Journal of University Policies

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The works must be unpublished and refer to topics of University educational planning, philosophy from the university educational point, social participation in the benefit of university education, equity and university educational coverage and other topics related to Social Sciences.

Presentation of Content

In a fist article we present, *Proposal to improve the process of administration of projects financed by CONACYT by the Treasuries of the Universities of Campeche* by TURRIZA-MENA, Roselia Lorena, CANUL-TURRIZA, Román Alejandro, CRUZ-Y CRUZ, Andrea del Rosario and BARRERA-LAO, Francisco Javier, with asdcription in Universidad Autónoma de Campeche, as the next article we present, *Productivity of management skills in educational institution, in Villahermosa Tabasco* by SIERRA-MOREJÓN, José Luis, ABID-BECERRA, Marco Antonio, JAVIER-GERONIMO, Zinath and GARCIA-JERÓNIMO, Irma, with asdcription in Tecnológico Nacional de México, Campus Villahermosa. México, as the next article we present, *Initial evaluation exercise of a Higher Education Unit: In response to the guidelines of a National System* by PALOMARES-RUIZ, María Blanca Elizabeth, TORRES-BUGDUD, Arturo, BÁEZ-VILLARREAL, Esteban and TREVIÑO-CUBERO, Arnulfo, with asdcription in Universidad Autónoma de Nuevo León, as the last article we present, *Teamwork skills in academic events that promote open innovation: A comparative analysis between in-person and virtual formats* by ECHEVARRIA-CHAN, Ivonne, FLORES-AZCANIO, Nancy Patricia and ESCAMILLA-REGÍS, Daisy, with asdcription in Instituto Tecnológico de Tlalnepantla, Universidad Politécnica del Valle de México and Tecnológico de Estudios Superiores de Cuautitlán Izcalli.

Content

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Proposal to improve the process of administration of projects financed by CONACYT by the Treasuries of the Universities of Campeche

Propuesta para mejorar el proceso de administración de proyectos financiados por CONACYT por parte de las Tesorerías de las Universidades de Campeche

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Abstract

The treasuries of the universities and educational institutions of the state of Campeche, have processes for the administration of projects that are generally made up of many steps to follow to carry out the different procedures such as payments to suppliers, per diems, scholarships, among others, which usually takes from days to weeks, making it impossible to meet the commitments made by the institution. The objective of this work is to evaluate the flow of the current financial administration process of the projects of the National Council of Science and Technology (CONACYT) to propose a reengineering of the processes. The technique of direct observation and the survey was applied to learn from the users the perspective of the administrative process and to identify critical points in conflict. The study of time and movement proposed by Tejada *et al* (2017) was applied, a tool that determines the standard times of the operations that make up a process; and the movements of the people involved to carry out said operation. With this application of this method, the following were achieved: minimizing the time required in each step and the costs, providing a reliable and high-quality process, eliminating inefficient steps, and accelerating the efficient ones.

Projects, Universities, Treasuries

Resumen

Las tesorerías de las universidades e instituciones educativas del estado de Campeche cuentan con procesos para la administración de proyectos que generalmente se componen de un gran número de pasos a seguir para realizar diferentes trámites como pagos a proveedores, viáticos, becas, entre otros ; los cuales suelen tardar de días a semanas, imposibilitando el cumplimiento de los compromisos adquiridos por la institución. El objetivo de este trabajo es evaluar el flujo del actual proceso de administración financiera de los proyectos del Consejo Nacional de Ciencia y Tecnología (CONACYT) para proponer una reingeniería de los procesos. Se aplicó la técnica de observación directa y encuesta para obtener de los usuarios la perspectiva del proceso administrativo e identificar puntos críticos de conflicto. Se aplicó el estudio de tiempos y movimientos propuesto por Tejada *et al.* (2017), herramienta que determina los tiempos estándar de las operaciones que conforman un proceso; y los movimientos de las personas involucradas en la realización de dicha operación. Con la aplicación de este método se logró: minimizar el tiempo requerido en cada paso y los costos, proporcionar un proceso confiable y de alta calidad, eliminar los pasos ineficientes y acelerar los eficientes.

Proyectos, Universidades, Tesorerías

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1. Introduction

Today, most educational institutions seek continuous improvement with the purpose of achieving the quality required by their various processes; The educational system is immersed in a society of constant transformation that continually pressures new demands to which it must have a response. Educational organizations cannot distance themselves from what is happening around them, they must anticipate by analyzing the needs that are required inside and outside them to achieve excellence. It is necessary for educational institutions to develop capabilities, structures and systems that allow them to be more adaptable and competent to respond to the numerous demands that society asks of them. One of the important areas of opportunity for the improvement of processes is that generated by long or clumsy cumbersome procedures that sometimes stop the fulfillment of obligations that have to be carried out with third parties, thereby creating an undesirable image of said organizations.

The excess of procedures often causes the commitments acquired by the institution towards the financing sources to not be fulfilled, thereby causing the lack of opportunity in subsequent years to compete for new projects before the institutions that grant financing sources, since that the institution creates an image of non-compliance.

Taking what was described above as a starting point, it is important to point out the need to have quality processes in all the operations carried out by our Educational Universities, and mainly in the financial administration of the projects financed by CONACYT, who are in charge of the Directorates of the Treasuries in the Financial Projects departments, with areas of opportunity.

1.1 Reengineering

The modifications in the functions of the different areas of the institution, as well as the requirements defined in the various regulations of external funds that are managed in the treasury departments and specifically those applicable to special projects such as those of CONACYT, require a process reengineering in the same that in our case we will delimit the administrative department of the financial projects.

Process reengineering, also known as Business Process Reengineering (BPR), consists of the radical redesign of processes with the aim of achieving better results in terms of costs, quality, service and speed (Hammer and Champy, 1994). It has been recognized that information technologies facilitate the redesign of processes in organizations (Davenport, 1993), since they greatly streamline the activities that are covered in the different functions of an organic structure, such is the case of the function financial and, within this, the functions of the treasury (Kroll, 2006) (Hernández, 2013).

According to Hammer and Stanton (1997), process reengineering is characterized by the need to take into account the rules on which the management carried out in a company or organization is based; it also means that existing processes must be discarded and new ones started., with the clear objective of tangibly increasing performance, concentrating on the processes that are carried out and not on the functions defined in the organic structure (Hernández, 2013).

The process methodology helps organizations achieve benefits that become excellent results in their value chain derived from better processes, improving their governance and productivity, as well as the quality of services and products they provide to society (Guerrero, 2011).

The benefits that society obtains by using a systematic procedure for the continuous improvement of its processes are (Guerrero, 2011, p.2):

– **More effective leadership**
– Better management visibility through critical process controls.
– Strengthening in process stages.

– **Progress of results through application of improved processes**
– Improvement priorities defined based on business objectives.
– Optimization of efficiency of critical processes.
– Measurement of results and improvement of process performance.

– **Project management of the improvement initiative**
– Development of improvement strategy for short, medium and long term.
– Improvement management as a true project, critical for the institution.
– Emphasis on cultural change and strengthening critical success factors.

1.2 Treasury

According to Atencio (2015), the Treasury is constituted as a strategic unit that must manage the financial resources of an organization effectively and efficiently. Likewise, Robles (2012) states that the treasury is the area where the monetary resource is managed and must include collection, management of bank deposits, execution of payments to suppliers, to creditors; must maximize wealth and reduce the risk of a crisis; In such a way that, the primary function is to have sufficient monetary resources to arrange and carry out operations in accordance with the activity of the organization.

Currently, society is constantly changing so changes and challenges must be faced responsibly. The factors and situations that the treasurer must face are: a) Volatility of interest and inflation rates, b) volatility of exchange rates, c) tax reforms, d) problems in obtaining external funds, e) high speculation, f) advancement of information technology, among others; Given this, Atencio (2015) suggests the implementation of strategies that serve as a basis to predict or mitigate the impact of changes in institutions.

The treasurer must be proactive, he must predict the changes and variations that the environments experience (Atencio, 2015); You must also make the decisions to use the best management tools; such as the timing of monetary flows of payments and collections; manage control over bank inflows and outflows, manage the organization's liquidity, establish contact with banking institutions and other agencies and must calculate the financial risk produced by variations in exchange and interest rates (Santos, 2005). All of the above with the objective of meeting the goals established by the institution. To effectively achieve planning and control of resources, the treasury must have the support of the entire organization, in this way the treasurer is the one who must ensure compliance with the goals.

And for this there must be timely and adequate planning of the company's financial policies and a connection between the treasury and the rest of the departments of the organization (Atencio, 2015: pp.557, 558).

1.3 Continuous improvement of management processes

Nowadays, universities are subject to processes of change and transformation in the face of the challenges posed by the so-called knowledge society, which grants them a central social role in the production, preservation and transfer of knowledge. These are increasingly revealed as a strategic component in the construction of a society where learning, the creativity of education and culture, given the value of knowledge, are key elements to achieve sustainable economic and social development (Esquivel, León and Castellanos, 2017: p.57).

The excellence of university institutions must be achieved through a process of continuous improvement in all fields: staff capabilities, efficiency of equipment and facilities, relationships with the sector and between members of the organization and with society. This is possible from the management of knowledge of university processes, to fulfill the mission and achieve the institutional vision and the academic process in question, as well as directing efforts to the needs and expectations of the students. This entails a continuous dynamic of study, analysis, experiences and solutions, which implies a process of continuous quality improvement (Esquivel et al., 2017: p.58). Therefore, the continuous improvement of the knowledge management process of university processes promotes social recognition of the results that the university generates; and constitutes a way to enhance not only institutional but also local development, by responding from its own development to the university social mandate, based on the demands that society generates (Esquivel et al., 2017: p.58).

1.4 Reengineering in processes

Processes are currently considered of utmost operational and structural importance in most organizations. This perception results after organizations go through internal limitations when carrying out their operations and even when implementing solutions to the needs of each moment.

When the organization is functional, the grouping of activities can give a feeling of control and generate high levels of effectiveness in the specialized operations handled by each function, however, it always results in a reduction in the overall effectiveness of the company and of limited and fluid communication between the different functions. When the processes in the organization are clear and defined, it can operate in a matrix manner, optimizing existing human capabilities, in an integrated and appropriate manner for each new project or activity (Zaratiegui, 1999).

Zaratiegui (1999) defines processes as a series of ordered and logical steps whose purpose is transformation; in the end, programmed results are obtained that must be delivered to clients.

Process reengineering involves a radical change in the way the company operates. It can be defined as the radical reconsideration or reinvention, from its foundations, of the organization's processes to achieve goals with spectacular results in terms of performance. cost, quality, service and speed. (Rafoso and Artiles, 2011).

According to Rafoso and Artles (2011) cited in Hammer and Champy (1994), the method can be introduced in theory process by process, but it involves profound changes in mentality, so in practice entire blocks of related processes, or all of them, are changed. basic processes of a business unit, or directly all the key processes of the company (Rafoso and Artiles, 2011).

Reengineering, when successful, produces a qualitative leap equivalent to several years of continuous progress and sometimes goes beyond what would be achieved with progressive improvement methods.

This implies risks, which must be compensated by the benefits to be obtained, so it is mandatory that reengineering projects (like all change projects for company management, on the other hand) are driven by market requirements, so customers, who are no longer satisfied with the similar characteristics offered by the range of competitors, without attractive initiatives (Rafoso and Artiles, 2011).

Methodology

Here data or components were collected on the different processes carried out in the financial administration of the projects financed by the CONACYT projects in some Universities, which allowed an analysis and measurement of these. This study was divided into two phases, in the first a structured closed-type questionnaire was applied on the current administrative process of CONACYT projects, while in the second to the proposed administrative process.

2.1 Intervention proposal

Once we have observed the process that is currently being carried out, it is easy to notice the large number of control moments or filters implemented between the different areas, departments or people involved in it, coupled with the fact that, in strategic areas of the process, the personnel who attend to projects financed by external funds in some Universities of Campeche. Table 1 presents the problems identified in each step or function.

Step or function	Problem
Administrative procedures and documents.	There are too many filters between the units responsible for meeting commitments with funding sources.
Delay in Bank reconciliations.	The aforementioned information is not available; When required, there are always delays, resulting in failure to comply in a timely manner according to the dates established in the delivery of financial reports.
Lack of personnel to issue checks.	By having a single person responsible for preparing all checks and bank transfers from Educational Institutions, there are delays and therefore non-compliance with the commitments made with institutions, researchers, suppliers, etc.
Obsolete equipment.	The equipment that the project area has in some Universities is obsolete. This means that there is no capacity to install programs on the computers necessary to carry out and expedite the delivery of financial reports.
Lack of motivation to staff.	The staff must be comfortable with the work they carry out, so it is necessary that the staff of every institution be motivated in terms of promotions, salary increases and impartiality by the General Management.
Absence of requirements for the implementation of projects.	Many projects are underway without formalization, procedures and/or procedures are incomplete (there is no agreement, breakdowns, etc.).

Table 1 Problem chart
Source: Self-Made

It is also evident that in the different areas in which project control is carried out, the benefit of carrying out adequate financial administration on research projects financed through the CONACYT fund is not known.

2.3 Solution proposal

The solution proposal is to redesign processes that allow obtaining the quality that Universities require; The new processes would be as follows (See Annex 1). When this proposal is implemented, the department will work very closely with the areas responsible for obtaining financing for the projects so that the documents are processed, archived, safeguarded and to be able to manage resources in a more efficient way. Table 2 presents the solution to the identified problems.

Problem	Solution
There are too many filters between the units responsible for meeting commitments with funding sources.	A reduction in filters is proposed in the issuance of administrative procedures and paperwork. Filters in any Institution are important, but in excess they cause delays in the release of resources. To release resources, two filters will be used, starting with a letter from the technical manager to the administrative coordinator of the responsible unit, who will send said request to the project department.
Delay in bank reconciliations. Banking information is not available; When required, there are always delays, resulting in failure to comply in a timely manner according to the dates established in the delivery of financial reports.	Independence of deposits made for projects. It is important to have a certain number of personnel in the Projects department that is sufficient to control the account statements, auxiliaries and reconciliations only of extraordinary income (project resources).
In many Educational Institutions there is only one person responsible for making all checks, electronic transfers, etc. of universities, is faced with the problem of their delay and non-compliance with the commitments made with institutions, researchers, suppliers, etc.	Hiring personnel to carry out checks, electronic transfers, etc. of projects. It is necessary to have sufficient personnel to carry out checks, electronic transfers, etc. of extraordinary resources (projects).
The equipment that the project areas have, which are used to deliver financial reports, are obsolete.	Updated equipment. It is important to have the capacity of the teams according to the workload, which will allow them to comply in a timely manner with the financial reports and the tasks to be carried out by each of them.
Many projects are underway without formalization, procedures and/or procedures are incomplete (there is no agreement, breakdowns, etc.).	It is urgent to hold meetings with the technical managers before carrying out the preliminary draft of their investigations, since in many cases they are not aware of the administrative process they have to carry out.

Table 2 Solutions Chart
Source: Self-Made

Results

The issue related to the financial administration of CONACYT projects managed by educational universities has been highly debated in recent times. We know that CONACYT is an institution dedicated to the financing of science, technology and innovation in Mexico, so educational institutions play a primary role in the progress and execution of research projects.

Therefore, it must be emphasized that the administration of CONACYT projects by educational universities involves a series of responsibilities and challenges that must be carried out in an effective way to guarantee the success of the project. One of the main challenges that universities face is financial management, since they must ensure that the funds granted by CONACYT are managed appropriately and efficiently to meet the project objectives.

Based on this research, it was possible to evaluate the situation in which the Universities were in the area of treasury projects and identify their areas of opportunity, since the results obtained support the need to implement an improvement process in most of its administrative areas.

There are many authors who describe the importance of implementing and innovating processes, such as Juan Luis Blat (2014) in which he points out in his work how to improve efficiency in the treasury department; since they are subject to adjustments in their structures in different periods of time, the administrative-financial departments and in particular the treasury departments that are not immune to this circumstance. However, it is important to mention that this requires that treasuries consider financial resources in their annual planning or budget to counteract those risks that are constantly found in the environment of any organization.

On many occasions, the educational institution assumes that it has the liquidity and solvency capacity to meet more immediate obligations, when this is truly not the case, which is why it is necessary for universities to carry out financial strategies that allow them to truly know what their financial situation is. from the same.

López *et al* 2015, points out how quality, evaluation, accreditation and management are integrated to achieve continuous improvement in higher education. It is important to emphasize that to achieve the aforementioned, there must be a constant in the application of the processes by each university, as well as the participation of all those involved proactively.

According to Pérez *et al* 2017, process reengineering offers an enormous advantage for companies. It is worth mentioning that every educational institution requires quality processes that help optimize the times and movements of the activities of every educational institution, considering that public schools are the space where they face challenges such as assuming a constant role of change. and transformation, it is necessary that the administrative processes and filters of educational institutions are carried out in order to achieve said quality, seeking to satisfy the requirements of society. Changing the administration processes of an educational institution to improve them has several implications, since it is a long-term transformation process in which many people who collaborate in the corresponding departments are involved, and this leads to establishing strategies to achieve or improve efficiency in these processes.

Some of the treasuries in the municipality of Campeche need modernization: they do not have up-to-date and online information, they have old processes and they have poorly qualified personnel without technical knowledge in the matter, which means that Senior Management does not have sufficient and real elements for daily intake. According to Cabrera and García, 2007, this is due to globalization and the evolution of new technologies; institutions decide to centralize their treasuries with the purpose of establishing visibility and control.

Changes in the economic environment have caused the financial function, specifically treasury, to be oriented toward performing its function in a very competitive manner, with lower costs, less time and greater quality. This function, which, although it seems only of internal interest to the organization, is currently recognized as a primary element, due to the need to analyze the information it generates, its strategic vision, its integration in all areas of the organization, its support role in decision-making, and its identification as a link or channel uniting the different areas in the organization.

Therefore, the function of the treasury can be understood from two main aspects, internal treasury management, which is related to the department's own activities, and external treasury management, referring to the activities carried out by other departments and that can influence in the financial flows of the organization.

Conclusions

All procedures carried out in the financial projects area or department require reengineering.

It is recommended:

– When the proposal is implemented, the department will work very closely with the areas responsible for obtaining financing for the projects so that the documents are processed, archived and safeguarded, and to be able to manage resources in a more efficient way.

– A meeting must be called in which the project area, the researcher, the area responsible for managing them, as well as the control and surveillance areas such as the Comptroller and Internal Audit, participate, in order to establish the administrative rules of operation for that the project is developed with strict adherence to the current fiscal provisions, as well as the internal regulations of the Educational Institutions.

– Establish a calendar of activities detailing the dates for the presentation of the financial reports of each of the CONACYT projects, in accordance with what is required by the agreements assigned with the financing entities in general, with the purpose of complying with the procedures in a timely manner.

– It is proposed that the deadline for payment procedures will be 3 business days from the date of receipt of the corresponding resource release request.

– The steps for any procedure will be from the Technical Manager to the Administrative Coordinator of his Responsible Unit, who in turn sends it to the project area, here it is received by the Project Director, and this in turn forwards it to the operational manager.

– Payment of checks or electronic transfers will be made only to the beneficiary of these or in the case of companies, to the person authorized to do so. No checks or bank transfer documents, nor policies will be delivered to those responsible for the areas; suppliers and/or beneficiaries will have to go to the financial projects management to collect them.

– Those responsible for the projects will schedule the release of their resources to avoid urgent checks or transfers. The project department will not be responsible for unsolicited checks or bank transfers.

– The verification of the resources must be carried out within a period of no more than 15 business days from their release; this in order to have supporting documentation to support the respective reports.

– The researcher, as well as the administrative areas, will keep track of the balance held by each authorized item in order to prevent overdrawing of their financial ceiling.

– Carry out a reconciliation per project between the balances released by the release of resources by the financial project management and the existing balances in the coordination of their area.

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Annexes

Productivity of management skills in educational institution, in Villahermosa Tabasco

Productividad de las habilidades directivas en institución educativa, en Villahermosa Tabasco

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Abstract

Objectives: Analyze the productivity of the management skills exercised in an educational institution in the city of Villahermosa Tabasco, designing a proposal for improvement. Methodology: To collect information on the productivity of managers' skills. An investigation will be carried out through an instrument (survey). For the research, the Likert scale technique will be used, which will be applied to the collaborators, so that they give their opinion on the productivity of the skills of the managers in the educational institution. Determining how each of the independent variables influences the research variable. Contribution: It will allow managers to make good decisions and design strategies to achieve objectives of the institution.

Productivity, Managers, Education

Resumen

Objetivos: Analizar la productividad de las habilidades directivas que se ejercen en una Institución educativa en la ciudad de Villahermosa Tabasco, diseñando una propuesta de mejora. Metodología: Para el levantamiento de la información sobre la productividad de habilidades de los directivos. Se realizará una investigación a través de un instrumento (encuesta). Para la investigación se utilizará la Técnica de escala de Likert, la cual será aplicada a los colaboradores, para que opinen sobre la productividad de las habilidades de los directivos en la Institución educativa. Determinando cómo influye cada una de las variables independientes sobre la variable de investigación. Contribución: Permitirá a los directivos tomar buenas decisiones y diseñar estrategias para lograr los objetivos de la Institución
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Productividad, Directivos, Educación

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Introduction

Globalisation is social, economic, cultural, cultural, political and technological changes in a common arena called the world economy. Globalisation has created opportunities and threats for governments, businesses and communities and it is the managers in today's world who are called upon to strategically address these challenges (Bartlett and Ghoshal, 1992). Therefore, managers must be prepared for the transformation of their companies into global organisations, therefore, they need to encourage the use and development of new technologies that create economies of scale and allow them to develop systems that respond quickly to new market conditions and cultural characteristics, developing the productivity of their managerial skills.

Leaders are, above all, agents of change, whose skills, knowledge and personal and managerial abilities manage to modify, deliberately and spontaneously, the dynamics of the balance that usually occurs in the interaction between the agents of the organisation (understood as a system), making its structure more flexible and preparing it to face the dizzying changes of the environment, but structurally and radically leading the changes themselves, characterised by increasing levels of uncertainty.

It is important for managers to be aware of and develop management skills in the education sector, as it is vital to be able to cope with the constant changes in the education sector. For this reason, educational institutions are expected to have managers who possess this set of skills in order to perform their functions correctly. The aim of the research is to identify the productivity of managerial skills in the education sector with a focus on quality education.

Research background

Several research studies are considered below, which will serve as background to the research. In Peru, the study by (Moreno and Wong, 2018), observed that managers have weaknesses that affect their own management skills and teaching performance because they are distant with teachers, and show lack of motivation to perform their activities.

Because there is not a good working environment, and there are constant variations in the stability of the staff, because they work under pressure, they do not do it by vocation but by necessity. It is observed that in the administrative part that the managers do not make decisions with a view to progress, and pay more attention to the quality of education, which reflects that there is poor administrative management by the managers to efficiently fulfil the functions of an institution.

Chen and Sriphon (2021), whose study aimed to investigate the impact of COVID-19 on leadership in organisations based on trust, community relations and social exchange relationships. The research employed correlation analysis to explore the interrelationships between variables. The 220 samples collected were from basic, middle and senior management. The findings show that COVID-19 affected organisational leadership. Concluding that managers need good communication skills to share true information with empathy and optimism and must be reflective and able to manage change in uncertain situations in an ethical manner.

Problem statement

The managers of the educational institution under study, face serious drawbacks in the fulfilment of their functions, as they focus their work on administrative aspects related to unproductive work meetings, leaving aside communication with teachers, and therefore there are weaknesses in terms of monitoring teacher performance. It is necessary to develop management skills and thus promote teamwork with all members of the institution, i.e., it is required that the manager promotes assertive communication, encourages the development of personal, intrapersonal and group skills that favour an environment conducive to teamwork. This would contribute to the good performance of teachers and thus favour the development of learning in the students of the educational institution. Management skills and performance are linked to the use of digital tools and their application in teaching and learning.

Justification

The development of managers' skills is one of the activities of personnel management, it is part of the personnel development used in the management process.

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Therefore, the development of personal and professional skills of managers in the educational institution should be related to the development of the organisation's staff. Personal skills of managers are reflected in the ability to adapt, self-analysis, high level of energy, striving for leadership, striving for knowledge, positive attitude, proper assessment of the environment, etc. Observing the behaviour of people who can be exemplary bearers of the competences to be developed. It is therefore important to carry out the project in order to improve the productivity of the management skills of those who run this educational institution.

Interpersonal skills are the skills that comprise the interaction with others, the manager must provide support, motivation and negotiate problems, promoting collaboration, trying to reduce obstacles (such as conflicts, disagreements, etc.) Interpersonal skills are of great help when it comes to dealing with the human resources aspect. The manager needs to get along well with others, as well as effective communication networks that enhance human skills, including the development of communication skills. This skill is good for team building and staff motivation, for work to be coordinated and tasks to be shared in any institution, members must have a harmonious relationship.

Managers need good communication skills to share truthful information with empathy and optimism; they must be reflective and able to handle change in uncertain situations in an ethical manner. Another interpersonal skill is trust, important for organisations, involves empowering people to believe in each other. Therefore, interpersonal trust can be described as an individual's confidence and willingness to believe the words, actions and decisions of others (Chen y Sriphon 2021).

Hypothesis

The variables; economic, political, social, cultural, technological and environmental influence on the productivity of management skills in the Educational Institution in Villahermosa Tabasco.

Identification of variables

Research variable or Dependent: productivity of management skills.

Independent variables: Economic, political, social, cultural, technological and environmental.

Contextual framework

International context: Ramirez-Rojas (2018), in his article "Managerial skills as a condition for effective execution", currently, several experts worldwide highlight the importance of the Development of managerial, interpersonal and group skills as a condition for obtaining results and successful executions, in business organisations, an aspect that definitely has an impact on the profitability and permanence of companies. Given the importance of managerial skills for top management, this article addresses from a theoretical point of view their importance in the business context and how they should be applied in the execution of the business.

Nowadays, management skills have become differentiating factors for effectiveness and execution in any business sector and management position, which is why personal work is necessary to develop them. The "top management of the company is responsible for leading and guiding all employees to achieve the strategic objectives that lead to the success of the organisation"; but, reaching this execution is not an easy task, despite the fact that whoever is in charge as a director has to find solutions to problems, through analysis and decision making. In this scenario, if a manager does not have sufficient skills to deal with various situations, he or she will not be able to achieve the desired goals". (Bonifaz, 2012:3).

The importance of managerial skills lies in the fact that they determine the job performance of managers. As a result of changes in the structures of globalised companies and the rapid technological development in communications and transport, new company and managerial concepts with distinctive skills that are difficult to copy are required today. It is therefore concluded that Vigorous Leadership, decision making based on rational, but also intuitive aspects, and the development of collaborative work are required, otherwise it will be difficult to execute and achieve profitable results in organisations. Knowing how to do implies the development of managerial skills in order to bring the organisation to a successful conclusion.

From this reflection, the work to be undertaken requires the Development of Management Skills to impact, infuse and create a multiplying effect on all those it manages. Managers of companies and institutions require first to have the right approach to observe the target and set actions to get there.

National Context

García Andrade et al. (2016), in their Study of managerial skills in the performance of a customs corporation, from the Universidad Veracruzana, comments that in this study of applying the MOSS test the following was observed: in the area of "supervisory skills" the majority of managers obtained lower middle dx with 44 %, followed by a middle dx with 33 %, while with the lowest frequency of 11 % the upper middle and upper dx were present.

On the other hand, in the "decision-making ability in human relations" the dx with the highest frequency of 56 % was the lower middle dx, followed by a middle dx with 33 % and finally an upper middle dx with 11 %. In the item "ability to evaluate interpersonal problems" its dx was medium superior, with a percentage of 33 %, the superior and very superior dx showed 22 % while the medium and medium-lower diagnoses were presented with 11 % of frequency respectively. In the area of "ability to establish interpersonal relationships" the majority of managers showed medium dx (44 %), followed by lower middle and upper middle dx with 22 % respectively, finally the diagnosis with the lowest frequency was very superior (11 %). Within the area of "common sense and tact in interpersonal relations", 44 % of managers had medium dx, 33 % had lower dx, 11 % had lower middle dx and another 11 % had higher dx.

Finally, the overall score obtained by the managers was medium dx with 56 %, which was the highest. According to the results obtained in the application of the MOSS test, the situational personality questionnaire (CPS) and the performance evaluation carried out by the customs agency in Mexico to operations managers, it was observed that the significant human managerial skills with adequate development that operations managers possess are: emotional stability, self-confidence, sociability, social adjustment, social intelligence, tolerance, leadership and ability to evaluate interpersonal problems.

Theoretical framework: Theoretical aspects on which each of the research variables are based are considered. Such as the research variable: Productivity of managerial skills and the independent variables: Economic, political, social, cultural, technological and environmental.

According to Whetten (2011): "Managerial skills form the vehicle by which management strategy and practices, tools, techniques, personality attributes and style work to produce effective results in organisations. They are the means by which managers translate their own style, strategy and tools into practice". According to the Universidad Privada del Norte (UPN, 2021), managerial skills are all those competencies necessary to be able to manage work teams. Every leader needs to add value not only at a personal level, but also at a team level, and therefore requires aptitudes to achieve success; and at the same time a set of skills that allow him/her to interact effectively.

Managers in the 21st century face challenges that require them to be at the forefront of the globalisation of technological advances, which is why they must have skills that enable them to overcome the challenges posed by the environment in which they operate. And this not only in private management, but also in public management, bearing in mind that the modern executive begins with an intrapersonal outlook that allows him/her to successfully develop his/her professional and personal life. (Chiavenato, I., 2007), describes management skills as management skills and points out that they are the set of skills and knowledge that a person possesses to carry out leadership and coordination activities in the role of manager of an organisation.

Madrigal (2009) considers that the skills that a manager must master in the first instance are: communication, knowing how to make decisions and being aware of the risk that each one entails, having the creativity to innovate, improvise and plan, being a leader in each project or programme that he undertakes, knowing how to manage his time and that of his staff, working as part of a team and being assertive. Along the same lines, Bateman and Snell (1999) develop a similar model by establishing that technical, conceptual or decision-making and interpersonal or communication skills are the cornerstones of managerial performance.

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They also argue that skills are particular capabilities resulting from knowledge, information, practice and aptitude.

Drucker (1978) then defines managerial skills as leadership, vision, people skills and image, innovation and teamwork, which are necessary for successful management, regardless of the size and purpose of the organisation. The aim is to ensure that these skills are developed and strengthened, allowing managers to advance their work with greater certainty, through action plans that allow for personal growth and expansion.

Once the opinions of different authors' points of view have been commented on. The researcher considers that in managerial skills, it is important communication between each of the members of the Educational institution, Leadership, as well as their attitude, that they can integrate to work as a team together with their collaborators supporting them to strengthen their values to improve the organisational climate of the educational institution.

Methodology

This research is considered firstly descriptive and then correlational. Since the study variables will be measured first descriptively and then in a correlational way, because it will be determined how the independent variables influence or affect the research variable (Productivity of managerial skills).

It is considered a non-experimental research because the independent variables: Economic, political, social, cultural, technological and environmental have already occurred at a given time and cannot be manipulated by the researcher because they already happened as well as their effects. It is considered a trans-sectional or cross-sectional design because data are collected at a single point in time. This allows conclusions to be drawn from a sample that is drawn from a population. Table 1 shows the population and sample. The sample is determined with a confidence level of 95% and a margin of error of 5% (Krejcie, R.V. & Morgan, D.W. 1970).

	Directors	Partners	Total
Population	10	110	120
Sample	10	86	96

Table 1 Population and sample
Source: Own Elaboration.2022

A meeting was held with the 10 managers of the institution, where the Brainstorming Technique was applied. To allow the managers to give their opinion on the statements that should be considered in each of the variables of the instrument that was applied by their collaborators.

The instrument (survey) was designed using the Likert scale, which is shown in Table 2 below. This instrument was applied to the 86 collaborators of the educational institution.

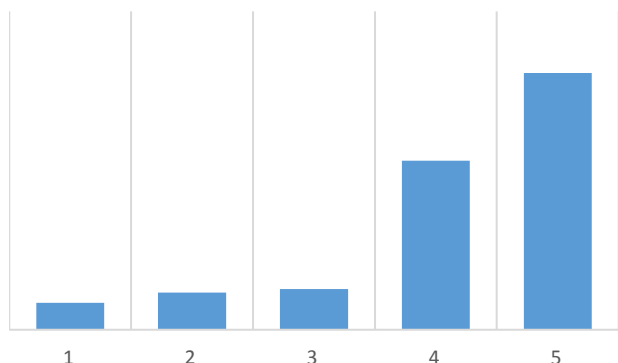| No.		5	4	3	2	1
Economic variable						
1	He is interested in the productivity of his employees					
2	Has helped to increase productivity rates in my department.					
3	Involves the members of the group in the planning of the activities carried out in the department.					
Political variable						
4	Encourages higher levels of performance at work					
5	Clearly communicates organisational policies to employees					
6	Gives employees the opportunity to contribute to the establishment of objectives.					
Social variable						
7	Trusts employees to perform their tasks in a motivating manner					
8	takes time to talk informally with members of the organisation about their ideas and goals					
9	Shows interest in his people					
Cultural variable						
10	Motivates employees to participate in institutional programmes					
11	Shows interest in the work I am doing					
12	Encourages teamwork					
Management skills variable						
13	Encourages interdepartmental communication					
14	Your staff share ideas and work together to get tasks accomplished					
15	Allows staff to participate in decision making					
Technological variable						
16	Allows employees to learn about new technologies					
17	Demonstrates willingness to accept responsibility for technological innovation					
18	Clearly communicates technology development strategies to employees					
Environmental variable						
19	Leads the staff to a friendly working environment and a friendly working pace					
20	Provides a pleasant working environment					

Table 2 Instrument applied to managers
Source: Own Elaboration 2022

Results

The following graphs show only some of the instrument applied to managers, of the graphs of frequency distributions of the independent variables (The variables; economic, political, social, cultural, technological and environmental) and of the research variable (Productivity of managerial skills). This is the result of the application of the instrument applied to the collaborators.

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The frequency distributions of the economic variable are presented, where the variable is measured descriptively. Graph 1 shows
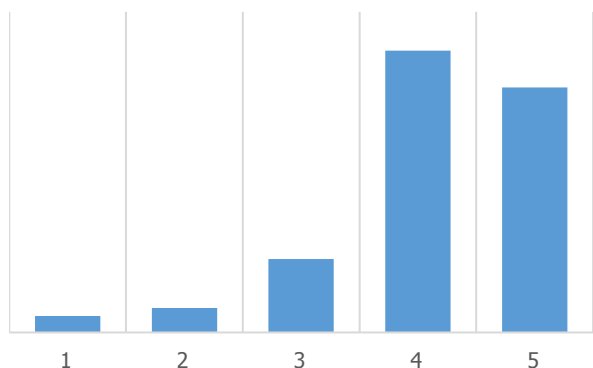
Question 1. Is interested in the productivity of its collaborators.

Graph 1 Descriptive Variable
Economic Variable
Source: Own Elaboration 2022

48% of the employees think that they completely agree that the managers are interested in their productivity.

Question 2. It has helped to increase the productivity indexes in my department.

Graph 2 Descriptive Variable
Economic variable
Source: Own Elaboration 2022

44 % of the collaborators comment that they agree that the managers favour an increase in the productivity indexes of the educational institution.

In question 3. Involves the members of the group in the planning of the activities that are carried out in the department. 52% of the collaborators think that they completely agree that the directors support them in their activities.
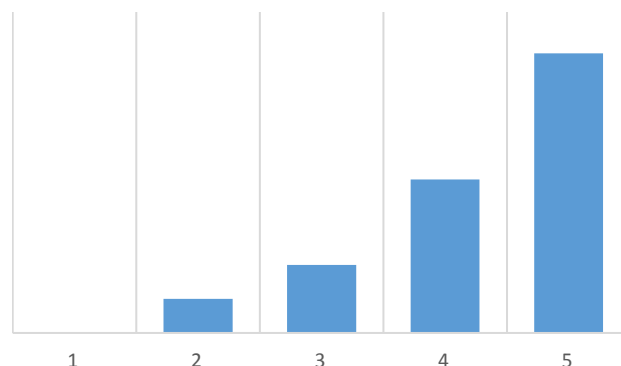
Graph 3 Descriptive Variable
Economic Variable
Source: Own Elaboration 2022

The dependent research variable (Productivity of managerial skills) is shown below.
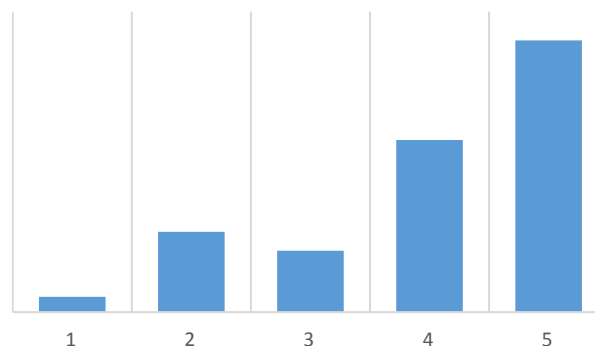
Question 3. Favours interdepartmental communication.
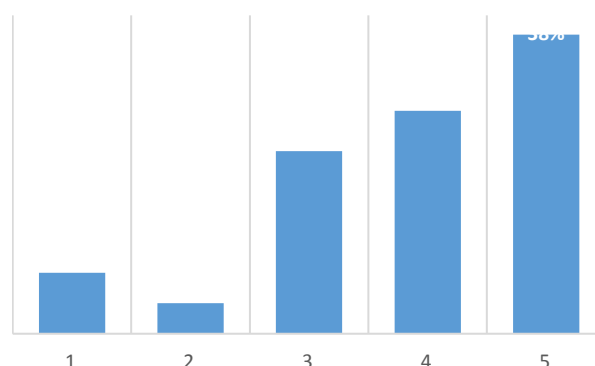
Graph 4 Descriptive Variable
Management skills variable
Source: *Own Elaboration 2022*

Graph 4 shows that 38% of employees completely agree that managers encourage interdepartmental communication.

Question 4. Their collaborators share ideas and work together to achieve that tasks are fulfilled.

Graph 5 Descriptive Variable
Management skills variable
Source: Own Elaboration 2022

This graph 5 shows that 45% of the employees completely agree that the managers share their ideas with them in order for them to be able to fulfil their tasks.

Question 5. Allowing staff to participate in decision-making
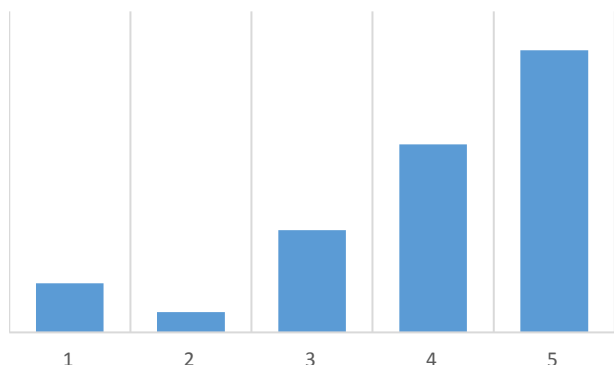
Graph 6 Descriptive Variable Management skills variable
Source: Own Elaboration 2022

In this graph, 44% of the employees completely agree that the managers allow themselves to participate in decision-making.

In the political variable, 46% of employees think that managers clearly communicate the organisation's policies to them. On the Social variable, 48% of employees think that managers take the time to talk informally with them about their ideas and objectives.

On the cultural variable, 61% of employees completely agree that managers encourage teamwork.

And on the technology variable, 28% of the employees completely agree that managers communicate clearly with them about technology development strategies. While 45% agree.

In relation to the environmental variable, 64% of the employees completely agree that the managers provide a pleasant working environment, once the contributions of each of the variables have been determined, 52% of the employees completely agree that the managers develop criteria that support the productivity of their managerial skills.

It is therefore important to determine the means or averages of the frequency distribution tables (Table 3).

Variable	Average
Economic variable	4.74
Political variable	4.15
Social variable	4.53
Cultural variable	4.85
Managerial skills variable.	4.50
Technological variable	4.84
Environmental variable	4.79

Tabla 3 Averages
Source: Own Elaboration 2022

Conclusions

In the results it can be seen that each of the independent variables influences the research variable, so that the hypothesis is proved. However, it can be observed that the employees think that the variable that has the greatest influence is the cultural variable on the productivity of management skills, followed by the technological and environmental variables.

Recommendations

It is suggested that in a future research an instrument for self-evaluation of the manager in the educational institution should be designed, so that a comparative analysis can be made between the opinion of the employees and the managers.

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Initial evaluation exercise of a Higher Education Unit: In response to the guidelines of a National System

Ejercicio de evaluación inicial de una dependencia de Educación Superior: En respuesta a los lineamientos de un Sistema Nacional

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Abstract

This article addresses the importance of assessment and accreditation in higher education, highlighting its crucial role in ensuring quality and relevance. It focuses on the methodology used in a specific analysis of a Higher Education Unit in Northern Mexico, to evaluate academic programs through the requirements posed by the National System of Evaluation and Accreditation of Higher Education in terms of social responsibility, equity. . , inclusion, excellence, social innovation, avant-garde and interculturality. The results reveal strengths and areas for improvement, especially in aspects such as social equity and inclusion. The analysis concludes by highlighting the need for evaluation and accreditation to not be mere bureaucratic requirements, but rather dynamic processes that drive the constant evolution of higher education at a global level.

Evaluation, Accreditation, Criteria, Education, Improvement, Academic Programs

Resumen

Este artículo aborda la importancia de la evaluación y acreditación en la educación superior, destacando su papel crucial en la garantía de calidad y relevancia. Se enfoca en la metodología utilizada en un análisis específico de una Dependencia de Educación Superior del Norte de México, para evaluar programas académicos a través de los requerimientos que plantea el Sistema Nacional de Evaluación y Acreditación de la Educación Superior en términos de responsabilidad social, equidad, inclusión, excelencia, innovación social, vanguardia e interculturalidad. Los resultados revelan puntos fuertes y áreas de mejora, especialmente en aspectos como equidad social e inclusión. El análisis concluye destacando la necesidad de que la evaluación y acreditación no sean meros requisitos burocráticos, sino procesos dinámicos que impulsen la evolución constante de la educación superior a nivel global.

Evaluación, Acreditación, Criterios, Educación, Mejora, Programas Academicos

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† Researcher contributing as first author.

Introduction

Higher education, as a fundamental axis in the training of professionals and social progress, faces great challenges on the one hand to guarantee academic excellence in a demanding society that demands increasingly competent professionals who will have to face a globalised environment with educational programmes that must respond day by day to the needs of today's world, coupled with a strong educational demand. This article arises from the reflection of what the evaluation of higher education implies as a means of transformation and thus achieve continuous improvement, to enhance the construction of institutional environments that according to the General Framework of the System of Evaluation and Accreditation of Higher Education, (2022) prevail trust, shared visions, communities of practice and learning, recognition of good practices and innovation especially self-evaluation processes that are aimed at the transformation of the National System of Higher Education in Mexico. in a XXI century that demands innovation and relevance.

The purpose of this work arises from the guidelines established by the Mexican National System for the Evaluation and Accreditation of Higher Education (SEAES), carrying out an initial self-evaluation exercise in a Higher Education Unit that can be used in the future as a guide to serve as an input to respond to these guidelines.

This exercise was carried out in a Higher Education Institution in the North of Mexico, called Universidad Autónoma De Nuevo León (UANL), applied within the Faculty of Mechanical and Electrical Engineering (FIME).

Background

Evaluation and accreditation in higher education have their historical roots in the need to establish quality standards in academic institutions. As Raza, D. F. (2019) points out, "Evaluation and accreditation processes originated in the early 20th century in the United States and Europe, with the purpose of ensuring the quality and relevance of higher education". These processes have developed and diversified over time to address the changing demands and expectations of society.

The emergence of evaluation and accreditation in higher education was strongly influenced by a number of issues and challenges facing academic institutions. According to Raza, (2019), "The expansion of higher education, diversification of programmes, lack of transparency and variability in the quality of teaching were factors that led to the need for the establishment of assessment and accreditation systems". Concerns for equity and accountability also played a crucial role in promoting these processes.

Evaluation and accreditation in higher education play a key role in improving the quality of education. According to Suárez-Landazábal (2023), "Assessment and accreditation promote continuous improvement by providing valuable feedback for academic programme development and institutional decision-making. These processes are essential to ensure that institutions meet quality standards and adapt to the changing needs of students and society at large".

Evaluation is a process of comparing and benchmarking higher education achievements, outcomes, aspirations, objectives and goals. General Framework of the Higher Education Evaluation and Accreditation System, (2023).

According to the General Law on Higher Education (LGES), Article 10, section XII considers higher education evaluation as an "integral, systematic and participative process for its continuous improvement, based, among other aspects, on diagnostic, programme and institutional management evaluations".

According to Torres, (2023). The main objective of evaluation is to encourage and promote the continuous improvement of the overall quality of an academic institution.

Methodology

The methodology used in this analysis is descriptive, focusing on the specific case of FIME. The implementation of the criteria table is the central focus. This approach allows for a detailed evaluation of analytical programmes in terms of criteria provided by the SEAES.

In addition, quantitative and qualitative techniques are included to capture the complexity of curriculum evaluation and accreditation. This multi-modal approach ensures a holistic understanding of the results and allows for a deeper interpretation of the observed trends.

Development

FIME, aware of contemporary challenges, led the initiative of curriculum innovation. Its SEAES criteria grid is not simply an evaluation tool; it is a tangible manifestation of the institution's commitment to social responsibility, equity, innovation and cutting edge. This pioneering approach seeks not only to meet external standards, but also to forge a path towards higher education that transcends conventional expectations.

Assessment is not an end in itself; it is a means for continuous improvement. The promulgation of SEAES standards seeks not just superficial compliance, but a deep commitment to educational transformation. Figure 1, in pointing to the need for analytical programmes in all universities, not only advocates administrative uniformity, but a collective commitment to educational excellence.
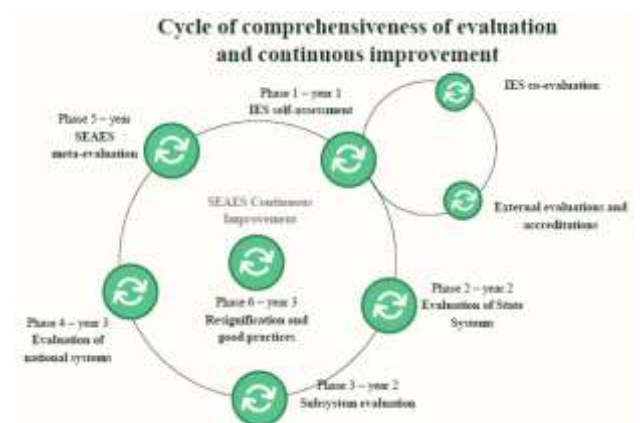

Figure 1 Necessary Requirements for Quality Assessment. General Framework of the Higher Education Evaluation and Accreditation System

Continuous improvement and curriculum evaluation are closely intertwined in education. The dynamics of continuous improvement are reflected in the constant evaluation of curricular approaches and practices. This process involves making repeated decisions, comparing results with expectations and goals, and adapting strategies to align with quality standards and the changing needs of society.

Closely related to the above, Curriculum Evaluation refers to the linking components in a system; it aims at adapting and being flexible in the areas and types of evaluation related to continuous improvement, clarifying the objects and referents of evaluation in terms that are correct and interrelated with the Transversal Criteria indicated to us by the SEAES.

For this reason, the present work points out the need to respond to the aforementioned requirements, visualising a second stage in the future within the Curricular Evaluation, where the results obtained in this evaluation are reflected and compared.

The cycle of Integral Evaluation and Continuous Improvement, proposed by SEAES, ranging from self-evaluation to external and internal evaluations, co-evaluation, evaluation of state systems and sub-systems, and the re-signification of good practices, constitutes a dynamic and collaborative process that is fundamental in curriculum evaluation. According to Figure 2.

Figure 2 Cycle of comprehensiveness of evaluation and continuous improvement. General Framework of the Higher Education Evaluation and Accreditation System

This holistic approach allows for a comprehensive view of educational practices, identifying areas of improvement and strengths. By integrating internal and external evaluations, as well as feedback from various levels, it creates a robust system that drives educational excellence and ensures the continued relevance of academic programmes to the changing challenges of the educational environment.

In congruence with the LGES, the National Policy for the Evaluation and Accreditation of Higher Education (PNEAES) establishes seven criteria that are considered guiding and transversal, since they are intended to offer a vision of the transformation of the National System of Higher Education (SNES) and cover all areas of evaluation and continuous improvement. General Framework of the Higher Education Evaluation and Accreditation System, (2023).

The following are the guiding criteria in the PNEAES:

– Commitment to social responsibility.
– Social and gender equity.
– Inclusion.
– Excellence.
– Social innovation.
– Avant-garde.
– Interculturality.

Based on the criteria established by the PNEAES, a cross-data analysis of the Analytical Programmes (AP) was elaborated; by learning unit (LU) of the selection of six Postgraduate Educational Programmes offered at FIME (three Masters and three Doctorates).

As an initial step, a spreadsheet software (Excel) was used, in which the AUs were listed vertically and the PNEAES Guiding Criteria horizontally, from which the results described below were obtained.

Results

The results obtained from the exercise indicate that the criteria of excellence and vanguard stand out in the curricular evaluation, while aspects such as social equity and inclusion present areas for improvement. The graphical representation (Graph 1) provides a clear visualisation of the strengths and areas to be strengthened in the academic programmes evaluated.
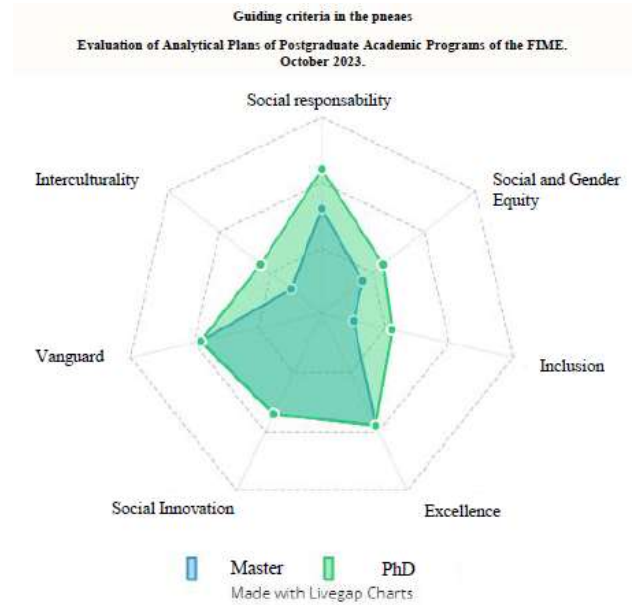
Graph 1 Evaluation of Analytical Plans of Postgraduate Academic Programs of the FIME. 2023
Own Elaboration

On the other hand, the results obtained in the application of the analysis are integrated, making the focal selection of the PNEAES Guiding Criteria. The average number of criteria fulfilled per postgraduate academic programme (Graph 2) offers a global vision of the situation at FIME, highlighting the need for specific focus on certain aspects.
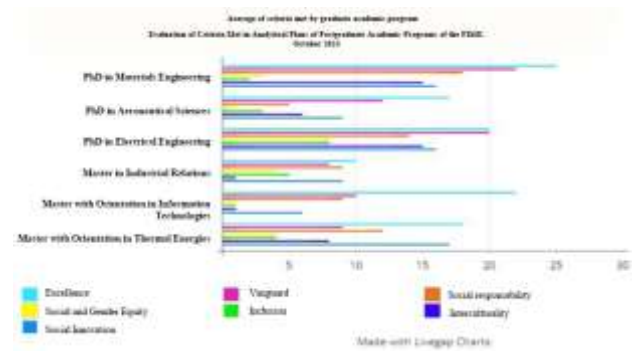
Graph 2 Record of SEASE Criteria met by Postgraduate Academic Program at FIME. October 2023
Own Preparation

In the detailed analysis of the analytical programmes, a diverse and dynamic panorama is revealed. Excellence and avant-garde emerge as the standard, but social equity and inclusion demand more meticulous attention. Figure 1 and Figure 2 are not just visual representations; they are impressions of a process of institutional introspection that triggers essential dialogues on how FIME and other institutions can evolve to address the identified gaps.

As the programmes were reviewed, it became evident that not all had Analytical Programmes, underlining the imperative need for all universities to have these documents in place in order to execute effective quality assessments.

This analysis applied at FIME is a call for reflection at a global level, in a world where education is the foundation of progress, evaluation and accreditation should not be mere bureaucratic requirements, but dynamic processes that drive constant evolution.

The contribution of this analysis is not limited to the boundaries of one institution; it seeks to impact on the context of higher education, acting as an Orientation Guide for other Higher Education Institutions, who will address these requirements by challenging paradigms and fostering an integral educational revolution.

Recommendations

− Maintain a continuous review of academic curricula to adapt to changing demands.
− Comprehensively address aspects of social equity and inclusion, maintaining levels of occurrence in the criteria of interculturality, social responsibility, vanguard and excellence.
− Fully include SEAES criteria in evaluation processes.
− Promote ongoing conversations at institutional level based on the results to collectively reflect on identified areas for improvement.
− Ensure that all academic programmes have curricular analyses, which are fundamental for quality assessment.

Conclusions

In conclusion, curricular evaluation and accreditation are essential elements for ensuring quality education in higher education. The regularity of these processes is a fundamental pillar for adapting to the changing dynamics of society. The implementation of SEAES standards highlights the importance of commitments such as social responsibility, equity, innovation and vanguard in higher education, leading to a comprehensive and socially responsible training of professionals.

The contribution of this analysis lies not only in the evaluation of FIME, but also in its potential to inform and improve practices nationally and internationally. Curricular evaluation and accreditation are more than institutional protocols; they are the tools that shape the future of higher education. The regularity of these processes is not only necessary; it is the constant heartbeat that drives educational life.

The implementation of SEAES standards is not simply regulatory compliance; it is a commitment to excellence, equity and innovation in higher education.

This analysis does not simply seek to evaluate FIME; it seeks to catalyse a movement of reflection and improvement at a global level, which in the future encourages continuous improvement and, in a second stage, becomes an indispensable tool for the evaluation and satisfaction of the Criteria of the Higher Education Evaluation and Accreditation System itself.

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Teamwork skills in academic events that promote open innovation: A comparative analysis between in-person and virtual formats

Habilidades de trabajo en equipo en eventos académicos que fomentan la innovación abierta: Un análisis comparativo entre formato presencial y virtual

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Abstract

Academic events that promote open innovation, within the training of engineers, allow knowledge to be obtained and developed in certain areas, but also promote the development of competencies and skills in the participants. In this research, the teamwork skills they develop within two academic events, in person and virtually, with similar characteristics, were evaluated with the aim of comparing how much they take advantage of the ability to work as a team. A methodology was used with a descriptive quantitative approach and through the application of evaluation instruments that were designed based on item response theory and classical test theory. This project was applied at the Instituto Tecnológico de Tlalnepantla in the Latin American Innovation Rally event in virtual format and the Hackatec event in-person format in local stages. They participated in each event through multidisciplinary work teams, responding to NGO challenges in a continuous period of 28 hours. Based on the results obtained in a comparative table, the hypothesis that the ability to work as a team is developed in the same way in an academic event in virtual format as in one in person.

Resumen

Los eventos académicos que fomentan la innovación abierta, dentro de la formación del ingeniero permiten obtener y desarrollar el conocimiento en determinadas áreas, pero también impulsan el desarrollo de competencias y habilidades en los participantes. En esta investigación se evaluó la habilidad del trabajo en equipo que desarrollan dentro de dos eventos académicos, de forma presencial y virtual con características similares con el objetivo de comparar que tanto aprovechan la habilidad de trabajar en equipo. Se utilizó una metodología con enfoque cuantitativo descriptivo y por medio de la aplicación de instrumentos de evaluación que se diseñó en base a la teoría de respuestas del item y la teoría clásica de pruebas. Este proyecto se aplicó en el Instituto Tecnológico de Tlalnepantla en el evento Rally latinoamericano de innovación formato virtual y el evento Hackatec formato presencial etapas locales. En cada evento participaron por medio de equipos de trabajo multidisciplinario dando respuesta a desafíos de ONG en un lapso de 28 horas continua. Con base en los resultados obtenidos en un cuadro comparativo se refutó la hipótesis de que la habilidad de trabajar en equipo se desarrolla de igual manera en un evento académico en formato virtual que en uno de formato presencial.

Teamwork, Multidisciplinary teams, Academic innovation events

Trabajo en equipo, Equipos multidisciplinarios, Eventos académicos de innovación

Introduction

Competence-based education at higher level, specifically in engineering education, is based on identifying and developing specific and generic competences within engineering education, the latter offering students life skills that they can apply in their personal or work environment. Academic events play a very important role in the development of these competences, which is why this research project analyses the use of teamwork skills in academic events, specifically the participation in Hackatec in a face-to-face format and the Latin American Innovation Rally in a virtual format, both in the year 2022. It is important to verify the contrast of these events due to their similarity in work characteristics, in both events challenges are solved in a period of 28 continuous hours of work, the teams that participate.

They must be multidisciplinary and elaborate the solution proposals with an exposition of the team work. In order to carry out this analysis, information was collected by means of evaluation instruments applied to the participants of both events at the Tlalnepantla sites. The information obtained was analysed using SPSS software, where proposals for improvement were identified for future participation in these events.

The methodology applied was the descriptive quantitative one, which answers the research question: What level of success does the ability to work as a team develop in engineering students when participating in academic events in person and virtually? This allows us to fulfil the objective of evaluating the teamwork skills indicator with participants in the Hackatec and Rally Latinoamericano de Innovación academic events at the Tlalnepantla 2022 headquarters, using a form that is analysed with SPSS software, in order to highlight the success of teamwork in each of the events.

Methodology

Delimitation of the problem and research question

The participation in academic events in the past years has reflected the lack of skills that allow them to achieve one of the first places in the finals at national level.

For this reason, this project is carried out to identify the influence of the ability to work in teams in different formats to obtain better results in the participation in academic events. In past years, participation in the Latin American Rally event was a unique case within the institution and on two occasions it managed to reach second place nationally.

In 2022, this new event called Hackatec will be integrated in an on-site format that offers participants experiences similar to the Rally. Given these options, we seek to answer the following question: What level of success does the ability to work as a team develop in engineering students when participating in academic events in different formats (face-to-face and virtual)? The study was carried out with the analysis of data from the events: Latin American Innovation Rally 2022 virtual format and Hackatec 2022 face-to-face format, which allow a comparative table to be drawn up of the participants' achievement in working on the skill of teamwork. Both events have similar characteristics, such as solving challenges in a period of 28 continuous hours and participating in multidisciplinary teams with proposed solutions, but they take place in different formats.

Procedure

The competences and soft skills within engineering education in Mexico are applied in each classroom with the didactic tools that each teacher masters; however, it is very important to consider the options that the institution itself provides to enrich them. This project is based on a descriptive quantitative methodology which, through the collection of data from each of the participants in these events, allows us to reflect on the benefits of working as a team in different formats in order to obtain better results in the competences.

It is important to consider that the data collection was based on the item response theory and classical test theory, identifying a test of mastery calculated by the point biserial coefficient, making it possible to identify the use of an assessment instrument based on the skills that ASIBEI in the engineering graduate profile book (2016) defined as a priority in the training of the engineer.

Article

Subsequently, the data was downloaded to SPSS software where the variables of use were defined to obtain the results to identify the development strategies within the specific objectives of the project.

Hypothesis

The ability to work in teams is developed in the same way in face-to-face events as in virtual events.

Population and sample

In the Rally (event2) and Hackatec (event1) events in 2022 the population size was 53 and 51 participants respectively with a 95% confidence level which consisted of a sample of 47 questionnaires in event2 and in event1 the population size was 50 which consisted of a sample of 45 questionnaires.

This sample was determined by finite sample calculation:

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

Figure 1 Formula determined for the finite sample calculation

Results

Descriptive statistical analyses for both events were first defined for each of the questions. Table 1 Rally (event1) and Table 2 Hackatec (event2)

Table 1 Descriptive analysis by question event 1

Table 2 Descriptive analysis by question event 2

When comparing the results of both events, it can be identified that the trend is reflected in the statement number 3 "almost always", so it is determined that the event in which the ability to work in a team is most developed is in the Hackatec face-to-face format. Also, out of 19 questions, 89.47% of the "almost always" statements were for the Hackatec event. This indicates that the event that requires reinforcement of teamwork skills is the virtual format Rally. In order to identify areas of opportunity in the development of improvement strategies, we considered the frequency of successes in statement number 2 "not very often", where it was important to establish workshops that allowed us to reinforce these actions in order to apply them in the next edition of the Latin American Rally, as well as in Hackatec. Table 3 Comparison of frequency between both events.

Rally			Hackatec		
P_1 Rally	N	%	**P_1 Hackatec**	N	%
Never	1	1.9%	Never	2	3.9%
Bit	12	22.6%	Bit	11	21.6%
Almost always	24	45.3%	Almost always	21	41.2%
Always	16	30.2%	Always	17	33.3%
P_2 Rally	N	%	**P_2 Hackatec**	N	%
Bit	16	30.2%	Bit	15	29.4%
Almost always	29	54.7%	Almost always	28	54.9%
Always	8	15.1%	Always	8	15.7%
P_3 Rally	N	%	**P_3 Hackatec**	N	%
Never	3	5.7%	Never	1	2.0%
Bit	20	37.7%	Bit	16	31.4%
Almost always	17	32.1%	Almost always	20	39.2%
Always	13	24.5%	Always	14	27.5%
P_4 Rally	N	%	**P_4 Hackatec**	N	%
Never	3	5.7%	Never	5	9.8%
Bit	16	30.2%	Bit	14	27.5%
Almost always	24	45.3%	Almost always	21	41.2%
Always	10	18.9%	Always	11	21.6%
P_5 Rally	N	%	**P_5 Hackatec**	N	%
Never	2	3.8%	Never	3	5.9%
Bit	18	34.0%	Bit	14	27.5%
Almost always	24	45.3%	Almost always	19	37.3%
Always	9	17.0%	Always	15	29.4%
P_6 Rally	N	%	**P_6 Hackatec**	N	%
Never	2	3.8%	Never	1	2.0%
Bit	14	26.4%	Bit	10	19.6%
Almost always	26	49.1%	Almost always	28	54.9%
Always	11	20.8%	Always	12	23.5%
P_7 Rally	N	%	**P_7 Hackatec**	N	%
Never	1	1.9%	Never	1	2.0%
Bit	13	24.5%	Bit	14	27.5%
Almost always	23	43.4%	Almost always	20	39.2%
Always	16	30.2%	Always	16	31.4%
P_8 Rally	N	%	**P_8 Hackatec**	N	%
Never	1	1.9%	Never	3	5.9%
Bit	19	35.8%	Bit	7	13.7%
Almost always	19	35.8%	Almost always	29	56.9%
Always	14	26.4%	Always	12	23.5%

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Rally	Hackatec

P_9 Rally

	N	%
Never	3	5.7%
Bit	16	30.2%
Almost always	20	37.7%
Always	14	26.4%

P_9 Hackatec

	N	%
Never	2	3.9%
Bit	13	25.5%
Almost always	24	47.1%
Always	12	23.5%

P_10 Rally

	N	%
Never	6	11.3%
Bit	15	28.3%
Almost always	18	34.0%
Always	14	26.4%

P_10 Hackatec

	N	%
Never	2	3.9%
Bit	15	29.4%
Almost always	22	43.1%
Always	12	23.5%

P_11 Rally

	N	%
Never	1	1.9%
Bit	17	32.1%
Almost always	26	49.1%
Always	9	17.0%

P_11 Hackatec

	N	%
Bit	13	25.5%
Almost always	27	52.9%
Always	11	21.6%

P_12 Rally

	N	%
Never	3	5.7%
Bit	13	24.5%
Almost always	21	39.6%
Always	16	30.2%

P_12 Hackatec

	N	%
Never	1	2.0%
Bit	12	23.5%
Almost always	24	47.1%
Always	14	27.5%

P_13 Rally

	N	%
Never	2	3.8%
Bit	13	24.5%
Almost always	24	45.3%
Always	14	26.4%

P_13 Hackatec

	N	%
Never	1	2.0%
Bit	10	19.6%
Almost always	24	47.1%
Always	16	31.4%

P_14 Rally

	N	%
Never	1	1.9%
Bit	20	37.7%
Almost always	22	41.5%
Always	10	18.9%

P_14 Hackatec

	N	%
Never	2	3.9%
Bit	9	17.6%
Almost always	26	51.0%
Always	14	27.5%

P_15 Rally

	N	%
Never	2	3.8%
Bit	17	32.1%
Almost always	20	37.7%
Always	14	26.4%

P_15 Hackatec

	N	%
Bit	13	25.5%
Almost always	26	51.0%
Always	12	23.5%

P_16 Rally

	N	%
Never	5	9.4%
Bit	12	22.6%
Almost always	21	39.6%
Always	15	28.3%

P_16 Hackatec

	N	%
Never	3	5.9%
Bit	13	25.5%
Almost always	23	45.1%
Always	12	23.5%

P_17 Rally

	N	%
Never	2	3.8%
Bit	14	26.4%
Almost always	23	43.4%
Always	14	26.4%

P_17 Hackatec

	N	%
Never	2	3.9%
Bit	10	19.6%
Almost always	29	56.9%
Always	10	19.6%

P_18 Rally

	N	%
Never	2	3.8%
Bit	17	32.1%
Almost always	22	41.5%
Always	12	22.6%

P_18 Hackatec

	N	%
Never	1	2.0%
Bit	10	19.6%
Almost always	28	54.9%
Always	12	23.5%

P_19 Rally

	N	%
Never	3	5.7%
Bit	11	20.8%
Almost always	28	52.8%
Always	11	20.8%

P_19 Hackatec

	N	%
Never	2	3.9%
Bit	12	23.5%
Almost always	23	45.1%
Always	14	27.5%

Table 3 Frequency analysis per statement per question for both events

The last results are shown in Table 4 where the descriptive statistics for both events were analysed in general

Heckatec Statistics			Rally Statistics		
ID			ID		
N	Valid	51	N	Válido	53
	Lost	0		Lost	0
Half		26.00	Half		27.00
Median		26.00	Median		27.00
Fashion		1ª	Fashion		1ª
Standard Deviation		14.866	Standard Deviation		15.443
Variance		221.000	Variance		238.500
a. There are multiple modes. It shows the smallest value			a. There are multiple modes. The smallest value is displayed.		

Table 4 Descriptive-total analysis of both events

In summary, the results of the statistical analysis of both events indicate that the centre of the distribution is around the values of the means 26 for event1 and 27 for event2, where in both cases the standard deviation and variance are relatively high, suggesting that the individual values vary significantly in relation to the mean indicating a rather dispersed or asymmetric distribution.

Conclusions and decisions

It is important to identify that both events identify similar results with small variations from each other, allowing us to identify that the importance of participating in face-to-face academic events will continue to take a significant advantage over virtual academic events. This also allows us to know that the results obtained within this data analysis reject the hypothesis that both events have the same level of achievement in the ability to work in teams.

Currently, education and the development of competences within the training of students at higher education level is oriented towards diversified learning where, after the pandemic, strategies are being tried to be taken advantage of that in an emerging manner have solved immediate problems, but with which it is still not possible to complement them in their totality for meaningful learning. There are now many ways to make inroads into both formats and with more time to make them fully two hundred per cent effective ways of training future engineers. The work is still part of the updating of both actors, teachers and students, to be able to show better results in academic events with higher competitiveness.

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* Correspondence to Author (example@example.org)
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Text in Times New Roman No.12, single space.

General explanation of the subject and explain why it is important.

What is your added value with respect to other techniques?

Clearly focus each of its features

Clearly explain the problem to be solved and the central hypothesis.

Explanation of sections Article.

Development of headings and subheadings of the article with subsequent numbers

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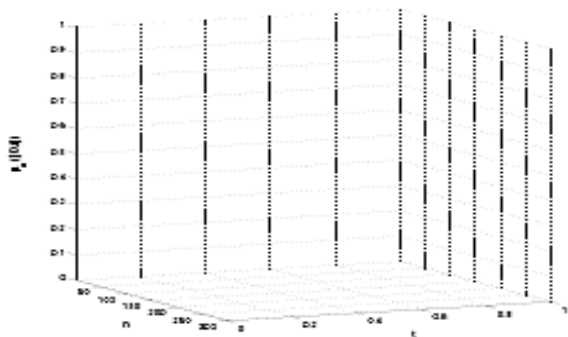
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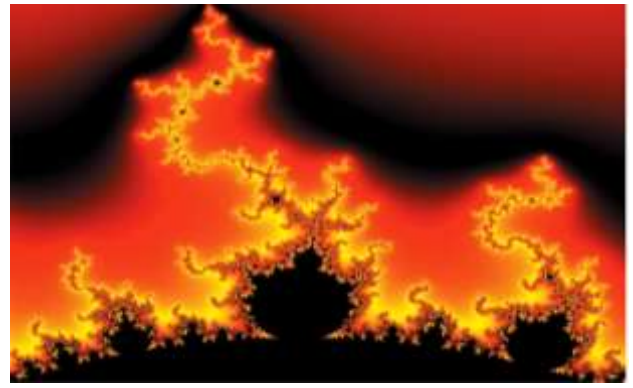
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Develop give the meaning of the variables in linear writing and important is the comparison of the used criteria.

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Explain clearly the results and possibilities of improvement.

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