance of the variables Accreditation and Deming Cycle in the implementation of a continuous improvement plan in the context of the different Faculties of the National University of Education, which is why it was necessary to study the variables involved in this pedagogical administrative action. The research is based on a quantitative approach, at a descriptive level that required frequencies and percentages. At the inferential level, use was made of parametric statistics and, as such, Pearson's R was used at a level of 0.05, given that the data present a normal distribution. The design is descriptive correlational at a given time of the current situation by testing two entities or variables (Hernández et al., 2015). Likewise, a probabilistic sample was obtained, which consisted of 150 teachers, who were the informant subjects for data collection, using the survey technique and the questionnaire as an instrument. In this sense, it is considered that this research work is sufficiently valid, as it seeks to respond to the social and cultural needs of today's society.

The study presents several antecedents, as can be seen in Salas (2018), who states that the use of the Deming Cycle to ensure quality in the educational process of a quantitative subject, with the MsSchool web application and the Desmos cloud service, allowed improving the development of skills and the assimilation of knowledge about the Gauss-Jordan method. These tools were compatible with the stages of the Deming Cycle (plan, do, check and act), which allowed the construction of creative educational experiences for the quantitative field. The sample consisted of 31 students who took a subject in the quantitative field for business, during the 2017 school year.

On the other hand, León et al. (2018) investigated the importance of a quality management system in the University of Medical Sciences. With the descriptors "Quality management system" and "Quality in health", they conducted a literature search in the database access platforms of the Cuban health information network Infomed, within them in EBSCOhost, PubMed/Medline and SciELO, and a documentary review of the normative basis that establishes the requirements to be met for the implementation of the system. They addressed the importance of the implementation of a quality management system at the University of Medical Sciences and the numerous advantages it offers; the most pointed out are a greater optimization of resources, and improvement

of internal communication and the external image of the organization. They conclude that the system of evaluation and accreditation of institutions and university programs constitutes the driving force of university quality management, the importance of implementing a quality management system in the medical university to achieve superior results in the process of training and development of health professionals is demonstrated.

Also, Lopez (2018) concluded that the degree of quality in the professional career is low. In addition, the population is unaware of the conformation and use of standard 06 of the accreditation process. Similarly, the degree of existing communication is not good, it does not have a policy and quality objectives, nor have they implemented a quality system because they do not have the documentation that refer to the management manuals, neither has the dissemination of the new accreditation model been carried out, nor the regulations for a public institution. Specifically, Llamo (2018), through his study, concluded that there is a moderate relationship between Organization and Quality, as presented by the general hypothesis test (p value or Asymptotic sig. (Bilateral) = 0.015 which is less than 0.05). However, in the opinion of Cano (2019), there is a very high, positive and significant relationship, a conclusion reached by applying the Rho Spearman statistic (0.925): educational management of 68.0 % at a moderate level and 25.2 % for the high level, and educational quality of 32.0 % at the moderate level and 61.2 % for the high level. For Campano and Flores (2019), there is a significant relationship between educational management and educational service in the educational institution, a result found through Pearson's R statistic r=0680. Finally, Javier (2019) concluded that 77% of the standards are at level 1, which is equivalent to the criterion "not achieved". Therefore, it has been considered of urgent need to elaborate an improvement plan that leads the study program to work towards the full achievement of its standards and its consequent accreditation in the short term.

There are many models that have guided the development of quality system and continuous improvement in higher education, among them the one that has been chosen as a development model that allows evaluating the continuous improvement process, we refer to the Deming Cycle or PDCA Cycle. The PDCA model and its 14 principles, for Ayala (2018):

They allow maintaining a quality system in the educational process of a higher Educational Institution. (...) It is used, in short, as a core control strategy for processes, to achieve proposed objectives, maintain the continuity of the educational service, allow institutional accreditation and control through self-evaluation assisted by adequate data analysis.(p.4)

Therefore, Zhao (2009) mentions that the use of the PDCA cycle means to continuously seek superior methods of improvement. It is more than just a tool, since it implies a desire, a strategy, a philosophy, a concept of continuous improvement that must be embedded in the culture of the organization. He concludes that the PDCA model is a powerful tool and philosophy that can be useful to HEIs for their continuous improvement processes. It must be accompanied by organizational changes and adjustments ranging from leadership to effective communication.

The new institutional accreditation model considers and shares the same conception as the model for study programs; that is, it should not be seen as a set of adjustments, modifications and transformations in the evaluation matrix, but as a significant change in the conception of the evaluation of educational quality. This new model conceives quality assessment as a formative process that offers institutions opportunities to analyze their work, introduce changes for progressive, permanent and sustained improvement, strengthen their capacity for self-regulation and install a culture of institutional quality and continuous improvement.

New accreditation model in Peru

The purpose of accreditation is to comply with the standards or requirements established by the accrediting body, disassociating itself from the most important purpose, which is continuous improvement. Accreditation, understood as public recognition of an institution's compliance with standards, does not in itself improve quality. Improvement is born and built within the institutions, and therein lies the value of self-evaluation. In this sense, self-assessment is the mechanism par excellence, which allows identifying and overcoming quality gaps through the development and implementation of improvement plans (SINEACE, 2017).

Therefore, the new institutional accreditation model shares the same conception as the model for study programs; that is, it should not be understood as a set of adjustments, modifications and transformations in the evaluation matrix, but as a significant turn in the conception of educational quality evaluation. This new model conceives quality assessment as a formative process that offers institutions opportunities to analyze their work, introduce changes for progressive, permanent and sustained improvement, strengthen their capacity for self-regulation and install a culture of institutional quality and continuous improvement.

History of the accreditation process in Peru.

In Peru the accreditation of universities is new, the experiences in this sense are necessary exercises in the formation of professionals of different branches, which means to accredit the competences according to the profile of the graduate for the exercise in the labor market. For the same reason, accreditation is a process of continuous improvement that the university requires in view of the opinion of observers, and the

analysis that allows its results. For SINEACE (2016), Accreditation "is a set of adjustments, modifications and transformations in the evaluation matrix, but as a significant turn in the conception of the evaluation of educational quality" (p. 10). According to the new standards established, both globally and nationally, an accreditation model is required that allows university projection in terms of educational quality: product and result, referring to the graduate, the trainer, and the projection of both through social and research action. In the country, evaluation and accreditation models have been established for several years, the most recent being that of SINEACE, said in a more globalized way. UNESCO (2016) establishes accreditation as:

The essential processes from which higher education institutions must draw to define their quality standards, which are: administrative and management structures and processes, Implementation of good policies, Appropriate legal framework, Resources, and Measurement of learning outcomes. (p. 4)

Although the evaluation and accreditation processes should be standardized for all the institutions that attend to the diversity of each one of them, and with this the condition of quality in the higher institutions is visualized, and not that one is more advantageous than the other, the process should be unison for all the houses of study, it is for such reason that the New model of accreditation for Peru is implemented, based on the public policies established by the Nation and by the above mentioned programs.

Standards of the accreditation model for higher education programs in Peru

The history of accreditation in Peru is not very different from that of other Latin American countries. Its beginnings date back to the year 2000, with the enactment of Law No. 27154, which established the requirements and general conditions to be met by medical schools and faculties in order to guarantee the quality and training aptitude of physicians. This law also included the rules for the formation and operation of the Commission for the Accreditation of Faculties or Schools of Human Medicine (CAFME) (López, 2004). Subsequently, in 2001, when the minimum standards for the accreditation of medical schools and faculties were approved by Supreme Resolution No. 013-2001-SA and the Procedures Manual of the Accreditation Commission was approved in 2002, the process of accreditation by CAFME began, subject to compliance with the minimum standards. It is important to note that CAFME was constituted as an autonomous multi-institutional and accreditation entity. For them, it was "the act by which the State periodically certifies that the training provided by medical schools or faculties complies with minimum standards of quality and suitability" (Nava, 2005, p. 14). However, this achievement was not achieved by chance, since the National Commission of Rectors for University

Accreditation (CNRAU) was created for this purpose, which, in addition to being responsible for the evaluation, review and proposal of accreditation standards, was also in charge of disseminating the need for evaluation and providing and promoting permanent mechanisms for self-evaluation.

Later on, CNRAU, in order to make improvements that would allow universities to prepare themselves, apply for accreditation and show the progress made, approved, in 2004, the proposal for the creation of the National Council for University Accreditation. This entity would henceforth be responsible for creating the standards and processes for the accreditation of higher education. In addition, it would assume the administration, supervision and permanent evaluation of universities (López, 2004, p. 121).

By 2006, Law 28740, Law for the Creation of the National System of Evaluation, Accreditation and Quality Certification (SINEACE), was enacted. However, in 2007, the Regulation of this Law is published, which states as its main objective "to guarantee society that public and private educational institutions offer a quality service" (SINEACE, 2016, p. 4). At the same time as this law, the National Education Project 2021-PEN is published, which has the primary objective of consolidating the National System of Accreditation of the Quality of Higher Education. According to Law 28740 (2006), the National System of Evaluation and Accreditation of Educational Quality (SINEACE) is the set of bodies, norms and procedures that establish the standards to ensure the quality of Peruvian education. Among its principles are: transparency, effectiveness, accountability, participation, objectivity and impartiality, ethics and periodicity and among its functions are defined criteria, concepts, policies, programs, strategies, promoting the commitment of citizens with quality.

The registration of the evaluating entities as operating bodies of the system should be considered as:

Peruvian Institute for Quality Assurance in Basic Education. IPEBA

• Council for Quality Assurance in Non-University Higher Education CONEACES.

• Consejo de EAC de la Calidad de la Educación Universitaria CONEAU. The Council for

• Evaluation, Accreditation and Certification of the Quality of Higher Education (CONEAU), which is the body responsible for defining the criteria, indicators and standards for measuring quality in Peru's public and private universities.

According to Law No. 24521 on Higher Education, CONEAU has the following functions:

• Coordinate and carry out the external evaluation of university institutions /Article 44/.

• To accredit undergraduate careers in the case of degrees corresponding to professions regulated by the State, the exercise of which could jeopardize the public interest, directly endangering the health, safety, rights, property or education of the inhabitants. /Article 43/

• To accredit postgraduate courses, whatever the field in which they are developed, in accordance with the standards established by the Ministry of Culture and Education in consultation with the Council of Universities.

• To pronounce on the consistency and viability of the institutional project required for the Ministry of Education to authorize the start-up of a new national university institution after its creation or the recognition of a provincial university institution.

To prepare the reports required to grant the provisional authorization and the definitive recognition of private university institutions on the basis of which the period the provisional operation of private university institutions will be evaluated whose objectives are:

• Promote the development of processes of evaluation, accreditation and certification of the quality of university higher education.

• Contribute to achieving optimal levels of quality in the processes, services and results of university higher education.

• To guarantee the quality of the university educational service.

The objectives of the Directorate of Evaluation and Accreditation include the following:

• Contribute to the improvement of the educational quality of institutions and university programs, through the development of evaluation and accreditation processes.

• Contribute to the establishment of mechanisms for the control and evaluation of the quality of institutional and academic management processes.

An evaluative culture must be fostered in higher education institutions, taking into account Accreditation Policies such as:

• Comply efficiently and effectively with the provisions of Law No. 28740 and its regulations, within the framework of ethics and public morality, to achieve the credibility and trust of society.

• Promote and contribute to the development of quality culture in universities and citizens.

• Establish norms and procedures for Self-Evaluation, External Evaluation and Accreditation that, within the framework of continuous

improvement, contribute to recognize the achievement of goals reached by institutions seeking excellence.

• Train university institutions and evaluating entities in the procedures and instruments established for Accreditation.

• Inform and communicate with transparency the results of the Accreditation process and management of the actors in the process.

• Supervise and evaluate the activities of university institutions and evaluating entities, under a follow-up plan established by CONEAU.

• Prioritize the accreditation of university professional careers and graduate studies, whose results will provide preliminary information for institutional evaluation.

Main accreditation models

The excellence of organizations worldwide is measured by the capacity and the achievement of results in quality management; which demands to be maintained in this way in a constant way, taking into account any of the accreditation models to maintain these processes in a continuous way. Some models to be considered are:

European Accreditation Model. Considered as a new method of quantification, pedagogical and methodological, based on the student's workload, i.e., focused on student learning (Palacios, 2004). Similarly, Gonzáles and Espinoza (2008) point out that this model "establishes a systematic arrangement of the most critical factors for the proper functioning of any organization" (p. 21).

In this sense, the European model is a benchmark of the highest quality, which has been able to achieve through its own initiatives the creation of organizations and associations such as the European Association for Quality Assurance in Higher Education (ENQA), an organization whose primary objective is to "promote European cooperation in quality assurance in higher education among all its constituent members" (Michavila and Zamorano, 2007, p. 249).

According to AQU (2017) the criteria and guidelines for quality assurance in the European Higher Education Area (ESG) date back to 2005, and were welcomed by the ministers of higher education responsible for the time through a proposal developed by the European Association for Qualityassurance in Higher Education (ENQA), in collaboration with the European Students Union (ESU), the European Associationof Institutions in Higher Education (EURASHE) and the European University Association (EUA).

Subsequently, in 2012, a proposal for the revision of these criteria and guidelines was put forward by the Ministry to improve clarity, applicability, usefulness and include the scope of application, in view of the need to adapt and update them. Currently, there is a new version of

the criteria and guidelines for quality assurance in the European Higher Education Area (ESG), approved at the Ministerial Conference in Yerevan, held on May 14 and 15, 2015, and which has among its primary objectives:

• To establish a common framework for quality assurance systems in learning and teaching at institutional, national and European level.

• To enable the assurance and enhancement of the quality of higher education in the European Higher Education Area.

• To promote mutual trust, thus facilitating recognition and mobility within and across national borders.

To provide information on quality assurance in the EHEA.

With respect to the AQU (2019) criteria, where higher education institutions must guarantee and ensure quality, the ESG structure it in three sections:

- Criteria and guidelines for internal quality assurance.
- Criteria and guidelines for external quality assurance.
- Criteria and guidelines for quality assurance agencies.

In Cruz research (2009), another European model is ECA, a body created to achieve the recognition of graduate student qualifications in Europe, for which it has developed a code of good practices, taking as a reference the work done by ENQA. Of the 17 standards in the code, 11 are related to accreditation, which are referred to below:

Have an explicit mission.

• Have an explicit mission.

• Be recognized by the competent authority as a national accreditation body.

• It must be sufficiently independent of government, institutions of higher education and chambers of commerce, industry and professional associations.

• It must be rigorous, fair and consistent in its decision making.

• It must have adequate and credible human and financial resources.

• It must have its own internal quality assurance system that emphasizes quality improvement.

• The agency/organization must undergo external evaluation on a cyclical basis.

• It must demonstrate public accountability, have official policies that are public, as well as procedures, guidelines and criteria.

- Report publicly and appropriately on accreditation decisions.
- Provide a method of appeal against decisions.

• Collaborate with other national, international and/or professional accrediting agencies/organizations.

Accreditation Model in the United States. The case of the United States is one of the most emblematic, since it was one of the pioneer countries in terms of accreditation, where the issue is no longer to have quality accreditation, but rather the actions are aimed at how accreditation is conducted and the effects it produces on public policies. It has legislation called the Higher Education Act (CHEA).

"Association of 3,000 degree-granting colleges and universities and recognizes 60 institutional and programmatic accrediting organizations" (CHEA.org 2017, p.1).

Its history in accreditation begins in the year 1885, with the founding of the New England Association of Schools and Colleges Commission on Institutions of Higher Education (NEASC-CIHE), followed in 1887 with the creation of the Middle States Commission on Higher Education.

In the 19th century, the North Central Association of Colleges and Schools-Higher Learning Commission (NCA-HLC) and the Southern Association of Colleges and Schools (SACS) Commission on Colleges were created; and in 1917 the Northwest Commission on Colleges and Universities (NWCCU) was created. Finally, in 1962, the Western Association of Schools and Colleges (WASC-ACCJC) was established, which has under its jurisdiction the Accrediting Commission for Community and Junior Colleges (WASC-ACCSCU) and the Accrediting Commission for Senior Colleges and Universities (Silas 2014:7).

The accreditation process of higher education institutions is complex and decentralized, carried out by private organizations called "Accrediting Agencies" nonprofit, designated for that specific purpose (NCATE, 2016; Guzmán Martínez, 2017; cited by Guillén 2017:140)

Latin American Accreditation Model. Currently, and due to globalization, higher education institutions are subject to strict evaluation and accreditation processes regarding their educational quality. In this sense, since the 1990s, Latin America has tried to generate mechanisms to strengthen the quality of education through institutional and program evaluations. According to Pires S. and Lemaitre M. (2008), this has originated "as a consequence of two complementary phenomena: on the one hand, the increase in demand for higher education, and on the other, the development of a business-oriented private sector" (cited by Gazzola and Didriksson, 2008:299).

These two visions, one subordinated to productivist concepts with tendencies towards the unification of international models and the

other, defending the identity of national systems, is, according to Lemaitre, the "consequence of the centrality that higher education has acquired in the framework of what we usually call the knowledge society, or the information era, and its role as an essential component of the development of countries" (cited by Gazzola and Didriksson, 2008:29:29). (Cited by Gazzola and Didriksson, 2008:299)

In this sense, Latin America has focused its efforts on guaranteeing educational quality in national organizations, but also committing itself to regional objectives through integrative alliances in terms of accreditation, such as the Ibero-American Network for Quality Accreditation in Higher Education (RIACES) which, in turn, is part of 18 other international networks, the International Network for Quality Assurance Agencies in Higher Education (INQAAHE).

On the other hand, there are 17 national accreditation systems in Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Dominican Republic and Venezuela, and in turn, there is a regional mechanism of vital importance such as MERCOSUR (Lopez, 2012, cited by Silas 2014:12).

The experience in education in MERCOSUR, initiated in the 1990s with the Experimental Accreditation Mechanism (MEXA), which aspired to the possibility of accrediting degree programs in its six member countries (Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay) with Venezuela being added later. In 1992, at the Meeting of Ministers of Education (RME) of Mercosur, the Triennial Plan for the Education Sector of Mercosur was approved, the main objective of which was the formulation of proposals for flexibility, accreditation and recognition of studies and degrees, allowing the mobility of people within the Region (Fernandez 2012:2). Over time, plans and new agreements were approved until 1998, when the Memorandum of Understanding on the Implementation of an Experimental Mechanism for the Accreditation of Degrees for the Recognition of University Degrees in MERCOSUR Countries was approved. The following standards were established there (Fernández, 2012, p. 12):

• Validate the titles of the careers where it is necessary to practice the profession.

• The system to be adopted should be freely adhered to, periodic, gradual and experimental.

- Include a previous step of self-evaluation.
- Peer evaluation process, in accordance with the requirements established at the regional level.

• The requirements will refer to the career in its entirety (curricula, faculty, infrastructure and equipment, etc.).

• The competent bodies at the national level will be the "National Accreditation Agencies", which must comply with the following requirements:

<sup>1</sup> They shall be persons under public law duly recognized by the national authorities.

They shall have a multi-person character.

<sup>1</sup> The procedure for their integration shall guarantee the suitability of their members and the autonomy of their decisions.

The "Meeting of Accreditation Agencies of MERCOSUR" was created as an instance of regional monitoring and cooperation and in 2006, the MEXA gave way to the Accreditation System of University Degrees of MERCOSUR (ARCU-SUR), a pioneer system in Latin America since it presented an important feature that took into account the profile of the graduate at the time of starting the evaluations (ARCU-SUL, 2017). For ARCU-SUL (2020), "accreditation is the result of the evaluation process through which, the academic quality of degree programs is certified, establishing that they meet the graduate profile and the quality criteria previously approved at the regional level for each degree program" (p. 1).

Currently, in spite of all the mechanisms established to achieve important results, some weaknesses are evident in Latin America; as regards accreditation processes, they have become a simulation, since there are models focused on the administrative aspect and not specifically on performance, generating an increase in the bureaucratic apparatus. On the other hand, the participation of the educational community is not observed in a serious manner, credibility in the bodies responsible for accreditation is necessary; likewise, there is an approach regarding work by competencies when in reality the work continues to be by content and finally, the authors point out that there is no innovative vision consistent with the current challenges posed by the knowledge society (Martínez et al., 2017).

Deming, the proponent of a quality model for university accreditation

According to Deming (1967), the following principles should be taken into account:

• Generate a permanent purpose in favor of improving products and services (Kaizen = Continuous Improvement), designating goods to supply long-term needs instead of seeking short-term gains.

• Adopting the new philosophy of financial soundness and refusing to allow habitual levels of delay, error, defective materials and production errors.

• Reduce the number of suppliers for the same product by excluding those who do not qualify by not contributing quality tests.

• Institute continuous training in the workplace. Develop and implement plans for training and continuous improvement of workers.

• Encourage efficient, two-way communication and other ways that can eliminate fear at the organizational level and support employees in working together to achieve the system's objectives.

• Remove barriers that exist between the various areas of the organization by encouraging teamwork.

• Eliminate the use of numerical goals, posters and slogans that demand new degrees of effectiveness without suggesting the method or providing the necessary tools and training.

• Permanently optimize quality and production level. As well as ending with numerical quotas. This basis should be implemented by the production system, more specifically the manager of this department can apply it in the manufacturing area.

• The limits that hinder the employee from being proud of his capabilities should be eliminated.

• Institute an optimal program for training and self-improvement. In this regard, it should be the management, with the support of the HR department, who will be in charge of the training and self-improvement.

• Determine management's ongoing responsibility for quality and productivity and its commitment to the implementation of these principles. Here it is the general manager who must realize this objective.

#### The PDCA Cycle: Deming Circle

The PDCA cycle (Plan, Do, Check, Act) is a process that, together with the classic method for solving problems, makes it possible to improve quality in the various processes of the company. It is a method for continuous improvement when applied in the management of the various processes, which is very useful (Camisón, 2009). Deming presented the PDCA cycle in the 50's in Japan, for this reason it is also called "Deming cycle". In Japan, the PDCA cycle was used from the beginning as a method for continuous improvement, which is applied to various contexts (Camisón, 2009). When the PDCA cycle was implemented in Japan, abnormalities were detected that are related to preventive work, which is important for continuous improvement. Operators can apply the plan to their particular labor department, carrying out the PDCA cycle in its entirety. Management and supervisors check if the desired progress occurred and finally, management makes amendments if needed and mandates the method of success with prevention goals (Camisón, 2009). Ishikawa, one of the recognized Japanese quality experts, pointed out that the essence of Total Quality lies in repeatedly applying the PDCA process until the objectives are

achieved. For him, the PDCA cycle, which he called "control cycle", consists of four major stages, and its implementation involves the completion of six steps that are constantly repeated once completed (Camisón, 2009). Development and continuous improvement of processes. Quality management. The PDCA cycle the stages and steps of the cycle are:

| Define the problem. Brainstorming   Define the project Analyze why it is important. |  |
|---|--|
| Define the project Analyze why it is important. Registers                           |  |
|   |  |
| Define indicators (control variables)   |  |
| Pareto Diagram  |  |
| Collect existing information. Brainstorming   |  |
| Analyze the current Identify relevant variables. Registers                          |  |
| situation Prepare registration forms. Flowchart                                     |  |
| Collecting data of interest. Pareto Diagram   |  |
| Plan Brainstorming  |  |
| Determine potential causes. Registers   |  |
| Analyze potential Analyze data collected. Flowchart                                 |  |
| causes Observe personal experience. Pareto Diagram                                  |  |
| Brainstorming. Scatter diagram  |  |
| Cause and effect diagram  |  |
| List of solutions. Brainstorming  |  |
| solutions Establish priorities Bar charts   |  |
| Prepare an operational plan. Pie charts   |  |
| Brainstorming Brainstorming   |  |
| solutions Carry out planned changes. Bar charts                                     |  |
| Pie charts  |  |
| Pareto Diagram  |  |
| Collect control data. Line charts   |  |
| Evaluate results. Histograms  |  |
| Control charts  |  |
| Check Make changes to scale. Pareto Diagram   |  |
| Standardize Training and coaching of personnel. Line charts                         |  |
| improvement. Define new responsibilities. Histograms                                |  |
| Define new operations Control charts and specifications.                            |  |

# Table 1 Deming Cycle

|     |                  |                                  | General procedures  |
|-----|------------------|----------------------------------|---------------------|
| Act | Documenting the  | Summarize the procedure learned. | Specific procedures |
|     | Records and work |                                  |                     |
|     |                  |                                  | instructions        |

# Source: Carro and Gonzales 2016

# Productivity in the process area

According to the EPA, productivity is the level of effective use of each productive entity. It seeks the permanent optimization of what already exists. It is based on being convinced that things can be done better today than yesterday, and tomorrow than today. It requires a continuous effort to accommodate economic tasks to the changing conditions and to apply new tools and methodologies (EPA, 2009). Likewise, Gutiérrez (2010) states that the effects achieved can be measured in units manufactured, in items sold or in profits, while the resources used can be quantified by number of workers, total time employed, machine hours, etc. For this study, productivity is defined as the results of a production task and the way in which the production was achieved, i.e. it is related to the organization's goals and the work environment, for which all the resources used to achieve the goals and the result must be considered. The productivity formula is defined by the product of efficiency and effectiveness.

# Efficiency

It is the indicator used to evaluate the resources or performance of tasks in two aspects: the first, as the "relationship between the number of resources used and the number of resources that are estimated or programmed"; the second, as the level at which the resources used are used and modified into products". As can be observed, efficiency points to the evaluation of results and the maximization of productive processes (Business News, 2010). It is understood that efficiency occurs when smaller amounts of resources are used to achieve the same goal. Or conversely when better results are achieved using the same or fewer resources. Seeking efficiency is about improving resources and managing so that there is no waste of resources, for example, reducing the time wasted when equipment is stopped, materials are missing or there is an imbalance (Gutiérrez, 2010).

# Effectiveness

It assesses the impact on the management of the products or services we provide. It is not enough to produce with 100% efficiency the services or products that we set as a goal, either in quantity or quality, but it is required that this is the right one; the one that will certainly satisfy customers or have an impact on the market. In this part, studies of certain functions of value chains are required (Business News, 2010). According to Gutiérrez (2010) defines efficiency as the level at which the

planned work is carried out and the planned objectives are achieved, being necessary for this to use the resources properly to achieve the goals set (do as planned), then indicates how important it is to go in search of the optimization of efficiency, whose purpose is to optimize the performance of equipment, tools and procedures, as well as training staff to achieve the goals set, through reducing defective products, failures in the start-up and defects in materials and equipment. In addition, efficiency should seek to increase and improve the skills of employees and generate programs that help them do their jobs better.

# Methodology

The research is comprised in the quantitative approach. According to Hernández et al. (2014), this involves the measurement of the variables under study in a given context and according to the researcher's criteria seeks to determine the correlation or causality between these variables, inferences are made through statistical procedures, from the sample to the population. The type of study of basic research, since it seeks to explain how the variables are related. The descriptive-correlational method, according to (Sánchez et al., 1998). It consists of systematically describing and interpreting a set of facts related to other phenomena as they occur in the present work. The design is non-experimental descriptive, according to (Sánchez et al., 1998), and is the most widely used in the field of educational research. It is a non-experimental cross-sectional design.

Design scheme:



Where:

M = Is the research sample.

OX1= Observation of variable X1.

OX2= Is the observation of variable X2.

r: Is the degree of relationship between both variables.

#### The sample

The type of sampling used is probabilistic, to the extent that the sample constitutes a subgroup of the population in which all the elements of the population have the same possibility of being chosen. Hernández (2006) mentions that:

The sample size was fixed with a margin of error of 0.05 and a confidence level of 0.95%. Using the following formula, where the estimator is the percentage of election of each element.

$$n = \frac{Z^2 x p x q x N}{E^2 (N-1) + Z^2 x p x q}$$

Where:

n =?

N = Population

Z = Confidence level (95% 1.96)

E = Allowable error (5%)

p = Probability of occurrence of the event (50%)

q = Probability of non-occurrence (50%)

Sample calculation

$$n = \frac{(1,96)^2 (0,50) (0,50) (110)}{(0,050)^2 (109) + (1,96)^2 (0,50) (0,50)}$$

# n = 150 (Rounded value)

After calculating the sample size, the stratified probability sampling type was used. Stratified, to the extent that the population is divided into subgroups according to the research.

The calculation of the proportion factor was worked as follows:

$$f = \frac{n}{N}$$

Where:

f = proportion factor

n = sample size (150)

N = population size (300)

f= 150/300

f= 0.5

Stratification of the sample

The characteristics of the sample stratification are detailed in the following:

Description of the sample

The sample under study in the present research work presents the following characteristics.

Table 2 Distribution of the sample of teachers from different faculties.

| N°   | Faculties                      | Teachers | %    |
|------|--------------------------------|----------|------|
| 1    | Agriculture and Nutrition      | 17       | 11%  |
| 2    | Science                        | 24       | 16%  |
| 3    | Business sciences              | 24       | 16%  |
| 4    | Social Sciences and Humanities | 50       | 33%  |
| 5    | Initial Education              | 9        | 6%   |
| 6    | Pedagogy and Physical Culture  | 15       | 10%  |
| 7    | Technology                     | 11       | 8%   |
| Tota | 1                              | 150      | 100% |

Source: Own elaboration

Techniques and instruments

For the purpose of collecting information relevant to the research topic, the following techniques will be used:

• Questionnaire to determine accreditation addressed to the teachers of the faculties of the National University of Education-2022.

• Questionnaire to determine Deming's quality addressed to the teachers of the faculties of the National University of Education-2022.

The instruments that were applied were questionnaires, to collect data for decision making. The data collection techniques used in this research work were: Participatory observation technique, i.e. we identified ourselves as researchers and on this basis the information was collected. The instrument was the questionnaire, and the technique was the survey.

### Discussion

The general objective of this study was to determine the relationship between the variables Accreditation and Deming Cycle in the faculties of the National University of Education. Also, according to the results obtained through the use of Pearson's r test, it was found that the variable accreditation is related to the Deming cycle (r = 0.62), with a significance value equal to 0.000 (p<0.005), a result that indicates that there is a direct, moderate and significant relationship between the variables studied.

The results coincide with the research conducted by; Lopez (2018), In the thesis, it had the purpose of proposing the implementation of a Quality Management System (QMS) in the Professional Career of Production Mechanics of the Institute to improve its processes and procedures with quality and validate the standard 06 of the SINEACE accreditation process. This research was framed in a qualitative approach, of exploratory type, of explanatory level with an observational level. For this purpose, it used the observation technique and applied the survey as an instrument to diagnose the reality of a population of 126 students and 10 teachers. It concludes that the degree of quality in the professional career is low, the population is unaware of the conformation and use of standard 06 of the accreditation process. Similarly, the degree of existing communication is not good, it does not have a policy and quality objectives, nor have they implemented a quality system, which leads to not having the documentation referred to the manuals, nor have they made the dissemination of the new accreditation model and especially the importance for a public institution.

The first specific objective is to determine the relationship between strategic management and planning with teachers of the faculties of the National University of Education. Also, according to the results obtained through the use of Pearson's r test, it was found that strategic management is related to planning (r = 0.58), with a significance value equal to 0.000 (p<0.005), a result that indicates that there is a direct, moderate and significant relationship between the variables studied.

These results coincide with the research conducted by; Lozano (2017). Educational management and its relationship with teaching quality at the Army War College - 2017, conducted at the National University of Education Enrique Guzmán y Valle. Research with quantitative approach, descriptive correlational type and descriptive cross-sectional correlational design, applied to a sample of 42 teachers using as a technique the survey and as an instrument the questionnaire for both variables, this had a reliability of 0.889. data was processed through the Chi-square statistic. It concludes that: With 88.1% educational management is significantly related to teacher educational quality. German (2017). Quality management and pedagogical management in

teachers of Educational Institution No. 88229 - Chimbote 2017. Carried out at the San Pedro University. The research is of basic type, with descriptive correlational design. The sample consisted of 23 teachers of the educational institution. For data collection, the survey technique was used and the questionnaire as an instrument. The conclusions reached are: quality management is 55.8%, which indicates that there is a regular level. Regarding pedagogical management, there is a relationship between the level of quality management and the level of pedagogical management in the teachers of the educational institution.

The second specific objective of the study determined the relationship that exists between comprehensive training and doing with teachers of the faculties of the National University of Education. Also, according to the results obtained through the use of Pearson's r test, it was found that comprehensive training is related to the doing of teachers (r = 0.52), being the significance value equal to 0.000 (p<0.005), a result that indicates to us that there is direct, moderate and significant relationship between the variables studied.

These results coincide with the research conducted by; Llamo (2018). Institutional management and educational quality of the emblematic educational institutions of the district Ate, UGEL 06. The research was of basic type, with descriptive correlational design. The sample consisted of 72 individuals. The instrument used was an observation form, an interview form and a questionnaire. The conclusion presented is that there is a moderate relationship between Institutional Management and the Educational Quality of the Institutions as evidenced by the general hypothesis test (p value or asymptotic sig. (Bilateral) = 0.015, which is less than 0.05). Similar results are presented in the following conclusion, a moderate relationship between Organization and Quality as shown by the general hypothesis test (p value or asymptotic sig. (Bilateral) = 0.015, which is less than 0.05).

The third specific objective of the study determined the relationship that exists between support and verification with teachers of the faculties of the National University of Education. Likewise, according to the results obtained through the use of Pearson's r test, it was found that institutional support is related to the verification of teachers (r = 0.46), with a significance value equal to 0.000 (p<0.005), a result that indicates that there is a direct, moderate and significant relationship between the variables studied.

These results coincide with the research conducted by; Cano (2019). Educational management and educational quality in the Ricardo Bentín Emblematic Educational Institution. UGEL 02, Lima, 2016. Performed at the Universidad Nacional Mayor de San Marcos, of basic type, with non-experimental design, descriptive-correlational level of method that was used hypothetical-deductive and quantitative approach. The sample consisted of 103 primary and secondary school teachers. The technique

used was the survey and the questionnaire instrument in both variables. It concludes that there is a very high positive and significant relationship applied with the Rho Spearman statistic of 0.925, the educational management of 68.0 % at a moderate level and 25.2 % for the high level, and the educational quality of 32.0 % at the moderate level and 61.2 % for the high level.

Regarding the fourth specific objective, it was possible to determine the relationship that exists between the results and the performance with teachers of the faculties of the National University of Education. Likewise, according to the results obtained through the use of Pearson's r test, it was found that institutional support is related to the verification of teachers (r = 0.46), with a significance value equal to 0.000 (p<0.005), a result that indicates that there is a direct, moderate and significant relationship between the variables studied.

These results coincide with the research conducted by; Campano and Flores (2019). Educational management and its influence on school service in the educational institution "Daniel Becerra Ocampo de Moquegua" in 2018. Carried out at the Universidad Nacional de San Agustín de Arequipa. The research is of basic type, with descriptive correlational design. The sample consisted of 50 teachers. For data collection, the survey technique was used in both variables and as an instrument the questionnaire. It is concluded that: There is a significant relationship between educational management and educational service in the educational institution, processed through Pearson's R statistic r=068.

# Conclusions

• Accreditation is significantly related to Deming quality with teachers from the faculties of the National University of Education.

- Strategic management is significantly related to planning with teachers from the faculties of the National University of Education.
- Comprehensive training is significantly related to doing with teachers from the faculties of the National University of Education.
- Support is significantly related to verification with teachers from the faculties of the National University of Education.
- The result is significantly related between acting with teachers from the faculties of the National University of Education.

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