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SUMARIO • SUMMARY • RESUMO

Editorial

MLS Project Design & Management presents this new issue highlighting, once again, the joint effort of our group of collaborators while emphasizing innovation as a primary tool in the scientific-technological development and its importance through creative, collaborative, and integral work, enabling the broadening knowledge of both people, culture, and society in the design of new projects. This new edition includes different topics presented in 6 articles that have been selected to address everything, from BIM project information, to the importance of generating new methodological strategies that include computational models, music technology and basic rules of harmonic composition, to the integration of proposals in the field of health and the experimental identification of organic components.

The first article is based on the use of a Project Management Maturity Model and aims to establish whether professionals in the state of Baja California, Mexico, know or apply any model of this type in their work. A new maturity model is likewise proposed that combines the strengths of the best-known models in the literature to propose a strategic action plan towards maturity.

The second article describes the development of 33 scale items to assess people's perceptions of fixed and learning mindset. The study involved 97 supervisors from the maquiladora industry in Reynosa, Tamaulipas. Surveys were applied to three groups of participants to carry out the process of factorial reduction analysis to check the level of significance and validation of items. The use of this scale can serve as a reference for future research in adults to demonstrate their competence in productivity.

The third article considers that the proposed research constitutes an instance where certain statistical devices have been generated from a descriptive analysis that enables measuring the impact of COVID-19 on gender relations and women's work. The operationalization measures: (1) the progress of the pandemic through the number of positive cases of COVID-19; (2) the economic slowdown through the number of women's jobs; (3) the progress of social confinement through the number of activities performed at home or outside the home to obtain an income. The proposed research is of interest to observe the behavior of gender relations and women's work with respect to the impact of the COVID-19 pandemic.

The fourth article describes the results of knowledge transfer between two companies in Colombia, based on improvement solutions to eliminate or mitigate conflictive or problematic situations, risks or opportunities in processes and strategic indicators. It proposes that the knowledge transmitted through methods, procedures and technologies has a positive influence on the corporate performance of the receiving company, deploying a decisive influence on the improvement of business performance.

The fifth article highlights the importance of analyzing the quality management landscape through a monitoring program and its effects on the quality of the different types of automotive lubricating oils distributed and marketed in Angola (Africa). This paper presents a proposal for a monitoring program for automotive lubricating oils to ensure product quality. The system is also presented as an example model, which could also be extended to monitor and manage the quality of other types of lubricating oils and fuels.

Finally, the last article in this issue seeks to provide knowledge through data, analysis, and conclusions on the impact of women's leadership in information technology (IT) projects in Argentina. The purpose of this research is to challenge the beliefs and stereotypes that hinder women's access toward leadership roles and the choice of their professional careers, seeking to raise awareness among organizations and the community in general about the biases and obstacles that persist to this day.

Before concluding this editorial, it is important for us to thank the entire team of collaborators, IT and technical, as well as the Iberoamerican University Foundation (FUNIBER) and the Universities that provided all the support material for this issue to be carried out, with the conviction that we are on the right path towards international recognition.

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THE NEW CULTURE OF MEXICAN MATURITY: A PROFESSIONAL DEVELOPMENT PLAN AND STRATEGIC ACTIONS AIMED AT IMPROVING THE MATURITY LEVEL ON THE BAJA CALIFORNIAN PROFESSIONALS

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Abstract. A Project Management Maturity Model helps organizations measure and mature their practices in project, program and portfolio management, through the definition of knowledge improvements in their processes. In Mexico, there are states with higher growth in the development of new projects, as has been seen in the last 20 years in the state of Baja California Norte. The national observatory reported that "the population of professionals in the state reached 305,374 people" (SNE, 2020). Therefore, it is intended to know if this sector of the population knows or applies any maturity model in their work. Therefore, a new maturity model is proposed that combines the strengths of the best-known models in the literature and proposes a plan of strategic actions aimed at maturity. The level of maturity of project management and individual, group and institutional competencies of this population in the state was analyzed by means of a multidimensional survey. To check its validity, exploratory factor analysis was applied. Knowledge in project management processes was found to have maturity level 3. However, the mission, vision and institutional competencies barely reached a level 2. Which suggests that the Baja Californian managements should work on these aspects. The new culture proposes an action plan that aligns with the strategies and fosters maturity in any organization.

Keywords: Maturity Models, Maturity level, OPM3, CP3M, CMMI.

LA NUEVA CULTURA DE LA MADUREZ MEXICANA: UN PLAN DE DESARROLLO PROFESIONAL Y ACCIONES ESTRATÉGICAS ENCAMINADAS A MEJORAR EL NIVEL DE MADUREZ SOBRE LOS PROFESIONISTAS BAJA CALIFORNIANOS

Resumen. Un Modelo de Madurez de la Gestión de Proyectos contribuye a que las organizaciones midan y maduren sus prácticas en gestión de proyectos, programas y portafolios, a través de la definición de conocimientos mejoras en sus procesos. En México, existen estados con mayor crecimiento en el desarrollo de nuevos proyectos, como se ha visto en los últimos 20 años en el estado de Baja California Norte. El observatorio nacional reportó que "la población de profesionistas en el estado alcanzó 305,374 de personas" (Servicio Nacional de Empleo [SNE], 2020). Por consiguiente, se pretende conocer si este sector de la población conoce o aplica algún modelo de madurez en su trabajo. Por lo anterior, se propone un nuevo modelo de madurez que combina las fortalezas de los modelos más conocidos en la literatura y propone un plan de acciones estratégicas encaminadas hacia la madurez. Se analizó el nivel de madurez de la gestión de proyectos y de las competencias individuales, grupales e institucionales de esta población en el estado por medio de una encuesta multidimensional. Para comprobar su validez, se aplicó el análisis factorial exploratorio. Se encontró que los conocimientos en los procesos de la gestión de proyectos cuentan con un nivel 3 de madurez. Sin embargo, la misión, visión y las competencias institucionales apenas lograron un nivel 2. Lo que sugiere que las gerencias bajacalifornianas deben trabajar en esos aspectos. La nueva cultura propone un plan de acciones que se alinee con las estrategias y fomente la madurez en cualquier organización.

Palabras clave: Modelos de madurez, Niveles de madurez, OPM3, CP3M, CMMI.

Introduction

According to Cooke-Davies (2002) as cited in Solarte and Sanchez (2014, p. 6), "The roots of maturity models stem from the work of Total Quality Management (TQM)," they play a great role in continuous improvement and have an important link to the mission and vision of any organization. Most maturity models are inspired by the Capability Maturity Model (CMM) developed by the Software Engineering Institute (SEI), where the organization progresses through a series of five levels. These five levels define an ordinal scale for assessing the maturity of an organization's processes and capabilities.

The Project Management Institute [PMI] (2013) defines the Project Management Maturity Model (PMMM) as "a framework that defines knowledge, assurance, and process improvements, based on best practices and capabilities, helps organizations measure and mature their project, program, and portfolio management practices" (p. 185). It can be seen that PMPMs have been evolving over time from just measuring the maturity of processes within an organization to becoming a culture that fosters maturity in an organization.

Currently, "about 30 PMMMs are known" (Backlund, Chronéer, & Sundqvist, 2013, p. 838), the best known are: the Organizational Project Management Maturity Model (OPM3) (PMI, 2013), the Capability Maturity Model (CMM) (Software Engineering Institute [SEI], 2010), and the Project, Program, and Portfolio Management Maturity Model (P3M3) (Murray & Sowden, 2015). The vast majority are supported by bodies of knowledge such as the Project Management Body of Knowledge (PMBOK) (PMI, 2017), the IPMA Baseline for Competencies (IPMA ICB) (International Project Management Association [IPMA], 2018), the APM Body of Knowledge (AMPBOK) (Association for Project Management [APM], 2012), among others. Each time any of

these bodies of knowledge are updated, consequently, the maturity models undergo an update.

In recent years, new maturity models have appeared such as the Colombian Project Management Maturity Model (CP3M) (Solarte and Sanchez, 2014), the Project Management Maturity Model developed by Prado (PMMM-Prado) (Prado, 2015), and the model made by Yimam (Yimam, 2011). These suggest new axes of analysis that were not considered in traditional maturity models.

Theoretical Framework

The analysis of maturity models and knowledge bodies

The bodies of project management knowledge that are most widely disseminated through the number of certifications throughout the Americas and Europe were analyzed. Eight PMMMs were found: the Organizational Project Management Maturity Model (OPM3) (PMI, 2013), Project Management Maturity Model (KPMMM) (Kezner, 2015), PM-Solutions Project Management Maturity Model (Crawford, 2015), Project Management Maturity Model, Programs and Portfolios (P3M3) (Murray and Sowden, 2015), Capability Maturity Model Integration (CMMI) (SEI, 2010), Colombian Project Management Maturity Model (CP3M) (Solarte and Sanchez, 2014), Maturity Model proposed by Abadir H. Yimam (Yimam, 2011), and Maturity by Project Category Model (PMMM) (Prado, 2015).

Table 1 analyzes the PMMMs based on the body of knowledge they rely on, the scope of each model, whether it has dimensions, its strengths, the domain, the focus on processes or systems, and the mandatory use of a body of knowledge.

Among the findings, the PMBOK is found in several maturity models with at least 8 knowledge areas, except integration and stakeholder management. The P3M3 only has the resource and risk management. CMMI correlates across objective profiles 2 and 3 (See Figure 1). The same situation is repeated when correlating the PMBOK, ICB-IPMA, and APMBOK bodies of knowledge (See Figure 2).

Table 1
Comparison of maturity models.

Model	Version	Edition	Domain	Author(s)	Levels	Axes of analysis or dimensions	Capabilities or processes	Base	Process / System	Area of knowledge
CP3M	5th	2014	Project approach	Solarte and Sanchez	1 - 5 (Inconsistency, Planning and Control, Integration, Strategic Alignment, Innovation and Optimization)	Five transversal analysis axes (PMBOK Guide, Strategic Alignment, Learning, Adaptability and Life Cycles). Sub-axes of analysis (Institutional Learning Orientation, Innovation Orientation), Institutional Support, Institutional Projectization)		PMBOK	Processes	Required
PMMM-Prado	3rd	2015	All domains	Prado	1-5 (Initial or embryonic or ad hoc, Known, Defined, or standardized, Managed and Optimized)	Competences (Project Management, contextual and technical-behavioral aspects) Methodology, Computerization, Use of the appropriate organizational structure, Alignment to the strategy.		PMBOK, ICB IPMA	Processes	Required

Abadir H. Yimam	1st	2011	Project approach	Yimam	From CMMI: Level 0. Incomplete, Level 1. Process developed, Level 2. Process managed, Level 3. Process defined, Level 4. Quantitatively Managed Process, Level 5.	Practical maturity dimension - incremental progression (practices: basic, intermediate, advanced) Process maturity dimension (Incomplete process, informally developed process, formally developed process, managed process, and defined process).	Knowledge Areas: Scope, Time, Cost, Financial, Quality, Human Resources, Communication, Risk, Procurement: Project Equipment and Project Material, Project Safety.	PMBOK, CMMI	Processes	Required
Kezner	3rd	2015	Project approach	Kezner	1-5 (Common Language, Common Processes, Unique Methodology, Benchmarking, Continuous Improvement)	N/A	Evaluates the following categories: *Scope management, *Time management, *Cost management, *Human resource management, *Procurement management, *Quality management, *Risk management, Communications management.	PMBOK	Processes	Required

CMMI	1.3	2010	Software	SEI	1-5 (Initial, Managed, Defined, Quantitatively Managed, In Optimization)	N/A	Capability level: 0- Incomplete, 1- Accomplished, 2- Managed, 3- Defined	CMM-SEI	Processes	Required
Crawford	3rd	2015	Project approach	Crawford	1-5 (Initial Processes, Structured Processes and Standards, Organizational Standards and Institutionalized Processes, Managed Processes, Process Optimization)	N/A	Evaluates all areas of PMBOK knowledge	PMBOK (areas)-CMMI (levels)	Processes	Required
P3M3	3rd	2015	All domains	Murray and Sowden	1-5 (Process Knowledge, Repeatable Process, Defined Process, Managed Process, Optimized Process)	N/A	7 perspectives: *Organizational Governance, *Management Control, *Profit Management, *Risk Management, *Stakeholder Management, *Financial Management, *Resource Management	It is not built around a particular body of knowledge.	System	Free to test by subject area or by levels

OPM3	3rd	2013	All domains	PMI	1-5 (Initial, Repeatable, Defined, Managed, Optimized, or Continuous Improvement)	N/A	10 areas of knowledge + 5 groups of processes, Projects: (Initiation, Planning, Execution, Monitoring-Control, and Closure) Programs: (Initiation, Planning, Execution, Monitoring-Control, and Closure) and Portfolio: Alignment, Monitoring, and Control.	PMBOK	Processes	Required

Note: Source: own elaboration

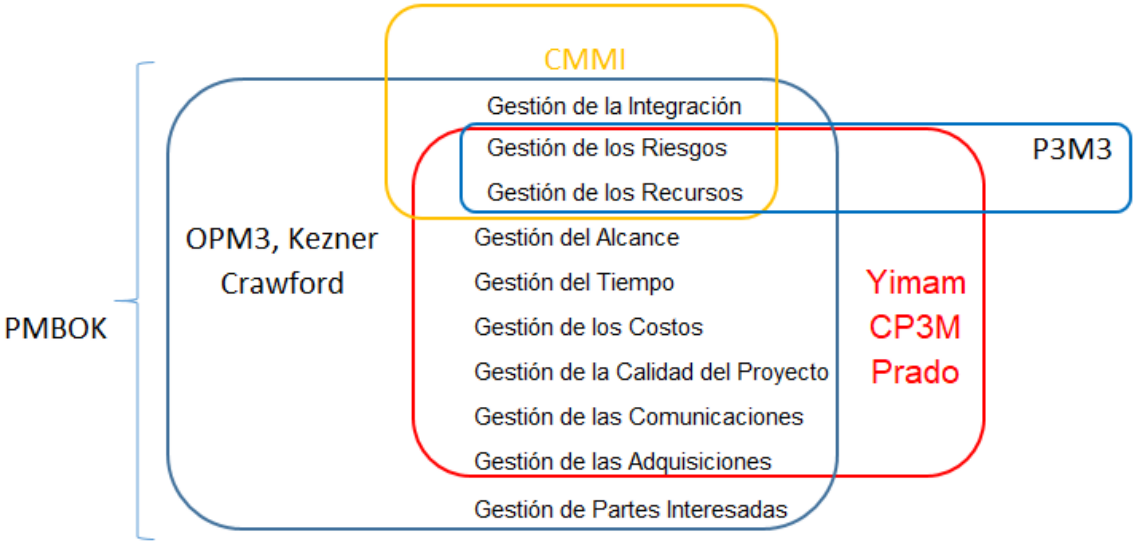

Figure 1. Correlation of the PMBOK with respect to the maturity models analyzed.
Note: Source: PMI (2017), PMI (2013), Kezner (2015), Crawford (2015), Murray and Sowden (2015), SEI (2010), Solarte and Sanchez (2014), Yimam (2011), and Prado (2015).

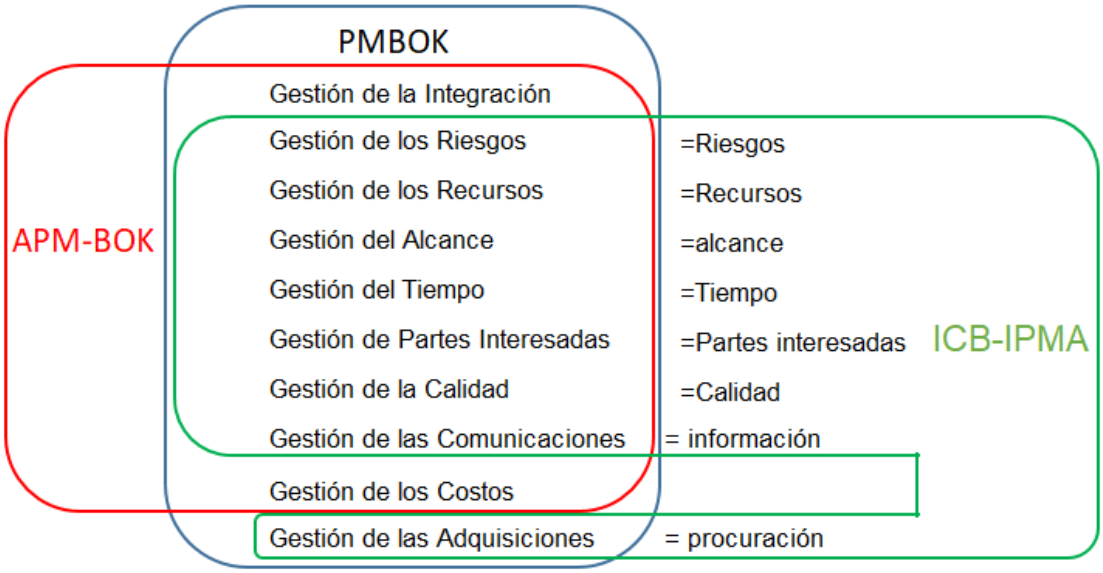

Figure 2. The correlation between the three bodies of knowledge analyzed.
Note: Source: PMI (2017), IPMA (2018), APM (2012).

It can be concluded that the three bodies of knowledge mentioned can be integrated into one. Being the APMBOK one of the most complete because it considers the knowledge at project, program, and portfolio management level in a single book.

On the other hand, when comparing P3M3 and CP3M, contextual similarities are observed such as strategic alignment, organizational governance, management control, and benefits management. In addition, when combined with APMBOK value management and ICB-IPMA program orientation, a new strategic dimension emerges (see Figure 3).

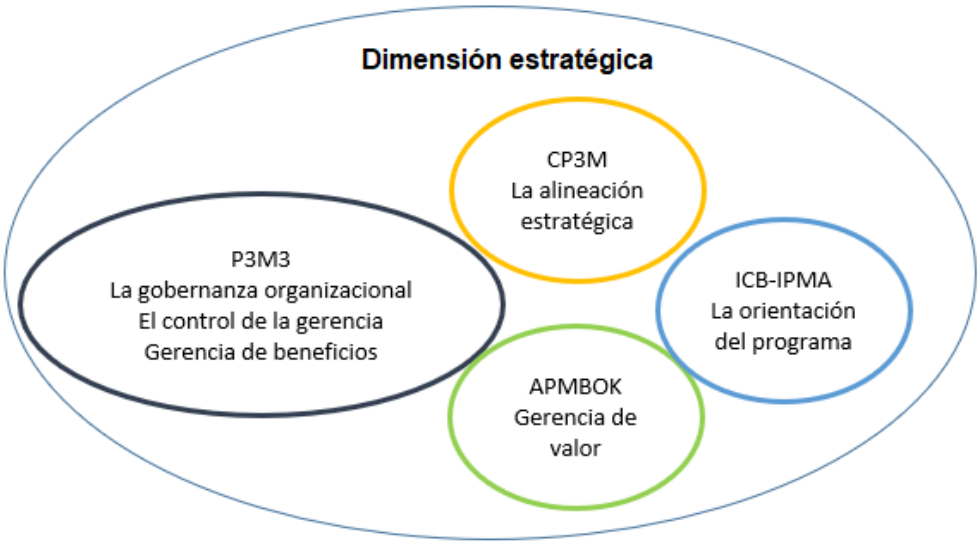

Figure 3. The strategic dimension.
Note: Source: IPMA (2018), APM (2012), Murray and Sowden (2015), Solarte and Sanchez (2014).

When analyzing Yimam, P3M3, CP3M, and ICB-IPMA, it is observed that their contextual competencies are common, these are the characterization of the organization and projects, the financial management. Thus, a new financial dimension emerges (See Figure 4).

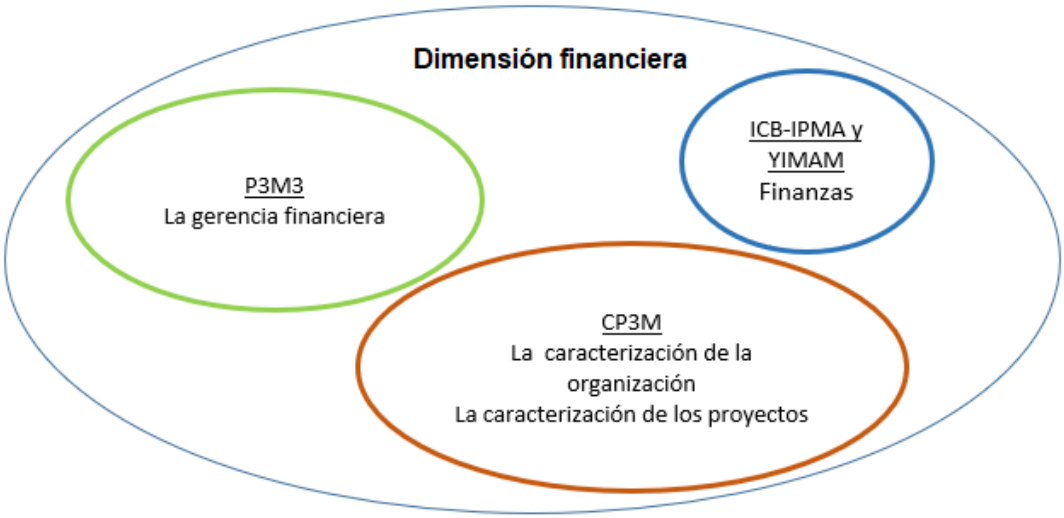

Figure 4. The financial dimension.
Note: Source: IPMA (2018), Murray and Sowden (2015), Solarte and Sanchez (2014).

Finally, when analyzing ICB-IPMA, PMI's Project Manager Competency Development (PMCD) and APMBOK, some common personal competencies for a project manager are observed, such as professionalism, conflict management, efficiency, and commitment and motivation. Regarding group performance, Saenz (2012) provides the following qualities, "success, group efficiency, task characteristics and contextual characteristics, composition, and identification of the group" (pp. 106-108). Finally, Motoa and Solarte (2005, p.1509) provide institutional competencies such as "institutional learning, capacity and institutional support" (See Figure 5). Therefore, it can be concluded that there is a high compatibility to make a single maturity model. At

the same time, the coverage of the current models can be extended if they consider the three bodies of knowledge PMBOK, APMBOK, and ICB-IPMA.

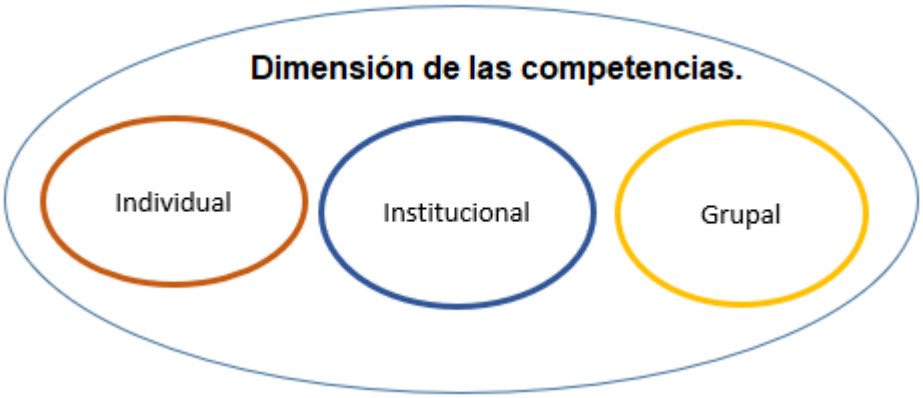

Figure 5. The dimension of competencies.
Note: Source: PMI (2007), Sáenz (2012), Santamaría and Hernández, (2016), Hernández, Cano, and Arano (2017).

Method

Objective of the research

The objective was to develop a new maturity model to be applied to the professional sector in the state of Baja California Norte. With the purpose of knowing if this sector of the population knows or applies a maturity model in their work.

The entity presents the ideal characteristics for its application due to its booming exponential development in the development of new projects in all areas. There are 95,882 companies established in the state, representing 2.3% of the total in all of Mexico (National Institute of Statistics, Geography and Informatics [INEGI], 2014). These represent a wide variety of productive sectors (manufacturing, aerospace, commerce, financial services, transportation, etc.). In addition, the state ranked sixteenth in gross national production.

Basis for developing a new maturity model

Based on the comparison of the PMMMs analyzed in Table 1 and together with the bodies of knowledge that support them, it was proposed to create a new proposal that combines contextual, performance, and knowledge competencies. It was proposed to create a new proposal that combines contextual, performance, and knowledge competencies. Moreover, it should be independent of any body of knowledge, the evaluation should be objective and easy to answer in order to judge each process, capable of evaluating the alignment of the strategic processes of the projects with the mission and vision, and at the same time, it should evaluate the competencies of its collaborators. That is economically accessible to initiate in the culture of project management maturity. In addition, it achieves results that are truly valid for the organizations and that present an adequate cost/benefit ratio.

The new culture of Mexican maturity.

Once the overlaps between the maturity models and the bodies of knowledge analyzed were identified, a new model was developed in which the strengths of each were combined. The new culture of maturity takes into account the financial and strategic

approaches, as considered by CP3M, ICB-IPMA, APMBOK, and P3M3. The capabilities and levels were taken from CMMI and OPM3. Finally, from the approach of individual competencies under the contributions of PMI PMCD, APMBOK, and IPMA ICB. In addition, it combines the contributions of Sáenz (Sáenz, 2012) at the group level. At the organizational level it is supported by CP3M together with the contributions of talent management (Santamaría and Hernández, 2016) and knowledge management (Hernández, Cano and Arano, 2017), being called as a whole the new Mexican maturity culture (NCMM).

The proposal proposes four dimensions that encompass the degree of maturity of an organization: knowledge or standard, financial and legal aspects, competencies, and strategic. Unlike other traditional maturity models, this model integrates individual, group, and institutional competencies. Considering them as key elements that affect the performance of project management execution. Like the other models that propose 5 levels to reach maturity, this one only proposes 4 levels to reach the *top model*, considering it as sufficient for small and medium companies that start on the road to organizational maturity (See Figure 6). In other words, that the organization has the freedom to reach the maturity that allows it to achieve its strategic goals.

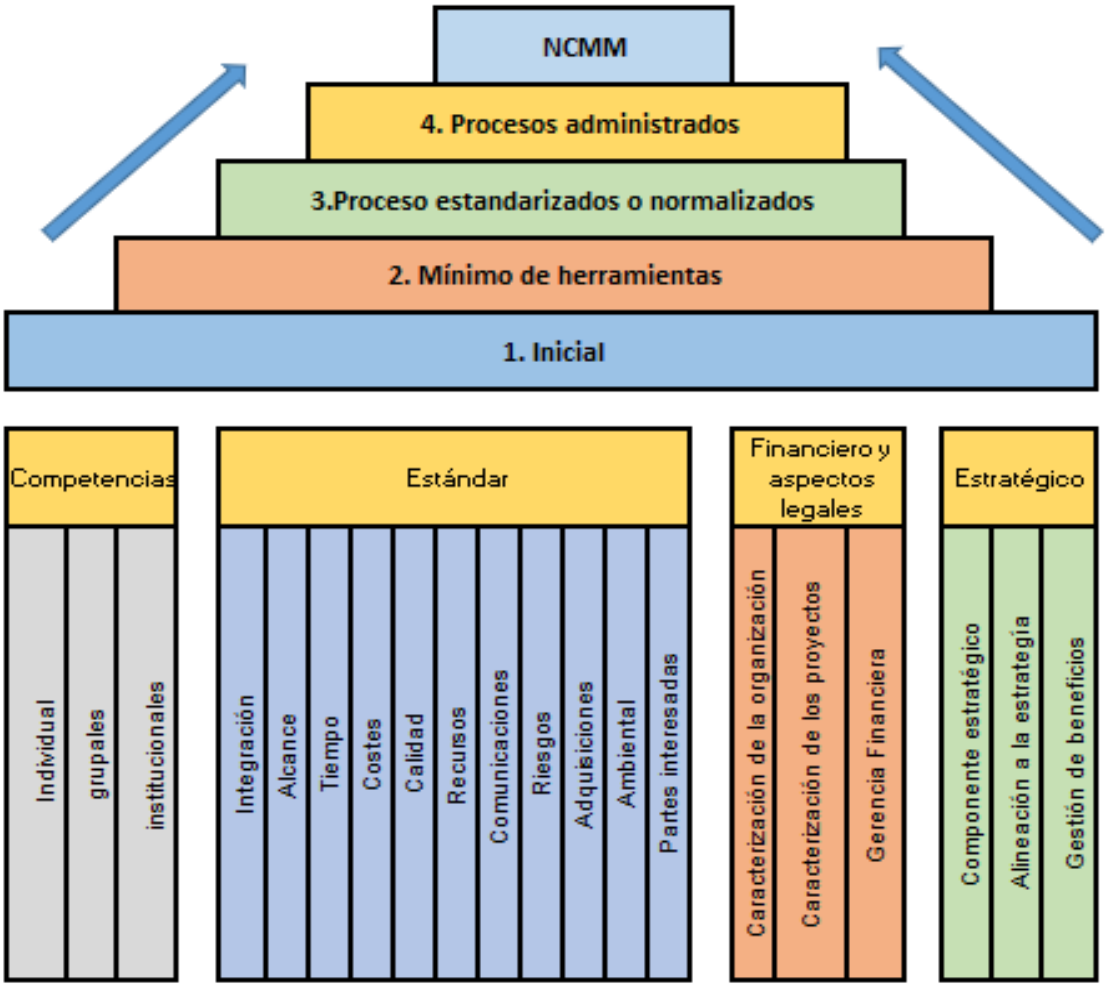

Figure 6. Graphical representation of the new Mexican maturity model.
Note: Source: own elaboration

Another attribute offered by the NCMM is that it reviews the current integrated command control of the analyzed organization and together with the contributions of the results of the evaluations of the new culture. It proposes an action plan that complements or modifies the integral command control, directing resources and infrastructure towards maturity. In the same way it applies it towards the competences of its collaborators, through an established professional development plan; which eliminates the deficiencies found to turn them into high performance teams. Unlike traditional maturity models, the new culture works at the same time on process capabilities and employee competencies. In addition, it evaluates its results longitudinally, rather than in a single snapshot as traditional models do.

The model can be implemented in any small and medium-sized organization that intends to get started in the culture of project management maturity. In addition, it allows you to create a customized plan focused on focusing resources and efforts towards maturity with the option to be certified in a recognized model.

a) The skills dimension

The new model suggests a dimension focused on analyzing the competencies of an organization that are observed from three approaches. From the individual or personal point of view, group, and institutional.

In the personal aspects, it includes the competencies of professionalism, conflict management, effectiveness, commitment, and motivation.

PMI (2007, p. 34) defines professionalism as "the performance of a person's ethical behavior that is governed by respect, responsibility, propriety, and honesty."

According to the APM (2012, p. 56), conflict management defines it as "a process that identifies and addresses differences, whereby, if not handled appropriately, they can affect project objectives."

According to IPMA (2018, p. 211), efficiency can be understood as "the ability to manage time and resources cost-effectively to produce the agreed products or services and achieve the expectations of the parties involved."

Motivation and commitment are defined as "the personal contribution that the manager and the people inside or associated give to a project. Consequently, it makes people feel part of a project and want to be part of it" (IPMA, 2018, p. 64).

The group aspect focuses on examining the competencies of the group in action. Among its elements are the contributions of Sáenz (2012, pp. 106-108), "group effectiveness, the success of the project, the characteristics of the tasks performed, the contextual characteristics of the field, the composition of the work team, and organizational identification."

The institutional aspect is divided into the sub-levels that must be evaluated from the contributions of Motoa and Solarte (2005, p.1509), "support (the provision of the necessary resources to successfully comply with the projects), capacity (evaluates the compliance of management in the organization), and institutional learning (evaluates the ability to permanently improve." The contributions of talent management are added, "customer service orientation, integrity, commitment, adaptability to change" (Santamaría and Hernández, 2016, p. 71) and knowledge management, "technological and innovation, intellectual and organizational" (Hernández, Cano and Arano, 2017, P. 49).

b) The dimension of the standard

This dimension describes the processes necessary to carry out a project or group of projects safely through to completion. In this aspect, the organization must have the knowledge competences based on any of the existing knowledge guides in the market. In this case, the model is supported by the three bodies of knowledge already mentioned above.

On the other hand, the areas are renamed as follows: integration, time, scope, communications, cost, quality, risk, procurement, and stakeholders. The areas that are renamed are Human Resources Management by Resources to encompass both the human part, the acquisition of machinery, and new technology. The areas that are added are Earned Value Management and Conflict Management by APMBOK. In addition, a new management is added called Environmental Management based on the ISO-14001 standard because any type of project can generate waste and these can impact directly or indirectly on the environment. This allows to cover all aspects that involve or alter the development of a project from various angles, outside and inside the organization.

In addition, the 5 process groups are maintained: initiation, planning, execution, monitoring and control, closing or deliverable. In some cases such as the maquiladora industry, the last group of processes is renamed because the newly produced product is being qualified on the production floor along with the delivery of documents and technical sheets to the immediate customer waiting for the start of mass production.

c) Financial and legal aspects

Another aspect to consider in the good functioning of a program or project is the legal and financial aspects. This dimension describes the aspects concerning the organization from the economic point of view, evaluates and analyses the data concerning the budgets allocated to the projects. In addition, it reviews all legal issues during the implementation of a project of the commitments made by the client - designer.

Financial Management is established to ensure that the likely costs of the initiative are captured and assessed within a formal business case and that costs are ranked and managed throughout the life cycle of the investment.

This management will evaluate two aspects: "one organizationally oriented and the other project oriented according to the financial aspects" of CP3M (Motoa and Solarte, 2005, pp. 1507-1508).

A management of legal aspects is added, taking as a reference the APMBOK APM (2006, p. 76), whose objective is to "promote legal awareness, consisting of a set of standards, values, ideals, and attitudes inside and outside the organization." In this sense, this management "must operate within the law and have knowledge of the legal system in the jurisdictions in which it operates: health and law, labor and contract law" (APM, 2012, p. 226).

d) The strategic dimension

This dimension is supported by the strategic component of the CP3M and the strategic alignment of the PMMM-Prado, which complement each other to strengthen this dimension. It evaluates that the projects are aligned with the organization's mission, as well as the correlation with the strategic plan and its structure to implement these strategies. The elements that make up the strategic dimension are the component and the strategic alignment.

The strategic component "evaluates three levels: how projects align with the organization's mission, how projects correlate with the objectives of the strategic plan, and the level of contribution of projects to organizational growth" (Motoa and Solarte, 2005, p. 1509).

Strategic alignment involves all stakeholders. "The organizational structure will define the roles and rules, as well as regulate the authority and power relationships between project leaders and the different areas of the organization involved in the projects" (Prado, 2015, p. 27).

The maturity levels of the proposal

The model is based on the CMM-SEI maturity levels. However, instead of considering all 5 levels, it will be limited to only 4 levels because very few organizations reach that level of maturity of excellence. In addition, companies that are beginners do not necessarily want to reach excellence but rather to improve their current situation. Table 2 lists the four levels of the proposal.

Table 2
Maturity levels of the new culture.

Level	Name of the level	Characterization
Level 1	Initial	• Top management does not consider the benefits of project management. • There is poor planning from the beginning of the project. • The team members do not feel identified. • Completed products and/or services exceed planned timelines and budgets. • It only meets the minimum necessary requirements.
Level 2	Minimum of tools	• Top management recognizes project management, but there is a lack of knowledge in the rest of the organization. • Some of the tools and good practices are applied locally. • Elaboration of the first procedures and instructions focused on project management. • I use rudimentary software programs dedicated to project management. • Projects and programs are not aligned with the organization's strategies, policies, and mission. • Project managers with limited autonomy and resources.
Level 3	Standardized or normalized processes	• Project management demonstrates successes, this enables standardization across the rest of the organization. • First steps are taken to align project management with policies, strategies, and mission. • Project managers receive formal training in technical, behavioral, and contextual competencies. • Project, program, and portfolio processes are defined and controlled.
Level 4	Managed	• Project management standards are already defined and established. • The first steps are taken to measure effectiveness and efficiency for decision making. • Countermeasures and actions to mitigate risks are established. • The indicators are visible to all employees. • The participation of everyone is encouraged to promote ideas and process improvements.

Note: Source: own elaboration

Data Collection Instrument and Sample Size

The survey was used as a data collection instrument over a period of six months. In addition, the technique of discretionary and snowball sampling was used, making use of social networks such as LinkedIn, Facebook, emails of known contacts, and the

participation of volunteers in different specialties. The population analyzed were managers, engineers, graduates belonging to small, medium, and large companies that are directly related to the projects.

A confidence level of 95% and a margin of error of 6% was used and applying the sample size equation (See Equation 1), resulted in 255 volunteers to be surveyed.

Equation 1. *Size of the sample to be analyzed.*

$$n = \frac{NZ_{\alpha/2}^2 P(1-P)}{(N-1)E^2 + Z_{\frac{\alpha}{2}}^2 P(1-P)} \quad (1)$$

Note: Source: Valdivieso, Valdivieso, and Valdivieso (2011, p. 158).

Where N = 305,374 professionals in Baja California Norte, P= 0.6, α=0., E = .06, Zα/2 = $Z0_{.025}$ =1.96 (confidence level of 95%).

n= 255 participants

On the other hand, the questions asked were of the closed type that allowed measuring the intensity of the maturity of the processes and knowledge by applying the Likert scale of 5 levels, whose levels are particular to each dimension (See Annex 2). In addition, a web page was developed to deposit the results of the survey (See Figure 7).

Each volunteer answered the four dimensions except in the dimension of standard or knowledge, which was the only one according to their process or daily activity, i.e., members of engineering and managers answered the questionnaire to their engineering processes and project management, members of quality, finance, purchasing, logistics, environmental responded according to their own management surveys.

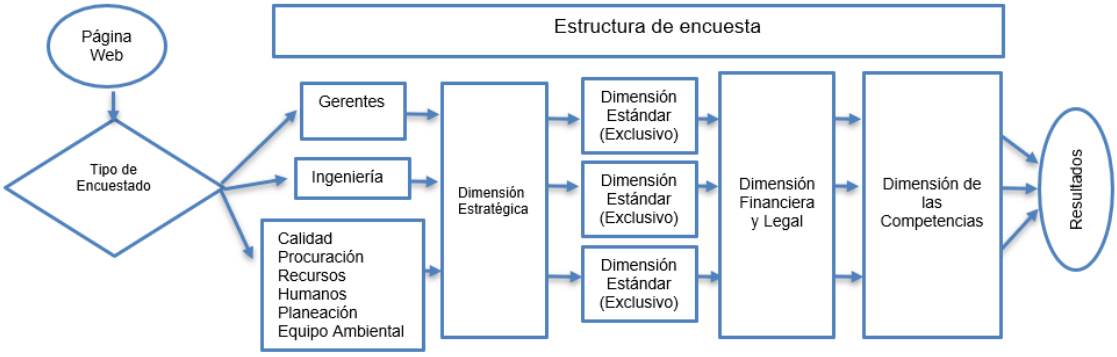

Figure 7. Structure of the survey of the new maturity model.

Note: Source: own elaboration

Results collection phase

In order to know the degree of maturity in all the federal entity, the present work divided its analysis in its four dimensions: knowledge or standard, financial and legal aspects, competences, and strategic.

To validate each of the surveys, the SPSS program was used, taking into consideration the following steps.

- Crobanch's Alpha was used to measure the reliability of each survey, that is, that the survey items are correlated with each other. Saenz (2012, p. 110) states that "Alpha values between 0.6 to 0.7 are considered weak, and values above 0.7 are considered acceptable or excellent." For the purposes of this research, an Alpha with a value higher than 0.6 is considered acceptable because there may be items in the survey that can be considered significant.
- Using the AFE to find new factors representative of each set of questions that make up each survey.
- The new factors, together with the scoring of their elements, allow to know the perception of the volunteers in the form of quick results and at the same time it is confronted against the results of the survey. In this way it is possible to have an approximation to validate the survey regarding the maturity level of each domain.
- Each survey is made up of three main elements: its alignment with the organization's mission and vision; the analysis of its project and competency management processes; and the analysis of its institutional capacities.

On the other hand, the survey questions are of the closed multiple-choice type with five answers each. Each answer is linked to a specific maturity level with its attributes and competencies. The respondent only has to answer according to the processes and competencies he/she performs on a daily basis (See Annex 2 for more information). In the end, the sum of each dimension will allow us to know the maturity level of the whole state.

Results interpretation phase

Once the results were presented and the deficiencies detected in the survey were known, a group of volunteers who experience the problems in the implementation of their projects were asked to help brainstorm possible causes for the development of tree diagrams. A group of volunteers who experience the problems in the implementation of their projects were asked to help brainstorm possible causes for the elaboration of tree diagrams. If the problem(s) can be measured, then they are candidates to become new indicators. In the end, a matrix with actions was obtained that complements the BSC and can be applied in any organization with slight modifications (see Figure 8). Annex 1 expands on the subject.

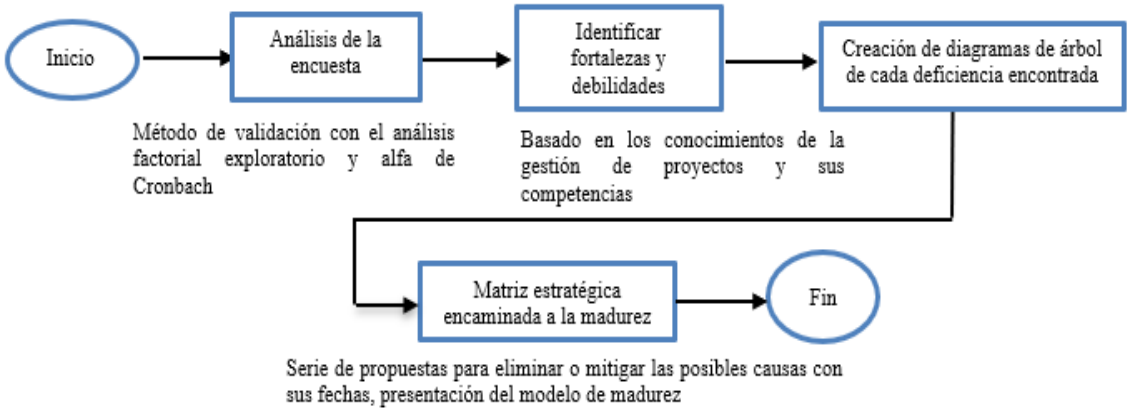

Figure 8. Data collection and interpretation.
Note: Source: own elaboration

Results

The results obtained by applying the new maturity culture on the Baja Californian professionals are presented below. Table 3 presents the scope of the population. It can be seen that the bulk of the respondents are members of a large company with 52.94%, and SMEs are the second group with 37.65%.

Table 3
Scope of the survey of the Baja California population.

Turn	Population	Percentage
Large Company	135	52.94%
SMEs	96	37.65%
Government	8	3.14%
Automotive / Transportation	8	3.14%
Construction	7	2.75%
Fishing	3	1.18%
Academic	2	0.78%
Total	255	

Note: Source: own elaboration

In addition, other demographic data of the surveyed population is presented. In which 76.47% have a university degree, followed by 18.42% with a master's degree. The bulk of the surveyed population is in the range of 43 to 51 years old with 30.98%, followed by the 36 to 43 years old population with 27.45%, and, in third place, the 26 to 35 years old group with 27.06%. In addition, the seniority in their last job is headed by the group between 2 to 5 years with 45.49%, followed by the group from 0 to 1 year with 20% and, in third place, the group from 6 to 9 years with 18.04%.

Strategic Dimension

The survey of this dimension has 15 questions and they were answered by all volunteers. When running the reliability analysis on the survey, the Crobanch's Alpha value of 0.933 was calculated; therefore, its result is reliable because it is greater than 0.7. When applying the AFE, a KMO[1] value of 0.863 is recognized; therefore, it is also favorable. In conclusion, there is correlation between the variables of the survey applied,

[1] The Kaiser, Meyer, and Olkin (KMO) test is a method that "checks whether the partial correlations between variables are small" (International Business Machine [IBM], 2020, para. 2). Like Crobanch's Alpha, both methods allow us to know whether the survey items are correlated with each other. Considering as favorable values above 0.7.

in addition three factors were obtained whose sum of their variances reach a value higher than 75.34% (See Table 4). The first factor recognizes questions E4, E5, E7, E11, and E12. The second factor has questions E1, E2, E3. The third factor is made up of only E9, E13, and E15.

Table 4
AFE analysis for strategic dimension.

	Rotated component matrix[a]		
	Component		
	1	2	3
Q1	.169	.885	.006
Q2	.249	.843	.293
Q3	.247	.873	.213
Q4	.860	.317	.008
Q5	.751	.479	.210
Q6	.328	.594	.545
Q7	.713	.349	.324
Q8	-.013	.377	.588
Q9	.382	.265	.740
Q10	.412	.414	.658
Q11	.773	.199	.238
Q12	.844	.048	.338
Q13	.413	.196	.723
Q14	.651	.024	.441
Q15	.192	-.065	.808

Note: Extraction method: principal component analysis.
Rotation method: Varimax with Kaiser normalization.[a]
a. The rotation has converged in 6 iterations. Source: own elaboration

When comparing the volunteers' perception of factor 1 (knowledge), 36% of the volunteers considered themselves to be at level 3, while the other 39.2% of the volunteers perceived themselves to be above level 3. For factor 2 (mission and vision), 42.3% of the volunteers believed they were at level 4, while the other 49.8% of the volunteers thought they were below level 4.

On the other hand, when comparing the overall results of the dimension (See Table 5) against the quick results, the new factors fit perfectly with the overall weights given by the volunteers.

Table 5
Survey results for the strategic dimension.

Mission - Vision	Knowledge	Institution
4 (42.35%)	3 (43.5%)	2 (40%)

Note: Source: own elaboration

Legal and Financial Dimension

There were ten questions associated with financial processes and five questions related to legal processes. When applying the reliability analysis for the financial survey, a Crobanch's alpha of 0.853 was reached. On the other hand, the Crobanch's alpha for the legal segment reached 0.811, both results are favorable. When applying the AFE of the financial segment, a KMO of 0.705 was obtained and a superior accumulated variance of 71.9% for 3 factors (See Table 6). Factor 1 (financial processes) is comprised of F1, F2,

F3, F4, F5, F6, and F7. While factor 2 are F8 and F9 (innovation); and factor 3 (institutional) F10.

Table 6
AFE analysis for the financial dimension.

Rotated component matrix[a]			
	Component		
	1	2	3
Q1	.343	-.159	.746
Q2	.767	.032	.123
Q3	.763	.264	.078
Q4	.838	.174	.153
Q5	.890	.043	.081
Q6	.778	.317	.119
Q7	.607	.557	-.031
Q8	.209	.853	-.040
Q9	.121	.730	.502
Q10	-.024	.232	.804

Note: Source: Own elaboration.

For the exploratory factor analysis of the legal segment, a KMO of 0.674 was obtained with a cumulative variance weight above 58.35% for a single factor (the same five questions).

When applying the 4 factors against the volunteers' perception. The first factor related to financial processes, 45.5% of the volunteers think they are at level 3, while the other 16% think they are below level 3, and the other 38.43% think they are above level 3. Regarding factor 2, which links it to the alignment to innovation and stimuli for new financial strategies, 43.4% of the volunteers think they are at level 3, the other 34.1% of the volunteers think they are below level 3. A 43.4% of the volunteers' perception was considered to be at level 3, the other 34.1% of the volunteers believe to be below level 3. The third factor related to institutional support, 42% considered it to be at level 2. The single factor related to legal processes, 42.75% of the volunteers think that they are at level 3, while the other 40% think that they are at levels below 3.

When confronting the new factors against the results of the complete financial and legal dimension, it is observed that they again fit with the overall results of the dimension.

Table 7
Results of the survey of the financial and legal dimension.

Mission - Vision	**Knowledge**	**Institution**
3 (46.7%)	3 (39.61%)	3 (41.18%)

Note: Source: Own elaboration

Dimension of competences

The competencies dimension was divided into three parts: individual, group, and institutional competencies. In turn, this was divided into subgroups (see Table 8). On the other hand, the group and institutional results reached an average of level 2. This indicates that work must be done on the integration of teams in order to reach the desired potential. What is striking is the institutional competencies, which gave a maturity level of 2. This result is significant, since management does not seem to provide adequate tools and training to its employees to perform their role to the fullest.

Table 8
Analysis by subgroups for the dimension of competencies.

Individual		Group		Institutional	
Professionalism	3.947	Effectiveness	4.400	Innovation support	2.192
Ethics	3.603	Quality	3.003	Capabilities	2.875
Conflict resolution	2.396	Customer Service	3.278	Institutional learning	1.949
Efficiency	2.739	Productivity	3.039		
Commitment Motivation	3.715	Task uncertainty	2.651		
		Task Interdependency	2.632		
		Field Independence	1.719		
		Field dependency	3.1856		
		Composition	2.515		
		Identification	2.945		

Note: Source: Own elaboration

Knowledge dimension or standard

The knowledge dimension is divided according to the functional departments which are engineering, management, quality, human resources, safety and environment, procurement, and logistics. It can be understood that some departments acquire more responsibilities than others according to the execution of programs and projects.

When analyzing the results from the different participating departments, a common trend emerges. Volunteers give a level 2 maturity in the alignment of the mission and vision of their organization. A level 3 maturity in their day-to-day processes and a marginal level of maturity to 2 maturity with respect to institutional competencies (See Table 9).

Table 9
Results by department according to knowledge dimension.

Department	Mission - Vision	Knowledge	Institutional
Quality	2.4619	3.397	2.006
Logistics	2.4156	2.789	1.537
Procurement	2.829	3.419	1.888
Safety and environment	2.717	2.425	2.333

Note: Source: Own elaboration

On the other hand, management and engineering results on the five groups of processes for executing programs and projects achieved a level 2 maturity because the majority considered the closure processes to be poor. On the other hand, information security and institutional competencies achieved a maturity level of 2. These are aspects that management must take into account in an institutional and continuous manner.

Table 10

Engineering and program management results.

Planning	3.135
Execution	3.297
Control	3.061
Closing	2.913
Resources and technologies	3.019
Security and information	2.839
Institutional	2.405

Note: Source: Own elaboration

Discussion and conclusions

The New Mexican Maturity Culture is structured from several existing maturity models. This means that its methods have already been validated in hundreds of organizations around the world. In addition, the NCMM focuses on knowing a multidimensional space of the process being analyzed, supported by talent and knowledge management. Unlike traditional models that only focus on asking questions related to the capabilities of project management processes to know their maturity level against a standard.

This model was first tested by analyzing the population of professionals in Baja California, Mexico.

Among the findings, the NCMM presents that in the dimension of individual and group competencies it presents a level 3 of maturity. However, some group competencies such as uncertainty of the task, independence of the field, composition and identification still need to be matured. It is recommended to acquire greater cohesion in order to reach group maturity.

On the other hand, the strategic, financial, and knowledge dimensions present a level 3 maturity in their processes. However, the four dimensions show little support from Baja California management to strengthen their competencies and innovation. Therefore, it is recommended that this aspect be evaluated in an institutional manner in Baja California organizations.

In addition, most of the companies surveyed are not aligned with the mission and vision of their organizations. As the demographics show, 65% of the population still does not know the values of the place where they work. This is a key aspect that management must review in an institutional manner.

Another interesting fact during the execution of the survey is that all participants completed the four assigned surveys with a hundred percent in a period of four minutes for the shortest one and twenty minutes for the longest one. This was one of the fastest maturity models to answer and no incomplete answers were found. Another striking aspect was that no human resources representatives participated in the survey. It is suspected that this group does not participate in surveys with psychological backgrounds.

Another contribution of the NCMM is that, once the weaknesses of the survey were detected, some volunteers worked on tree diagrams to explain the reasons why full maturity was not reached. The results of these tree diagrams were converted into action maps with indicators, which, in turn, complement the integrated command control for any Baja California company (See Annex 1 for more details).

It can be concluded that the NCMM was able to present an ex post diagnosis of the low population of California. As well, it is able to generate value by presenting a complementary comprehensive command control focused on organizational maturity.

One of the limitations detected was the degree of participation to achieve the desired goal. In this case, different methods of dissemination were applied: known friends, co-workers, dissemination in social networks, sending emails, and messages. At the same time, continuous reminders were sent to distant respondents. Another limitation was the number of questions for the competency and standard dimensions. Since the most representative questions had to be selected for each subgroup, this could slightly affect the checks.

From a methodological point of view, the present research opens the door for further studies using different types of survey platforms. Another field would be the use of new testing methods during the application of project management maturity models. Or also, applying the new maturity model in other types of organizations.

From the academic point of view, it opens the invitation to go a little deeper into the standardization of maturity models in order to take a step towards standardization. On the other hand, it invites to take a step towards perfecting the new maturity model through new studies.

From a practical point of view, the new maturity model is invited to be applied in a different organization or economic sector. In order to know the maturity level of that organization, improve a process, undertake organizational improvement, or develop a professional plan for their employees.

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Annexes

Annex 1

Tree Diagrams

Once the deficiencies found in the four dimensions of the new culture were detected. The tree diagram method was applied to explain the reasons why the maturity and success of the projects was not achieved. From its results, a set of action matrices were created that will complement the integral command control of any company.

At the end of the exercise 6 tree diagrams were found, which are financial, project team competencies, infrastructure and internal processes, human resources, safety and environment, and supply chain.

In the case of the financial tree diagram, its objective was aimed at making the operation more efficient, improving profitability and cost control. For the project team competencies diagram, the objectives were aimed at increasing team cohesion, implementing project management culture, and improving current processes. In the diagram corresponding to infrastructure and internal processes, all processes in action and the search for and implementation of new technologies were considered. The human resources management diagram aimed to attract candidates, identify potential resources with the necessary skills to meet the requirements of the new processes, as well as measure the performance of each member. Finally, to establish an achievement and reward program for all associates. The safety and environmental management diagram aims to meet the new labor regulations and the awareness of environmental management within the organization.

Finally, we have the tree diagram for the supply chain, which focused on solving two problems. The first one is related to reducing the time to meet the abrupt ramps demanded by customers. The second problem is to improve communication with the customer / suppliers to improve response times in the supply chain.

Table A-1

Example of a Customer Focus competency and growth tree diagram.

Dimension	Strategy No.	Strategy	Success Factor No.	Critical success factor	No. of initiative	Initiative
Customer focus competencies and growth	C1	Enhancing the structure of customer-focused teams	C1-1	Increase the cohesion of work teams.	8	Consolidate the complete adherence of the CFT structure.
					9	Reinforce the company's values and teamwork.
			C1-2	Training plan for professional development in project management	10	Implement a project management training and development plan.
					11	Include a "Basic Package" of Project Management. With exam.
					12	Feasibility search for CFT members to achieve PMI certification.
	C2	Improve project management processes	C2-1	Improve communication to align with customer requirements	13	Provide training to the CFT in Communication and Stakeholder Management.
					14	Using lessons learned to support your current projects.
					15	Evaluation for using an external company to use temporary employees for NPI activities.

C2-3	Technical Expertise Improvement Plan	16	Identify whether project management training materials are available in the global corporation.
		17	Processes from other Corporate sites may be reproduced on our site.
C2-4	NPI Configuration Systems	18	Perform Kaizen for BOM configuration and quote transfers.
C2-5	Disciplined management of executions and metrics	19	Set metrics.
		20	Measuring performance.
		21	Annual voice of the customer review / injuries learned and implemented for NPI.

Note: Source: Own elaboration.

Annex 2

Surveys

As previously mentioned, the survey questions are linked to analyzing a specific maturity level of a process. The respondent should only answer one of the answers that he/she considers related to his/her processes and competencies that he/she performs on a daily basis. It also allows to know their individual performance level, how they relate to their group and their affinity, and if they have the necessary support and tools to perform their role in order to achieve the strategic objectives of the organization. In the end, the responses of each respondent define the level of maturity in each dimension.

Table B-1 presents the distribution of questions presented by the NCMM. It can be observed that the greatest number of questions are in the domains of competencies and knowledge. In the case of knowledge, it can be said that the questions are focused on engineering processes and program managers, rather than on the other management areas, given their contribution to project management.

Table B-1
Distribution of the questions in the NCMM.

Survey	Questions
Competences	39
Financial	15
Strategic	15
Skills - Engineering	31
Knowledge - Quality	10
Knowledge - Procurement	10
Skills - Logistics	13
Knowledge - Safety and environment	13

Note: Source: Own elaboration.

The strategic dimension survey

The survey is composed of fifteen questions in total. In turn, it is divided into three groups. The first group consists of three questions are dedicated to know if the strategies are aligned with the mission and vision of the organization. The second group has nine questions focused on whether management informs stakeholders of its strategic plans and mechanisms. Finally, the last group of questions analyzes whether the strategic plans include projects for institutional growth, innovation, and incentives for employees.

Table B-2 below presents an extract of the questions used in the strategic dimension. In addition, it presents the possible answers that can be selected by the respondent that is related to his or her perception.

Table B-2
Extract from the questions of the strategic dimension

In the last 12 months, in your personal opinion, do you consider your organization:

Identification	Questions
E4	Do you have rules, as well as regulate the authority and power relationships between project managers and the different areas of the organization involved in the projects? a) I don't know b) They exist, but I am not well informed c) They exist, but there is little diffusion d) There are well-structured rules, and I am familiar with their procedures. e) There are well structured rules where we share information. The rules are aligned to the Mission and Vision of the organization. We care about having a good working environment and collaboration.
E5	Are you aware of the strategies and plans, how they affect them, and what their inputs should be? a) I don't know b) They exist, but I am not well informed c) They exist, but there is little diffusion d) I have the knowledge. I am informed of the processes on a regular basis, and some indicators are analyzed, and we participate in the strategies on an ongoing basis. e) I am the role model and an authority on the subject. Management listens to new criteria and suggestions. We all align ourselves to achieve the same goal. We rely on trends and take action to eliminate or mitigate potential risks. In addition, I use state-of-the-art tools to develop my activities according to strategies and plans.
E6	Do you communicate strategies and plans to all stakeholders as they may affect them? a) Rarely b) Communicates when there is something important c) Yes, on a regular basis d) It is a common practice in the organization. Management listens to new criteria and suggestions. Everyone is aligned to achieve the same goal. Information is stored electronically. e) It is a common practice in the organization. Management listens to new criteria and suggestions. We all align to achieve the same goal. We rely on trends and take actions to eliminate or mitigate potential risks. In addition, I use state-of-the-art tools to store information and review actions learned from other projects to reduce risks.
E7	Do you consider the current and future needs of different stakeholder groups (shareholders, customers, employees, suppliers)? a) Rarely b) It is contemplated, but seldom reported c) It is reported regularly, but to certain groups. d) Processes are reported and known on a regular basis. Some indicators are analyzed, and we participate in strategies on an ongoing basis. e) Processes are reported and known on a regular basis. Management listens to new criteria and suggestions. We are all aligned to achieve the same goal. We rely on trends and take action to eliminate or mitigate potential risks using state-of-the-art tools.

Note: Source: Own elaboration.

On the other hand, the survey of the competences dimension allows to know the perception that exists in the working groups, a small self-assessment of some of the competences at individual level is made. Finally, it analyses the competencies offered by the organization in relation to project management. The survey is divided into three main groups: individual competencies, group competencies, and institutional competencies. As previously mentioned, there are nine questions focused on individual competencies, twenty-six questions focused on group competencies, and four questions focused on institutional competencies. Table B-3 presents an extract of the individual competencies together with the closed responses.

Table B-3
Extract from the competency dimension survey

In the last 12 months, in your personal opinion, do you consider your organization:

Individual competences	Identification	Questions
Professionalism	C1	Do you show a commitment to achieving your organization's desired results? a) I never do b) I rarely do c) I often do d) I frequently do e) Yes, I always do
	C2	Do you use manners and forms of address towards your colleagues, customers and superiors? a) I never do b) I rarely do c) I often do d) I frequently do e) Yes, I always do
Ethics	C3	Do you practice values such as responsibility, punctuality, study, perseverance, character, concentration, training, discretion, among others? a) I never do b) I rarely do c) I often do d) I frequently do e) Yes, I always do
Conflicts	C4	Have you been trained to manage and control a conflict, design alternative solutions, be open to innovations, and use methods to achieve conciliation of the parties? a) I have not been trained b) I have the minimum training but have not applied it to my job c) I have the minimum training and have applied it to my job d) I have mastery and share my knowledge to others e) I am the role model, and I am an authority on the subject
Efficiency	C5	Have you been trained to achieve the programmed objectives and goals with the minimum of resources and time available? a) I have not been trained b) I have the minimum training but have not applied it to my job c) I have the minimum training and have applied it to my job d) I have mastery and share my knowledge to others e) I am the role model, and I am an authority on the subject
	C6	Are you able to make a plan to achieve the best possible performance and achieve the desired results? a) I have not been trained

	b) I have the minimum training but have not applied it to my job c) I have the minimum training and have applied it to my job d) I have mastery and share my knowledge to others e) I am the role model, and I am an authority on the subject

Note: Source: Own elaboration.

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A NEW FIXED AND GROWTH MEASUREMENT SCALE: DEVELOPMENT AND VALIDATION

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Abstract. This paper describes the development of 33 scale reagents to assess people's fixed and growth mindset perceptions. The concept of fixed and growth mindset arises from the theory of Carol S. Dweck that has been discussed for years in various investigations in the school environment; however, a scale of measurement in adults, particularly in workers for productivity, has not yet been developed. A measurement scale with three sections was designed with 70 reagents of fixed, learning mentality, taking the intelligence measurement of Buchanan, and Kern (2017), Dweck, Chiu, and Hong (1995), Dweck et al. (1999), as the reference. In the study, 97 supervisors from the maquiladora industry of Reynosa Tamaulipas participated; surveys were applied to three groups of participants to carry out the factorial reduction analysis process to verify the level of significance and validation of reagents. As a result, 15 fixed mindsets were obtained and 18 questions of growth mindset, which corroborate the referred theories of the measurement of the two dimensions of fixed and growth mindset. The use of this scale can serve as a reference for future research in adults to demonstrate their competence in productivity.

Keywords: Measurement scale, fixed mindset and growth mindset

NUEVA ESCALA DE MEDICIÓN DE MENTALIDAD FIJA Y APRENDIENTE: DESARROLLO Y VALIDACIÓN

Resumen. Esta publicación describe el desarrollo de 33 reactivos de escala para evaluar las percepciones de mentalidad fija y aprendiente de las personas. El concepto de mentalidad fija y aprendiente surge de la teoría de Carol S. Dweck que ha sido discutida por años en diversas investigaciones en el ámbito escolar, sin embargo aún no se ha desarrollado una escala de medición en adultos particularmente en trabajadores para la productividad, se diseñó una escala de medición con tres secciones con 70 reactivos de mentalidad fija y aprendiente, tomando la referencia la medición de inteligencia de Buchanan y Kern (2017), Dweck, Chiu y Hong (1995) y Dweck et al. (1999). En el estudio participaron 97 supervisores de la industria maquiladora de Reynosa Tamaulipas, se aplicaron encuestas a tres grupos de participantes para realizar el proceso de análisis de reducción factorial para comprobar el nivel de significancia y validación de reactivos.

Como resultado se obtuvieron 15 reactivos de mentalidad fija y 18 reactivos de mentalidad aprendiente, los cuales corroboran las teorías referidas de la medición de las dos dimensiones de mentalidad fija y aprendiente. El uso de esta escala puede servir como referente para futuras investigaciones en adultos para demostrar su competencia en la productividad.

Palabras clave: Escala de medición, mentalidad fija, mentalidad aprendiente.

Introduction

In this paper an empirical measurement scale is developed to assess perceptions of fixed and learning mindsets. The concept of learning and fixed mindset arises from Carol S. Dweck's theory that has been discussed for years in several researches in the school environment; however, a measurement scale has not yet been developed for adults, particularly in industrial workers.

The performance of the human factor is a critical factor in measuring the success of the productivity of companies that want to maintain and develop their workers.

There are several mechanisms to verify if a person is efficient, through tests and methods to measure their results, generally efficiency metrics; however, it may be insufficient only to take into account the knowledge and skill of the person. It is also necessary to measure the attitude and the way to face the challenges and difficulties of the task and the way to overcome them or decline; consequently, to know if the person has a characteristic trait of his person, as the mentality that can favor the achievement of his personal performance. Therefore, it is necessary to have a reliable reference to determine the type of mentality, learner or fixed, which may mean that the person can have a predictable behavior to the challenge.

This study focuses on the development of the scale of measurement of the learner or fixed mindset to identify the characteristic features of the person, which allows to evaluate the judgment of a person to face a given situation in their performance.

The Objective of this study is to (1) describe the development of a measurement scale for fixed and learner mentality and (2) discuss the properties of the scale and its potential application. The procedure for constructing the scale is based on the assessments of intelligence and the type of fixed or learner mentality.

Mindset and Personal Change

The theory of mindedness, also known as the implicit self theory, Dweck, Chiu and Hong (1995), state that people's self-beliefs influence judgments and reactions, particularly in the face of negative events. The main contribution of their study refers to two different assumptions. On the one hand, based on entity theory, they define that people have a highly valued personal trait such as intelligence, it is a fixed trait that cannot be changed. On the other hand, based on the incremental theory, they define that people can change their intelligence and develop it by learning new things and become more intelligent through effort.

In another study, Dweck, et al. (1999) confirm that intelligence has a relative effect on the trait of the person assigned to fixed factors and contrary to malleable ones. This contrast depends on the way the person copes with challenges and determines the

way of achievement. In this study it is determined that people with fixed trait depend on their self-confidence and, in the face of failure, they are not willing to make an effort, while malleable people in the face of failure are willing to make an effort.

Theories of the self in personality development are of great contribution to the understanding of individual change. In this regard, based on his own intelligence, Dweck (2000) explains that the hallmark of an individual is that he or she loves to learn, envisions change from assessing his or her own strength and persistence in the face of obstacles.

In a study of students, Dweck (2000) explains that some students show a certain quality for change and others do not, according to the following assertions: (1) students showed more abilities when facing obstacles, (2) they show more energy when facing more changes in the test to succeed, (3) they feel more encouraged when others recognize their intelligence, (4) students are more confident in their own intelligence. Conviction is when students believe in their own abilities to thrive.

The choice of achievement is related to the value of the task. In the study of Eccles (2005) through his model of choice for achievement, he determines two important groupings of the beliefs of the individual. First, the importance of individual choices for success has explanation in personal efficacy confidence. Second, the importance of evaluating the task among different choices for achievement is explained by the individual's intelligence and estimation of the level of difficulty of the decision.

In Eccles' (2005) proposed model applied to students, to enroll in career choice courses resulted in the following constructs (1) the expectation for success and sense of achievement through personal efficacy in the face of different testing options, (2) the relationship of short and long term goal choices through the need for social acceptance, (3) the individual role by culture, gender, religion, and ethnic group, and (4) the potential and cost of time investment in the preference of an activity among others.

Following the idea that when people face a challenge they activate their intelligence, Gollwitzer (2012) states that cognitive procedures are activated when the person faces a complex task, they deliberately choose what information they need to analyze and process to activate their intelligence.

This study highlights the relationship of the person between motivation and will establishing that the theory of mind-set has a process of phases of action. It also refers that people construct their own self-concept by setting goals such as being a good parent, a good scientist, a good worker, and their taste for achievement. Regarding the will and self-esteem to determine their own identity or self-definition of goals, he determines it as the theory of self-determination. The main purpose of this theory is to demonstrate that when people face experiences of failure or barriers, they do not give up but rather intensify their efforts to reach their goal.

In the phased mindset type, Gollwitzer (2012) highlights that the task of choosing in preliminary phase before a decision is a way of choosing between several desires of the person and choosing those few desires that he/she wants to realize. However, the choice of information has to be provided with pros and cons, to carry weight in the choice, and to be open minded so that the challenge is a genuine attraction. In this way it can be deduced that the person activates his mentality in phases to select what he really wants to do and that means to reach a goal, this choice among several desires inside of him, the one that has more weight.

Expectations of the Fixed and Learner Mentality

In Dweck's (2000) study with students, he confirms that some people believe that intelligence is a fixed personal trait. This condition was referred to as the entity theory of intelligence. This theory explains that intelligence is a reflection of the person, that change is a result of self-efficacy, and that intelligence can be malleable. When people persist in cultivating their behavior through learning, intelligence is something that can be increased and manifests itself as a strength of the person.

Following this concept of intelligence is malleable Dweck (2000) in setting goals for achievement, two conditions are identified: First, performance is a goal, this is determined by having a positive judgment of what it means to win. In the test with students, the author finds that the goals are related to their intelligence, they want to feel intelligent in front of others. Second, learning is a goal, increasing one's competence reflects one's tool for learning, students want to be smart.

People develop their own ability to learn and improve their competence, Wood and Bandura (1989) explain in their research that people with this conception adopt learning as a goal. They seek challenging tasks that provide opportunities to expand their knowledge and competencies. Mistakes are considered natural and necessary in the process of acquisition.

In Wood and Bandura's study (1989), three aspects of people were evaluated: managerial self-efficacy, personal goals, and personal strategies for performance. They were able to confirm the proposed hypothesis of individual self-regulation through management mechanisms in decision making. When people are focused on the realization of work requirements, using goals, feedback, and rewards to achieve productivity gains, they necessarily demonstrate their competence. People's conceptions of capability when approaching complex tasks affect self-regulation to display their talent. Therefore, self-regulation is an indicator variable of people who face a complex task, modify their talent or intelligence to face it as a goal or personal strategy to overcome it.

In another study Buchanan and Kern (2017) explore the importance of mindset in shaping a future of greater possibilities. They explain that people's mindsets reflect attitudes, beliefs, and values that influence their ability to learn, lead, and contribute to their environment. The authors explain that a narrow focus is that people think about what they do (fixed mindset) and how they do it (learning mindset), rather than asking the broader question why they do something. This leads to individuals tending to repeat past patterns, rather than looking for and producing what might be different and meaningful in their environment.

According to Buchanan and Kern (2017), fixed and learner mindset are also related to the maturity and performance level of an achiever. The authors describe that generally achievers are more comfortable working in the system where they belong, they do not question the system itself, they behave with (fixed mindset), they mature at an individualistic level. However, the individualist who behaves with a (learning mindset) questions why they do what they do and if they find a purpose beyond what the goal is. They strive to learn. Then it could be the beginning of the individualist's shift from being a learner to becoming a leader in the system.

Method

Design of the measurement scale

The generation and construction of the instrument's reagents correspond to two categories of mentality: the fixed mentality and the learning mentality. To design the scale, we started with a total of 70 reagents for a first grouping of the questionnaire integrated into three sections. Below it is described how it was carried out:

The first section was designed based on the selection of 20 reagents taken from previous publications such as the measurement of intelligence (Buchanan and Kern, 2017; Dweck, Chiu and Hong, 1995; Dweck, et al., 1999) based on these English language reagents, a process of translation and adaptation for the environment of manufacturing supervisors was performed. In this way, each item was edited to obtain the best interpretation in Spanish in which the identification is achieved to question the intelligence and talent of the people.

Subsequently, they were integrated into the instrument in the first section in the numbering from 1-20 to identify each reagent, a coding column describing the type of reagent was added. The purpose of the coding is to control each reagent for the analysis process, as can be seen in figure 1.

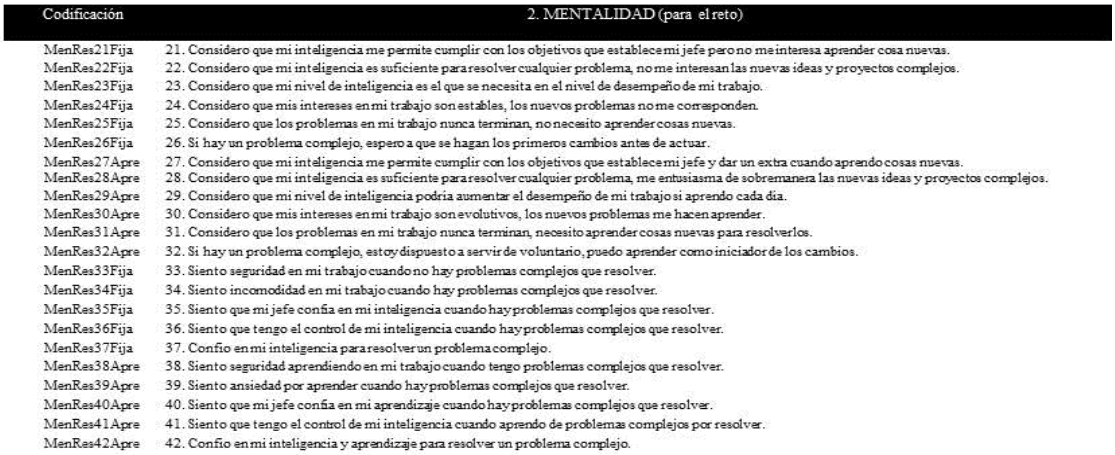
Codificación	1. MENTALIDAD (inteligencia/talento)
MenInte1Fija	1.Considero que tengo cierta cantidad de inteligencia y realmente no puedo hacer mucho por cambiarla.
MenInte2Fija	2.Considero que mi inteligencia es algo sobre mi que no puedo cambiar mucho.
MenInte3Fija	3.Considero que soy honesto, realmente no puedo cambiar mi nivel de inteligencia.
MenInte4Fija	4.Considero que puedo cambiar cosas nuevas, pero realmente no puedo cambiar mi inteligencia básica.
MenInte5Fija	5.Considero que la inteligencia que tengo, no ha cambiado desde que nací.
MenInte6Apre	6.Considero que sin importar como soy como soy, yo puedo cambiar significativamente mi nivel de inteligencia.
MenInte7Apre	7.Considero que puedo cambiar considerablemente la inteligencia que tengo.
MenInte8Apre	8.Considero que sin importar el nivel de inteligencia que tenga, siempre puedo incrementarla.
MenInte9Apre	9. Puedo cambiar incluso mi nivel básico de inteligencia considerablemente.
MenInte10Apre	10. Considero que la inteligencia que tengo, aumento con el aprendizaje y la edad.
MenInte11Fija	11. Considero que tengo cierta cantidad de talento y realmente no puedo hacer mucho por cambiarlo.
MenInte12Fija	12. Considero que mi talento es algo sobre mi que no puedo cambiar mucho.
MenInte13Fija	13. Considero que soy honesto, realmente no puedo cambiar mi nivel de talento.
MenInte14Fija	14. Considero que puedo cambiar cosas nuevas, pero realmente no puedo cambiar mi talento básico.
MenInte15Fija	15. Considero que el talento que tengo, es de nacimiento.
MenInte16Apre	16. Considero que sin importar como soy como soy, yo puedo cambiar significativamente mi nivel de talento.
MenInte17Apre	17. Considero que puedo cambiar considerablemente el talento que tengo.
MenInte18Apre	18. Considero que sin importar el nivel de talento que tenga, siempre puedo incrementarlo.
MenInte19Apre	19. Puedo cambiar incluso mi nivel básico de talento considerablemente.
MenInte20Apre	20. Considero que el talento que tengo, aumento con el aprendizaje y la edad.

Figure 1. Section 1 mindset instrument (Intelligence-talent). Measurement scale reagents from 1 to 20 coded for fixed mindset and learning mindset.

Note: Source: Own elaboration, 2021.

The second section was designed based on the selection of 10 reagents taken from previous publications such as the measurement of intelligence for the challenge (Dweck, Chiu and Hong, 1995; Dweck, et al., 1999; Dweck, 2000; Eccles, 2005); based on these English language items, a process of translation and adaptation for the environment of manufacturing supervisors was carried out. In this way, each item was edited to obtain the best interpretation of 22 reagents in the Spanish language in which the identification is achieved to question the intelligence for the people's challenge. Subsequently, they were integrated into the instrument in the second section in the 21-42 numbering to identify each item, a coding column was added that describes the type of item. The

purpose of the coding is to control each item for the analysis process, as can be seen in figure 2.



Codificación	2. MENTALIDAD (para el reto)
MenRes21Fija	21. Considero que mi inteligencia me permite cumplir con los objetivos que establece mi jefe pero no me interesa aprender cosa nuevas.
MenRes22Fija	22. Considero que mi inteligencia es suficiente para resolver cualquier problema, no me interesan las nuevas ideas y proyectos complejos.
MenRes23Fija	23. Considero que mi nivel de inteligencia es el que se necesita en el nivel de desempeño de mi trabajo.
MenRes24Fija	24. Considero que mis intereses en mi trabajo son estables, los nuevos problemas no me corresponden.
MenRes25Fija	25. Considero que los problemas en mi trabajo nunca terminan, no necesito aprender cosas nuevas.
MenRes26Fija	26. Si hay un problema complejo, espero a que se hagan los primeros cambios antes de actuar.
MenRes27Apre	27. Considero que mi inteligencia me permite cumplir con los objetivos que establece mi jefe y dar un extra cuando aprendo cosas nuevas.
MenRes28Apre	28. Considero que mi inteligencia es suficiente para resolver cualquier problema, me entusiasma de sobremanera las nuevas ideas y proyectos complejos.
MenRes29Apre	29. Considero que mi nivel de inteligencia podría aumentar el desempeño de mi trabajo si aprendo cada día.
MenRes30Apre	30. Considero que mis intereses en mi trabajo son evolutivos, los nuevos problemas me hacen aprender.
MenRes31Apre	31. Considero que los problemas en mi trabajo nunca terminan, necesito aprender cosas nuevas para resolverlos.
MenRes32Apre	32. Si hay un problema complejo, estoy dispuesto a servir de voluntario, puedo aprender como iniciador de los cambios.
MenRes33Fija	33. Siento seguridad en mi trabajo cuando no hay problemas complejos que resolver.
MenRes34Fija	34. Siento incomodidad en mi trabajo cuando hay problemas complejos que resolver.
MenRes35Fija	35. Siento que mi jefe confía en mi inteligencia cuando hay problemas complejos que resolver.
MenRes36Fija	36. Siento que tengo el control de mi inteligencia cuando hay problemas complejos que resolver.
MenRes37Fija	37. Confío en mi inteligencia para resolver un problema complejo.
MenRes38Apre	38. Siento seguridad aprendiendo en mi trabajo cuando tengo problemas complejos que resolver.
MenRes39Apre	39. Siento ansiedad por aprender cuando hay problemas complejos que resolver.
MenRes40Apre	40. Siento que mi jefe confía en mi aprendizaje cuando hay problemas complejos que resolver.
MenRes41Apre	41. Siento que tengo el control de mi inteligencia cuando aprendo de problemas complejos por resolver.
MenRes42Apre	42. Confío en mi inteligencia y aprendizaje para resolver un problema complejo.

Figure 2. Instrument section 2 mindset (for the challenge). Measurement scale reagents 21-42 coded for fixed mindset and learner mindset.

Note: Source: Own elaboration, 2021.

The third section was designed based on the selection of 10 reagents taken from previous publications such as the measurement of intelligence for self-efficacy of (Buchanan and Kern, 2017; Dweck, Chiu and Hong, 1995; Dweck, et al., 1999; Dweck, 2000; Gollwitzer, 2012; Wood and Bandura, 1989), based on these English language reagents, a process of translation and adaptation for the environment of manufacturing supervisors was performed. In this way, each item was edited to obtain the best interpretation of 28 reagents to the Spanish language in which the identification is achieved to question the intelligence for self-efficacy of people. Subsequently, they were integrated into the instrument in the third section in the numbering of 43-70 to identify each item, a coding column was added that describes the type of item. The purpose of the coding is to control each item for the analysis process, as can be seen in figure 3.

Codificación	3. MENTALIDAD (para la autoeficacia)
MenAut43Fija	43. Considero que las dificultades de mi trabajo son eventos que siempre puedo superar.
MenAut44Fija	44. Considero que las dificultades de mi trabajo, puedo resolver sin esfuerzo.
MenAut45Fija	45. Considero que tengo controladas las dificultades en mi trabajo.
MenAut46Fija	46. Considero que he estado obsesionado con una determinada idea o proyecto durante un tiempo corto, pero luego pierdo interés para continuar.
MenAut47Fija	47. Considero que no soy muy persistente en mi trabajo.
MenAut48Fija	48. Considero que no necesito esforzarme en proyectos que tardan más de unos meses en completarse.
MenAut49Fija	49. Considero que soy eficaz cuando termino cualquier proyecto que empiezo.
MenAut50Fija	50. Considero que soy eficaz cuando se trata de persuadir a las personas, para que comprendan mi punto de vista o que hagan lo que yo deseo.
MenAut51Fija	51. Al terminar mi día de trabajo, me siento satisfecho de lo que he realizado.
MenAut52Apre	52. Considero que he superado las dificultades en mi trabajo para conquistar con inteligencia un desafío importante.
MenAut53Apre	53. Considero que enfrentar las dificultades en mi trabajo, alientan mi inteligencia.
MenAut54Apre	54. Considero que para controlar las dificultades en mi trabajo., necesito ser más inteligente.
MenAut55Apre	55. Considero que he estado obsesionado con una determinada idea o proyecto durante un tiempo corto, pero luego me intereso en ser más inteligente para continuar.
MenAut56Apre	56. Considero que soy muy persistente en mi trabajo.
MenAut57Apre	57. Considero que necesito esforzarme y aprender de proyectos que tardan más de unos meses en completarse.
MenAut58Apre	58. Considero que soy eficaz cuando me esfuerzo y aprendo para terminar cualquier proyecto que empiezo.
MenAut59Apre	59. Considero que soy eficaz cuando aprendo y con inteligencia trato de persuadir a las personas, para que comprendan mi punto de vista o que hagan lo que yo deseo.
MenAut60Apre	60. Al terminar mi día de trabajo, me siento satisfecho si aprendí algo nuevo de lo que he realizado.
MenAut61Fija	61. Confío en mi inteligencia pero no estoy muy a gusto con cambios en mi trabajo.
MenAut62Fija	62. Confío en mi inteligencia pero siento que no soy respetado por mi trabajo
MenAut63Fija	63. Confío en obtener buen resultado en las pruebas fáciles.
MenAut64Fija	64. Confío en mi inteligencia pero no soy el indicado para resolver una dificultad de trabajo.
MenAut65Fija	65. Confío en mi inteligencia pero me disgustan las nuevas exigencias.
MenAut66Apre	66. Confío en mi inteligencia me ayuda a sentirme a gusto en mi trabajo aún de que existan cambios.
MenAut67Apre	67. Confío en mi inteligencia me ayuda a ganar respeto por mi trabajo.
MenAut68Apre	68. Confío en obtener buen resultado en las pruebas aún en las difíciles.
MenAut69Apre	69. Confío en mi inteligencia me ayuda a comprender y resolver una dificultad de trabajo.
MenAut70Apre	70. Confío en mi inteligencia me ayuda a comprender y enfrentar las nuevas exigencias.

Figure 3. Instrument section 3 mindset (for self-efficacy). Measurement scale reagents from 43 to 70 coded for fixed mindset and learner mindset.

Note: Source: Own elaboration, 2021.

The participants of the measurement scale.

The target population for the study (production supervisors) were chosen through a non-probability procedure, a convenience sample of 97 participants from a list of contacts from 5 maquiladora industrial parks of the industrial sectors (Automotive, Aerospace, Agro-industrial, Chemical, Plastic, Medical, Packaging, Metal-mechanical, Electrical-Electronic) of the City of Reynosa Tamps. For the collection of the information, electronic surveys were applied, sent by e-mail due to the restrictions of the current pandemic.

The first data collection for processing and analysis, an instrument with 70 reagents was applied to a group of 30 participants. The second data collection for analysis and refinement, an instrument with 33 reagents was applied to a group of 36 participants. The third data collection for analysis and refinement, an instrument with 33 reagents was applied to a group of 31 participants.

The instrument of the measuring scale.

The instrument is composed of cover page, introduction, general purpose of the study, instructions inserted throughout the same, contains three sections. A section with 20 reagents to identify the factors of fixed and learning mindset (intelligence/talent). Another section with 22 reagents to identify the fixed and learning mindset factors (challenge mindset). A final section with 28 reagents to identify the fixed and learning mindset factors (self-efficacy mindset). At the end of the questionnaire, a thank you to the participants was added. The questionnaire was administered by email to each participant.

Analysis of the measurement scale data.

The data of the initial instrument with 70 reagents were statistically analyzed to find similarities until the reduction of 33 reagents that determined the validity and reliability of the constructs of mindset (learner and fixed) was achieved through the following process.

First data collection, an instrument with 70 reagents was applied to a group of 30 participants. Using the method of extraction of the main factors and reliability assessment (Cronbach's alpha), the following results were obtained.

The first principal component (table 1.1) explained 80.498% of variance and was composed of fixed mindset reagents from the intelligence and talent section (eight reagents), challenge section (five reagents), self-efficacy (two reagents). The second principal component (table 1.2) explained 77.362% of variance and was composed of learning mindset reagents from the intelligence and talent section (six reagents), challenge section (four reagents), self-efficacy (seven reagents).

Table 1
Fixed mindset factor extraction of the sections: intelligence and talent, challenge and self-efficacy, 30 participants.

Reagents	Factorial extraction
MenInte 1 Fixed	.670
MenInte 2 Fixed	.766
MenInte 3 Fixed	.899
MenInte 4 Fixed	.829
MenInte 5 Fixed	.671
MenInte 12 Fixed	.896
MenInte 13 Fixed	.921
MenInte 14 Fixed	.904
MenRes 21 Fixed	.840
MenRes 22 Fixed	.785
MenRes 25 Fixed	.841
MenRes 35 Fixed	.691
MenRes 36 Fixed	.824
MenAut 43 Fixed	.800
MenAut 63 Fixed	.738

Note: Rotated factor loadings for the first fixed mindset principal component showing fifteen constituent reagents and the strength of their relationship.

Table 2
Factorial extraction of intelligence learning mindset sections: intelligence and talent, challenge and self-efficacy, 30 participants.

Reagents	Factorial extraction
MenInte 6 Apre	.725
MenInte 8 Apre	.922
MenInte 9 Apre	.874
MenInte 10 Apre	.869
MenInte 16 Apre	.869
MenInte 18 Apre	.898
MenRes 30 Apre	.824
MenRes 32 Apre	.858
MenRes 38 Apre	.762
MenRes 42 Apre	.845
MenAut 52 Apre	.784
MenAu t53 Apre	.649
MenAut 55 Apre	.910
MenAut 57 Apre	.559
MenAut 60 Apre	.531
MenAut 67 Apre	.622
MenAut 68 Apre	.675
MenAut 69 Apre	.748

Note: Rotated factor loadings for the first learner mindset principal component showing eighteen constituent reagents and the strength of their relationship.

Second data collection, an instrument with 33 reagents was applied to a group of 36 participants. Using the method of extraction of the main factors and reliability assessment (Cronbach's alpha), the following results were obtained.

The first principal component (Table 2.1) explained 77.06% of variance and was composed of fixed mindset reagents from the intelligence and talent section (eight reagents), challenge section (five reagents), self-efficacy (two reagents). The second principal component (Table 2.2) explained 77.362% of variance and was composed of learning mindset reagents from the intelligence and talent section (six reagents), challenge section (four reagents), self-efficacy (eight reagents).

Table 3
Fixed mindset factor extraction of the sections: intelligence and talent, challenge and self-efficacy, 36 participants.

Reagents	Factorial extraction
MenInte 1 Fixed	.654
MenInte 2 Fixed	.802
MenInte 3 Fixed	.854
MenInte 4 Fixed	.645
MenInte 5 Fixed	.817
MenInte 12 Fixed	.754
MenInte 13 Fixed	.815
MenInte 14 Fixed	.778
MenRes 21 Fixed	.782
MenRes 22 Fixed	.740
MenRes 25 Fixed	.695
MenRes 35 Fixed	.852
MenRes 36 Fixed	.776
MenAut 43 Fixed	.839
MenAut 63 Fixed	.757

Note: Rotated factor loadings for the first fixed mindset principal component showing fifteen constituent reagents and the strength of their relationship.

Table 4
Factorial extraction of intelligence learning mindset sections: intelligence and talent, challenge and self-efficacy.

Reagents	Factorial extraction
MenInte 6 Apre	.919
MenInte 8 Apre	.915
MenInte 9 Apre	.765
MenInte 10 Apre	.815
MenInte 16 Apre	.838
MenInte 18 Apre	.828
MenRes 30 Apre	.802
MenRes 32 Apre	.765
MenRes 38 Apre	.795
MenRes 42 Apre	.874
MenAut 52 Apre	.646
MenAut 53 Apre	.882
MenAut 55 Apre	.680
MenAut 57 Apre	.848
MenAut 60 Apre	.816
MenAut 67 Apre	.678
MenAut 68 Apre	.773
MenAut 69 Apre	.727

Note: Rotated factor loadings for the first learner mindset principal component showing eighteen constituent reagents and the strength of their relationship.

Third data collection, an instrument with 33 reagents was applied to a group of 30 participants. Using the method of extraction of the main factors and reliability assessment (Cronbach's alpha) the following results were obtained.

The first principal component (Table 3.1) explained 77.06% of variance and was composed of fixed mindset reagents from the intelligence and talent section (eight reagents), challenge section (five reagents), self-efficacy (two reagents). The second principal component (Table 3.2) explained 79.82% of variance and was composed of learning mindset reagents from the intelligence and talent section (six reagents), challenge section (four reagents), self-efficacy (eight reagents).

Table 5
Factor extraction of fixed mindset from the sections: intelligence and talent, challenge and self-efficacy.

Reagents	Factorial extraction
MenInte 1 Fixed	.654
MenInte 2 Fixed	.802
MenInte 3 Fixed	.854
MenInte 4 Fixed	.645
MenInte 5 Fixed	.817
MenInte 12 Fixed	.754
MenInte 13 Fixed	.815
MenInte 14 Fixed	.778
MenRes 21 Fixed	.782
MenRes 22 Fixed	.740
MenRes 25 Fixed	.695
MenRes 35 Fixed	.852
MenRes 36 Fixed	.776
MenAut 43 Fixed	.839
MenAut 63 Fixed	.757

Note: Rotated factor loadings for the first fixed mindset principal component showing fifteen constituent reagents and the strength of their relationship.

Table 6
Factorial extraction of intelligence learning mindset sections: intelligence and talent, challenge and self-efficacy.

Reagents	Factorial extraction
MenInte 6 Apre	.919
MenInte 8 Apre	.915
MenInte 9 Apre	.765
MenInte 10 Apre	.815
MenInte 16 Apre	.838
MenInte 18 Apre	.828
MenRes 30 Apre	.802
MenRes 32 Apre	.765
MenRes 38 Apre	.795
MenRes 42 Apre	.874
MenAut 52 Apre	.646
MenAut 53 Apre	.882
MenAut 55 Apre	.680
MenAut 57 Apre	.848
MenAut 60 Apre	.816
MenAut 67 Apre	.678
MenAut 68 Apre	.773
MenAut 69 Apre	.727

Note: Rotated factor loadings for the first learner mindset principal component showing eighteen constituent reagents and the strength of their relationship.

Results

The questionnaires applied to the selected groups were experimentally confirmed, through factor analysis and reliability studies (Cronbach's alpha), to assess their validity and confidence. Each item was measured repeatedly until the construct was confirmed.

Downscaling

The initial instrument of 70 reagents was grouped for analysis of the result of three sections, one with 20 reagents to identify the factors of fixed and learner mindset (intelligence/talent). Another section with 22 reagents to identify the fixed and learner mindset factors (challenge mindset), and a final section with 28 reagents to identify the fixed and learner mindset factors (self-efficacy mindset). These groupings were deliberately appropriate to meet the objective of developing a reliable and meaningful

fixed and learner mindset measurement scale to assess a person's judgment in coping with a given situation in their performance for productivity.

Purification of the scale, first collection

The purification of the instrument was done by computer analysis with the SPSS program, the data were run to obtain the extraction of 15 fixed mindset reagents with an analysis of variance of 80.498, with a coefficient (Cronbach's alpha) of .784 loaded on 4 dimensions (constructs) and the extraction of 18 learning mindset reagents with an analysis of variance of 77, with a coefficient (Cronbach's alpha) of .913 loaded on 5 dimensions (constructs).

Purification of the scale, second collection

The purification of the instrument was done by computer analysis with the SPSS program, the data were run to obtain the extraction of 15 fixed mindset reagents with an analysis of variance of 77.06, with a coefficient (Cronbach's alpha) of .756 loaded on 5 dimensions (constructs) and the extraction of 18 learning mindset reagents with an analysis of variance of 79.82, with a coefficient (Cronbach's alpha) of .824 loaded on 6 dimensions (constructs).

Purification of the scale, third collection

The purification of the instrument was done by computer analysis with SPSS program, the data were run to obtain the extraction of 15 fixed mindset reagents with an analysis of variance of 74.72, with a coefficient (Cronbach's alpha) of .811 loaded on 4 dimensions (constructs) and the extraction of 18 learner mindset reagents with an analysis of variance of 73.75, with a coefficient (Cronbach's alpha) of .835 loaded on 4 dimensions (constructs).

Discussion and conclusions

The study conducted provides empirical information, the properties of a scale to measure the type of mindset: fixed mindset and learning mindset based on Carol S. Dweck's mindset theory, which has been discussed for years.

The study was conducted in the maquiladora industry of the industrial sectors (Automotive, Aerospace, Agro-industrial, Chemical, Plastic, Medical, Packaging, Metal-mechanical, Electrical-Electronic) of the City of Reynosa Tamps. These industries are representative, to measure the performance behavior of production supervisors under the context of production operation.

In relation to the theories of mindset and personal change, several studies (Dweck, Chiu and Hong 1995; Dweck, et al., 1999; Dweck 2000; Eccles, 2005; Gollwitzer, 2012) corroborate the way in which people face their own beliefs, studies such as Dweck, Chiu, and Hong's (1995) entity theory, show that people influence judgments and reactions to negative events, people have a highly valued personal trait such as intelligence, a fixed trait that cannot be changed. Also in reference to the incremental theory, they define that people can change their intelligence and develop it through learning and effort.

Following this basis of intelligence in the study of Dweck, et al. (1999), they confirm that people with fixed trait depend on their self-confidence and in the face of failure are not willing to make an effort. However, considering that people can change, Dweck's (2000) study confirms that the individual projects their change by assessing their own

strength and persistence in the face of obstacles. It also confirmed that a person's abilities are demonstrated when they face obstacles, apply energy to face changes in the test, and feel more encouraged when others recognize their intelligence.

In this sense, to demonstrate the choice of people for achievement, Eccles (2005) contributed with the constructs that refer to the expectation of success, the choice of goals and social acceptance, the individual role, and the preference based on the investment of time, also the study of Gollwitzer (2012) refers that the choice of achievement has to do with an evaluation of pros and cons to assert their self-determination and does so through a process of phases that before a complex task they deliberately choose what they will occupy to use their own intelligence. All of these studies reported that the measurements made involved only students.

In relation to the expectations of fixed and learning mindset, several studies (Dweck, 2000; Wood & Bandura, 1989; Buchanan & Kern, 2017) corroborate that intelligence is a fixed trait. Dweck's (2000) theory of intelligence confirms that intelligence is malleable and can be increased.

People pursue a goal, they tend to feel intelligent in the eyes of others, and learning is a tool of their own. Wood and Bandura (1989) show that people develop their own ability to learn and improve their competence. In their study they show that self-regulation through management mechanisms are favorable for decision making. People reflect a regulatory mechanism when they face a problem situation, i.e. they are willing to modify their talent or intelligence to face a difficulty as a personal goal or strategy.

For their part, Buchanan and Kern (2017) highlight the importance of mindset to create greater chances of success of the person. The mindset reflects conditions of the person to learn and contribute to their environment, they emphasize the difference between fixed mindset and learner mindset. Also in their study they confirm that the person can cope with a shift from being an individualistic-learner to feeling like a leader of a system by finding a purpose to answer questions about the reasons for their behaviors and their effort to learn. The benefits of the mindset could have an influence on individual leadership and on the collective, creating the future as a complement of evolution.

It is noted that the studies of ((Dweck, Chiu and Hong 1995; Dweck, et al. 1999; Dweck 2000; Eccles, 2005; Gollwitzer, 2012; Wood and Bandura, 1989; Buchanan and Kern, 2017), all of them reported that the measurements made involved only students.

In relation to the articles published on the fixed mindset and the learning mindset, there has been discussion about their importance for the development of the person and their learning to learn from their own potential, and there has also been an increase in publications in recent years that show interest in the subject.

The researches explored propose a new approach for people to maintain their own capabilities, starting from their beliefs and putting it to benefit in all their relationships such as in school, in business, and in any activity that requires putting their performance into action.

The purpose of this research is to describe and develop multiple scale reagents to measure the type of fixed mindset and learner mindset, based on assessments of the theories analyzed.

This study empirically confirms two dimensions of mindset: fixed mindset and learning mindset developed three sections. The first section with 20 reagents to identify the factors of fixed and learning mindset (intelligence/talent). The second section with 22

reagents to identify the factors of fixed and learning mindset (challenge mindset). The third section with 28 reagents to identify the fixed and learner mindset factors (self-efficacy mindset). Production supervisors from the maquiladora industry participated in this study to experimentally confirm the questionnaires applied to the selected groups through factor analysis and their reliability.

The purification of the scale after three data collections through computer analysis using SPSS program, the data were run to obtain the extraction of 15 fixed mindset reagents with an analysis of variance of 74.72, with a coefficient (Cronbach's alpha) of .811 loaded on 4 dimensions (constructs) and the extraction of 18 learner mindset reagents with an analysis of variance of 73.75, with a coefficient (Cronbach's alpha) of .835 loaded on 4 dimensions (constructs).

The result of 33 reagents to determine the scale that tests validity and confidence were based on previous studies of (Dweck, Chiu and Hong 1995; Dweck, et al. 1999; Dweck 2000; Eccles, 2005; Gollwitzer, 2012); it can be seen that past research efforts to corroborate that fixed mindset and learner mindset are distinctive traits of each individual and can be identified.

For their part, the studies of Buchanan and Kern (2017), Dweck (2000), Wood and Bandura (1989), have made a great contribution to the knowledge of the behavior of students for a better understanding of their evolution and personal development.

However, it is necessary to verify these conditions in other environments different from the school one in order to have more reference of people's development behaviors, as in the industrial production that is the reason of this research. We can conclude that the potential of people from the point of view of the type of fixed mentality or learning mentality by which they develop in their school, social, and productive environments, is currently unknown. The contribution of this study can be a reference for future research, the scale can be used in the measurement of the fixed mentality and apprehensive mentality that people have and have a new approach to the potential and development of each person.

The benefits of this scale can determine whether a person can perform better in the workplace if their fixed mindset or learning mindset is known. This could be a trigger to design complementary human resource assessments to design training and human development programs. The testing of this scale is limited to measurements of groups of production supervisors in the Reynosa maquiladora industry. It is necessary to continue testing on more groups of participants from different regions and production sectors to increase its confidence and validity.

This research was conducted without including production supervisors of the maquiladora industry in the city of Reynosa, Tamaulipas. For the object of study, neither the companies nor the participants were randomly selected, since this limits the generalization of the results. Although this allowed us to accommodate factors that implicate the heterogeneity of the measurements in terms of fixed and learner mentality to determine a standard scale in adults, it is very necessary to continue doing research in diverse productive sectors to broaden its understanding.

Because of pandemic constraints, access to personal interviews and permission to collect other personal data from respondents was difficult. Surveys were administered online.

The continuity of this research and the use of the scale will facilitate decision making for selection, hiring, induction, training, and development of personnel by labor

competencies. This scale will allow other users such as employers, consultants to have as a reference for future research in the field of productivity in various productive sectors.

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GENDER RELATIONS AND WOMEN'S WORK AS DEMOGRAPHIC RISK FACTORS DUE TO THE COVID-19 PANDEMIC

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Summary. Having unleashed the COVID-19 pandemic at the international level, the response of the Peruvian State is to promulgate the Supreme Decree No. 0400-2020-PCM where the State of National Emergency is declared in Peru due to the COVID-19 outbreak. Given the last point, it is necessary to be aware of the impact of COVID-19, in particular, in relation to gender relations and women's work in Peru. The proposed research constitutes an instance where certain statistical artifacts have been generated from a descriptive analysis that allows measuring the impact of COVID-19 on gender relations and women's work. Statistical artifacts result from the operationalization of women's gender and labor relations as demographic risk factors. Operationalization measures: (1) the progress of the pandemic through the number of positive cases for COVID-19; (2) the economic slowdown through the number of positions for women; (3) the advancement of social confinement through the number of activities performed at home or outside of it to obtain an income. The statistical artifacts addressed have their scope for the Peruvian nation during the fourth quarter of 2020 and first quarter of 2021. The proposed research is of interest to observe the behavior of gender relations and women's work regarding the impact of the COVID-19 pandemic.

Keywords: gender relations, women's work, impact of COVID-19, operationalization

LAS RELACIONES DE GÉNERO Y EL TRABAJO DE MUJERES COMO FACTORES DE RIESGO DEMOGRÁFICOS POR LA PANDEMIA DEL COVID-19

Resumen. Habiéndose desatado la pandemia del COVID-19 a nivel internacional, se tiene que la respuesta del Estado Peruano es la de promulgar el Decreto Supremo N° 0400-2020-PCM donde se declara el Estado de Emergencia Nacional en Perú por el brote del COVID-19. Dado lo anterior es menester tener conocimiento del impacto del COVID-19, en particular, en lo referido a las relaciones de género y trabajo de mujeres en el Perú. La investigación propuesta constituye una instancia donde se han generado ciertos dispositivos estadísticos a partir de un análisis descriptivo que permite medir el impacto del COVID-19 en

las relaciones de género y trabajo de mujeres. Los dispositivos estadísticos resultan de la operacionalización de las relaciones de género y trabajo de mujeres como factores de riesgo demográficos. En la operacionalización se mide: (1) el avance de la pandemia mediante la cantidad de casos positivos por COVID-19; (2) la desaceleración económica mediante el número de puestos de mujeres; (3) el avance del confinamiento social mediante el número de actividades desempeñados en el hogar o fuera de él para obtener un ingreso. Los dispositivos estadísticos abordados tienen su alcance para con la nación peruana durante los trimestres IV de 2020 y I de 2021. La investigación propuesta resulta de interés para observar el comportamiento de las relaciones de género y trabajo de mujeres respecto del impacto de la pandemia COVID-19.

Palabras clave: relaciones de género, trabajo de mujeres, impacto de COVID-19, operacionalización

Introduction

This document comes from the research topic entitled "Impact of COVID-19 on gender relations and women's work in Peru," which has been promoted by the National Institute of Statistics and Informatics (INEI) in Peru through the 1st and 2nd National Call for Research in 2021, which seeks to promote the databases of the National Censuses and Surveys that this Peruvian public entity executes. Given the topic is that the proposed research seeks to operationalize gender relations and women's work as demographic risk factors to measure the impact of COVID-19 on both gender relations and women's work.

Method

Basis of the problem

A State of National Emergency has been declared in Peru by Supreme Decree No. 044-2020-PCM due to the serious circumstances affecting the life of the Peruvian nation as a result of the outbreak of COVID-19. Among others, mandatory social isolation (quarantine) and restrictions on commercial activities, cultural activities, establishments, and recreational activities, hotels, and restaurants were ordered; however, essential or critical activities were allowed to continue under strict security measures. Similarly, Supreme Decree No. 80-2020-PCM has been issued approving the resumption of economic activities in a gradual and progressive manner within the framework of the declaration of a National Sanitary Emergency in Peru. The above provisions as a whole caused Peru to have a negative inter-annual variation of 11.1% of its GDP within the framework of a joint decrease of 6.6% of GDP in 2020 on the part of South American countries where it is evident that Peru has had an economy during the year 2020 that has added to the slowdown in world economic activity (Dirección de Promoción Minera, 2021). The above results in the contextualization of the health emergency due to COVID-19 as a factor that originates structural inequalities, deficiencies, and fragilities in the health and education sectors, in addition to reversing the progress in the inclusion of women in the labor market to levels of previous periods. Given the above, the violation of gender relations and women's work is implied by the COVID-19 pandemic.

Given the above, it is considered necessary to operationalize gender relations and women's work as demographic risk factors during the fourth quarter of 2020 and the first quarter of 2021, given that statistical devices are required to measure the impact of COVID-19 on these factors. In other words, it is necessary to operationally develop

gender relations and women's work as demographic risk factors during the reference period to measure the impact of the pandemic in terms of its epidemiological advance and the consequent slowdown of economic activities and advance of social confinement. It is perceived that the operational development of the demographic risk factors in question would be the responsibility of governmental authorities and business associations because such development would be linked to a certain demographic complexity, which requires expert judgment. The operational development of the demographic risk factors in question is thought not to have been undertaken to date mainly due to the prioritization of the emergency approach over the economic revival approach, the effects of the economic slowdown, and/or social conflicts. It is perceived important to address the issue of operational development of demographic risk factors in question given that Peruvian operations happen to be the economic engine of Peru. The operational development of the demographic risk factors in question is considered relevant given that a greater survey and knowledge of the female population, both employed and unemployed, is required. It is thought that it is possible to carry out the operational development of the demographic risk factors in question by cross-referencing data and information from certain national surveys with open data from the Ministry of Health (MINSA) - COVID-19 with respect to COVID-19 positive cases; the national surveys for cross-referencing data would be the following: (1) National Household Survey (ENAHO); (2) Demographic and Family Health Survey; (3) Permanent Employment Survey.

- The formulation of the problem (Proposes a meaningful question that justifies the research)

How has the COVID-19 pandemic impacted women's gender and work relations during the fourth quarter of 2020 and the first quarter of 2021?

- Systematization of the problem (these are the sub-questions that will help to answer the significant question)

How has the COVID-19 pandemic impacted women's work in terms of the number of healthy women and the number of jobs for women?

How has the COVID-19 pandemic impacted gender relations in terms of the number of infected household members and their level of interactivity?

Research objectives

Overall objective

To operationally develop gender relations and women's work as risk factors for the COVID-19 pandemic in Peru during the fourth quarter of 2020 and the first quarter of 2021.

Specific Objectives (Specific purposes by which the overall objective can be achieved)

Operationally develop women's work as a national risk factor due to the COVID-19 outbreak, during the fourth quarter of 2020 and first quarter of 2021, linking the advance of COVID-19 infections and the economic slowdown.

Operationally develop gender relations as a national-level risk factor due to the COVID-19 outbreak, during the fourth quarter of 2020 and first quarter of 2021, linking the progression of COVID-19 infections and the acceleration of social confinement.

Research Justification

Practical motivations (research supports problem solving for decision making)

In the Peruvian environment, secondary information is required for decision-making related to gender relations and women's work, in particular, where these are referred to as risk factors due to the COVID-19 pandemic. The secondary information to be provided would contribute as a support tool for decision-making linked to compliance with Supreme Decree 080-2020-PCM where the central government of Peru approves the resumption of economic activities in 4 phases. Having promulgated Supreme Decree No. 184-2020-PCM, which establishes measures for a new social coexistence that promotes physical or bodily isolation while activities are resumed with discipline and prioritizing health, it is presumed to be of relevance to contribute additionally to this new social coexistence with the identification of practices linked to the risk factors in question in the different national surveys that complicate them or not.

Motivations of a methodological nature (contributes to the use or creation of research instruments and models)

It is presumed that the proposed research would allow the detection of risk groups that can be identified dimensionally by means of comorbidities (e.g. obesity, cardiovascular diseases, diabetes mellitus, among others), demographic aspects (e.g. age, kinship relationship, lifestyle, occupational exposure, among others), among others.

Theoretical motivations (allows to verify, reject, or provide theoretical propositions of the subject of study)

The proposed research contributes to increase the complexity in the management of the results of certain large-scale research. The results of the proposed research serve to increase the complexity of managing the results of the National Household Survey (ENAHO), Demographic and Family Health Survey, and Permanent Employment Survey with respect to certain risk factors resulting from the living conditions of the population at risk for the COVID-19 pandemic.

The proposed research contributes to the sufficiency of certain legal devices in Peru. First, the proposed research would serve to verify the economic generalization carried out by means of Supreme Decree 080-2020-PCM, which approves the resumption of economic activities in 4 phases, which is supposed to be effective for all economic activity, with exceptions, and its corresponding complexity with respect to women's work. Additionally, the proposed research would contribute to typify the referred new social coexistence determined by means of Supreme Decree N° 184-2020-PCM given that it is presumed that at a national level there is not only one type of coexistence but a diversity of coexistence, which would imply the need for a corresponding typification of the new social coexistence.

Theoretical Framework (It locates the investigation within the set of existing theories with the purpose of specifying in which current of thought it is inscribed and to what extent it means a contribution or is complementary)

Background of the proposed research

To date, no research work has been recorded as background for the proposed research; however, it can be affirmed that the information to be generated in the research is relatively included in research work that uses the following national surveys as a source: (1) National Household Survey (ENAHO); (2) Demographic and Family Health Survey; (3) Permanent Employment Survey. The research works that are highly compatible with the proposed research are the works of Gutiérrez et al. (2020) and Suárez et al. (2020) that develop living conditions of the population at risk for the COVID-19 pandemic and risk factors associated with COVID-19 complications, respectively.

Legal framework

The proposed research is contextualized in the Peruvian legal framework in relation to the promulgation of Supreme Decrees N° 044-2020-PCM, N° 080-2020-PCM and N° 184-2020-PCM, where Peru is declared in a State of National Emergency due to the outbreak of COVID-19, the economic reactivation in 4 phases is approved, and measures for the new social coexistence are established, respectively. The results of the proposed research would contribute, mainly, with respect to deepening in what refers to the vulnerable population in particular, in their quality as participants, in gender relations, and their participation in women's work.

Given that women's work and gender relations are linked as issues to gender equality, the proposed research is legally framed by Supreme Decree 008-2019-MIMP that approves the National Policy on Gender Equality.

Peruvian institutional framework

The proposed research is based on certain reports of the National Institute of Statistics and Informatics (INEI). First, given that we intend to inquire about gender relations and women's work, it is thought that the information provided by households at the national level through the National Household Survey (ENAHO) 2019 would inferentially describe the target population since the latter survey claims to disseminate the living conditions of the population at risk of the COVID-19 pandemic (Gutierrez et al., 2020). Secondly, in view that it is intended to inquire about gender relations and women's work, it is considered that the information inquired is partially described by certain risk factors associated with COVID-19 complications, information related to the object of the Demographic and Family Health Survey (ENDES) 2018-2019 (Suárez et al., 2020).

International Institutional Framework

Given the international context of the COVID-19 pandemic, it has been seen convenient to contextualize the proposed research with global documents that refer to certain trends or patterns of behavior common to all nations. The proposed research is located within the gender implications of health, education, economic conditions, and citizen security proposed by De Paz et al. (2020), which is addressed as a development of gender dimensions. Additionally, the proposed research finds its context in both macroeconomic and microeconomic facts that are exposed among others through global institutions such as the World Bank (2020) that exposes determining factors of the COVID-19 epidemic, such as macroeconomic and microeconomic difficulties of the population; the microeconomic difficulties in question as a determining factor would mainly frame and/or orient the gender dimensions to be addressed in the proposed research. The World Bank (2020) exposes the lack of resources when facing confinements and quarantines, informality, labor migration, and the problem of economic transfers.

The COVID-19 pandemic has impacted gender relations and women's work in terms of their productivity, causing it to slow down; given the above, the proposed research is convenient to frame it within internationally accepted contents regarding the implications of COVID-19 on productivity, such as the contents proposed by Dieppe (2021), which state that the low productivity due to COVID-19 would be linked to the following: (1) a slowdown in investments and foreign trade; (2) erosion of human capital and a shift in labor markets; (3) slowdown in labor reallocation; (4) a heavy debt burden. On the other hand, Dieppe (2021) argues that productivity has been relatively positively impacted by the following: (1) positive organizational and technological changes; (2)

diversity and resilience in supply chains; (3) improvements in education; (4) financial development.

The proposed research is intended to be framed in contents referred to the evaluation of the impact of the COVID-19 pandemic in the business world given that it is developed within the framework of women's work. Given the above, it is considered important to include in the theoretical framework of the proposed research the contents proposed by Apedo-Amah et al. (2020) about the impact of COVID-19 on businesses in developing countries where nearly 100,000 businesses have been evaluated to inquire about the COVID-19 shock in terms of its magnitude and distribution. The empirical contents of Apedo-Amah et al. (2020) are perceived with some degree of similarity as they refer that the COVID-19 pandemic has generated among others labor adjustments, financial constraints, increased digital solutions, and uncertainty in the future.

It is considered relevant to use as international framework of the proposed research referential documents of the International Labour Organization by the social purpose of the institution in question. It has been found important to have the contents about labor trends for the year 2021 disclosed by the International Labour Organization (2021). Likewise, it has been seen convenient to include within the theoretical framework contents related to the application of labor standards in times of crisis such as the COVID-19 pandemic that discloses the International Labour Organization (2020). In terms of trends, the International Labour Organization (2021) mentions that the COVID-19 pandemic constitutes a disruption in the work environment that will take time to disappear. The International Labour Organization (2020) reports that the COVID-19 pandemic has undermined the progress of equality between men and women in the world of work, and women are perceived to have been more affected in terms of job loss.

Framework for research methodology

It is convenient to use literature that refers to both qualitative and quantitative research methodologies and also mixed; given the above, it is intended to frame the proposed research within the research methodologies proposed by Hernandez et al. (2010) since the contents that are disclosed refer to some that belong to different sciences and disciplines in the field of research. Additionally, it is convenient to include in the theoretical framework bibliography of research methodology specific to the field of business because it addresses the work of women; exposed the above, it is convenient to include the guidelines for the research of case studies proposed by Dul and Hak (2008). Similarly, given that the proposed research refers to the review of various contents, it is considered relevant to include in its theoretical framework literature that refers in a focused way to the literature review; having said this, the proposed research is framed in the guidelines for the research methodology of traditional and systematic reviews and meta-analysis proposed by Jesson et al. (2011) since it integrates a multidisciplinary approach.

Since research methodologies are important as a reference for the proposed research, it is considered important to include certain documents as reference reports to verify the functionality of the data collection instruments; this is linked to the inclusion of the report prepared by Cucagna and Romero (2021) where they investigate the gender impacts of COVID-19 on the labor market in Latin America and the Caribbean through high-frequency telephone surveys.

A research methodology that is useful for the proposed research is that proposed by Maliszewska et al. (2020) that seeks to simulate a potential impact of COVID-19 on gross domestic product (GDP) using a global standard equilibrium computational model; the model represents the COVID-19 shock as an underutilization of labor and capital, an

increase in foreign trade costs, a drop in travel services, variations in demand for face-to-face services (Maliszewska et al., 2020). The model proposed by Maliszewska et al. (2020) is thought to serve as a reference research material for the determination of determinants of the COVID-19 pandemic impact on gender relations and women's work.

Hypothesis Formulation and Operationalization

Formulation (Hypotheses are stated in a form that allows for verification)

H_1 : The higher the number of cases of COVID-19 infection, the lower the number of women's jobs.

H_2 : The greater the economic slowdown due to the COVID-19 pandemic, the lower the number of women's jobs.

H_3 : The greater the number of cases of COVID-19 infection, the greater the interactivity in gender relations.

H_4 : The greater the acceleration of social confinement due to the COVID-19 pandemic, the greater the interactivity in gender relations.

Operationalization (The variables that define the hypotheses are broken down into indicators).

Table 1
Operationalization

Dimension	Risk Factor	Indicator	Operationalization of indicators
Economic	Women's Work	COVID-19 Pandemic Update	Number of women infected with COVID-19
		Economic slowdown due to COVID-19 pandemic	Quarterly percentage change in the ratio of persons who were engaged in an income-earning activity at home or outside the household to those who were not.
	Gender relations	COVID-19 Pandemic Update	Number of people infected with COVID-19
		Accelerating Social Confinement due to COVID-19 Pandemic	Variation in the number of instances of interaction in gender relations. An instance of interaction is an experience in the home or outside the home that has an impact on the family system in terms of social, economic, or emotional aspects.

Methodological Aspects

Type of study: Descriptive and explanatory study.

In the first place, the type of study to be carried out is descriptive. This is based on the fact that the research proposal describes the impact of the COVID-19 pandemic on women's work and gender relations. Based on what has been described, the aim is to use statistical devices as indicators to measure the impact of COVID-19 on women's work and gender relations.

Secondly, the type of study is explanatory. This is based on the fact that the aim is to contrast correlational hypotheses.

Research Method(s)

Observation: In the proposed research, use is made of observation of women and every participating member of a household in the field of work and home, respectively. The public in question is observed since the primary data are extracted from these segments of the population. The observation will be carried out using primary sources of information from certain national surveys and open data from the Ministry of Health (MINSA).

Analysis and synthesis: Given that we intend to relate events in the proposed research such as the advance of the pandemic, economic slowdown, and acceleration of confinement, it is convenient to apply a methodological process of synthesis for the formulation of theories. Likewise, given that the advance of the pandemic, economic slowdown, and acceleration of confinement are phenomena that result from certain determining factors, it is useful to apply a methodological process of analysis to generalize through theories.

Sources and techniques of data collection

Primary sources: First-hand data are obtained from the following: (1) National Household Survey (ENAHO); (2) Demographic and Family Health Survey; (3) Permanent Employment Survey; (4) Open data from the Ministry of Health (MINSA) regarding the number of positive COVID-19 cases.

Secondary sources: Second-hand data corresponds to World Bank Open Data for the female workforce as a percentage of the total workforce in Peru from 1990 to 2019. Information on workplace pandemic management proposed by Fernandez (2020), Alegre (2020), and EU-OSHA (2020) is also included.

Information processing

Statistical analysis techniques: The following analyses are intended to be used: (1) descriptive analysis; (2) inferential analysis; (3) causal analysis.

Econometric analysis techniques: In the case that the primary data collection is sufficiently representative, a time series analysis is intended.

Innovative Nature of the Proposal

The proposed research is considered innovative since it is carried out during the National State of Emergency due to the COVID-19 pandemic and its objective is to study the national population that develops during the pandemic; the aforementioned makes the research have a high index of originality with respect to other works. To date, there is no national work that refers to measurements of the impact of COVID-19 on women's work and gender relations.

The proposed research constitutes one of the national research works in the socioeconomic field that is oriented to generate a synergy of efforts for the achievement

of the 5th sustainable development goal proposed by the United Nations at the international level, i.e. the gender equality goal. It is worth mentioning that to date not much effort has been devoted to this goal.

Impact of the research on public policy

The proposed research constitutes an effort to achieve compliance with policies set out in Supreme Decree No. 008-2019-MIMP, which approves the National Gender Policy. It is worth mentioning that the information to be generated constitutes a means of support to fight against structural discrimination against women and its effects; in particular, it is expected to contribute to reduce what is exposed in the Supreme Decree No. 008-2019-MIMP as the violation of the right to access and participation of women in decision-making spaces and the violation of economic and social rights. The information to be generated is intended to be an input of information for the desired national care system with a gender perspective, which is set out in Supreme Decree No. 008-2019-MIMP as the main alternative solution to the public problem of gender equality and structural discrimination against women.

The proposed research contributes to providing privileged information for the effective resumption of activities mandated through the enactment of Supreme Decree No. 080-2020-PCM. Similarly, it is considered that the information generated by the proposed research would contribute to the formulation of draft legislation for extraordinary attention to women's work and gender relations due to the impact of the COVID-19 pandemic.

Limitations of the research proposal

The proposed research has the following limitations:

From the commissioning

The proposed research is conducted by personnel from outside the National Institute of Statistics and Informatics (INEI); however, it is an outsourced research delimited and approved by the public entity in that the research topic is raised by the National Institute of Statistics and Informatics (INEI) in the 1st and 2nd National Call for Research of 2021 (Instituto Nacional de Estadística e Informática, 2021).

Institutionalism

Given that the responsible researcher lacks public institutionalization in view of the fact that he/she does not belong contractually to a public entity whose interests are aligned with the object of the research, the research is considered to be impartial and not institutionally biased through gender equality policies.

Work Schedule

Activity		Month 1				Month 2				Month 3			
#	Description	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
1	Recruitment responsible for research and office rental												
2	License purchase 1 (Office Package)												
3	License purchase 2 (Statistical Package)												
4	Laptop and printer rental												
5	Researcher recruitment 1												
6	Researcher recruitment 2												
7	Quantitative Research Quantitative problem statement Literature review and theoretical framework construction Defining the scope of the research Formulating hypotheses Choosing the research design Population management Quantitative data collection Quantitative data analysis Quantitative process report												
8	Feedback and report approval												
9	Report 1/2												
10	Observation survey												
11	Qualitative Research Problem statement, literature review, hypothesis formulation Population management Qualitative data collection and Qualitative analysis Qualitative research process design Quantitative process report												
12	Feedback and report approval												
13	Report 2/2												
14	Observation survey												
15	Final report delivery (Final Report)												

Figura 1. Work Schedule

Note: Source: Own elaboration

Results

COVID-19 positive cases

There is an increase in COVID-19 positive cases, however, while the male affected population decreases, the female affected population increases from the fourth quarter of 2020 to the first quarter of 2021.

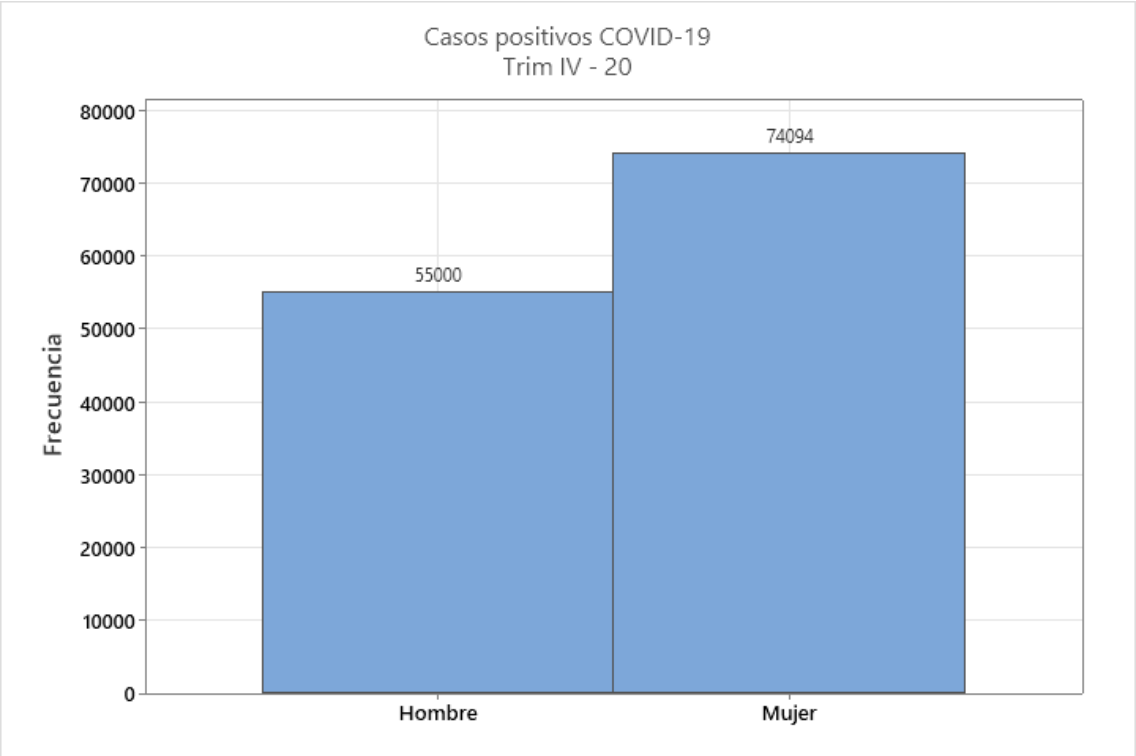

Figure 1. COVID-19 positive cases - Fourth quarter of 2020
Note. Source: National Open Data Platform (2021), COVID-19 Open Data in Ministry of Health (MINSA).

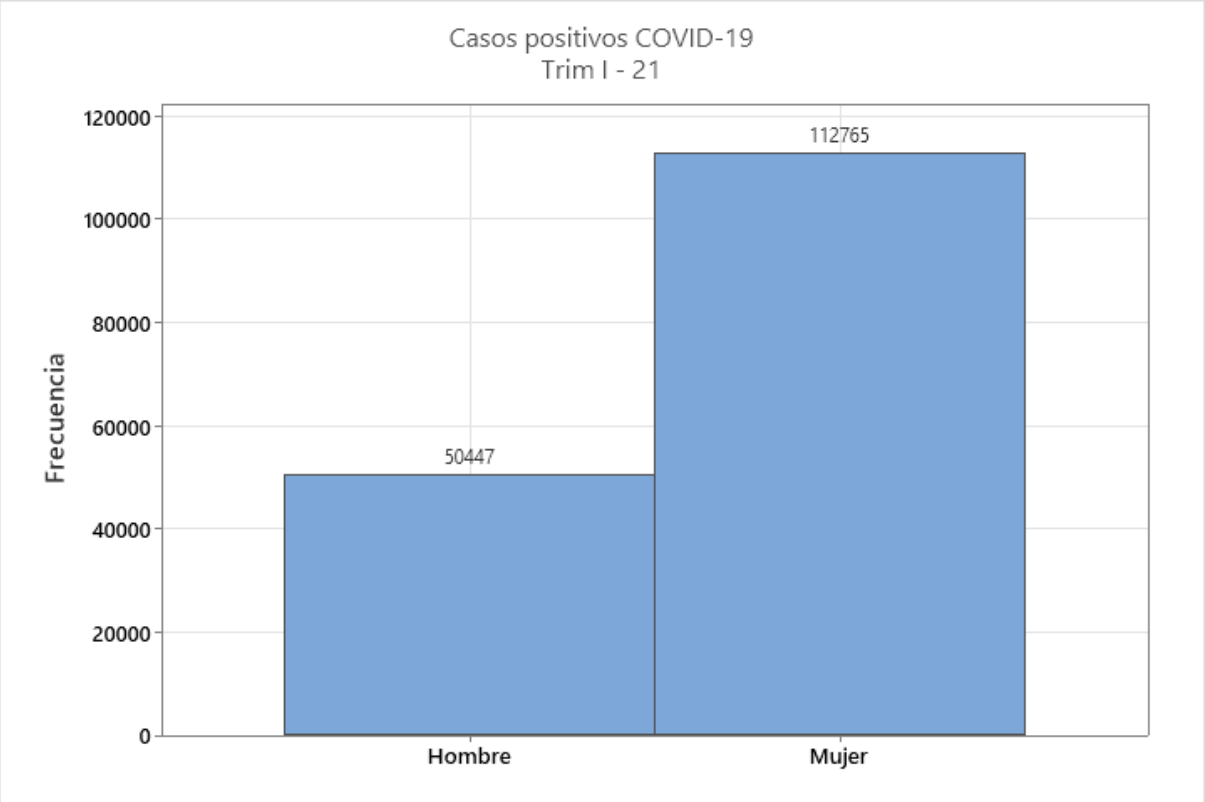

Figure 2. COVID-19 Positive Cases - First quarter of 2021
Note. Source: National Open Data Platform (2021), COVID-19 Open Data in Ministry of Health (MINSA).

Economic Slowdown and Women's Work

The change in the ratio of the number of women who performed any task to the number of women who did not perform a task measures women's work during the economic slowdown by COVID-19. In the fourth quarter of 2020 we have a value of 455 / 3116 ≈ 0.1460, and in the first quarter of 2021 we have a value of 461 / 2413 ≈ 0.1910. The increase in the ratio in question implies and evidences the increase in women's work during the economic slowdown by COVID-19.

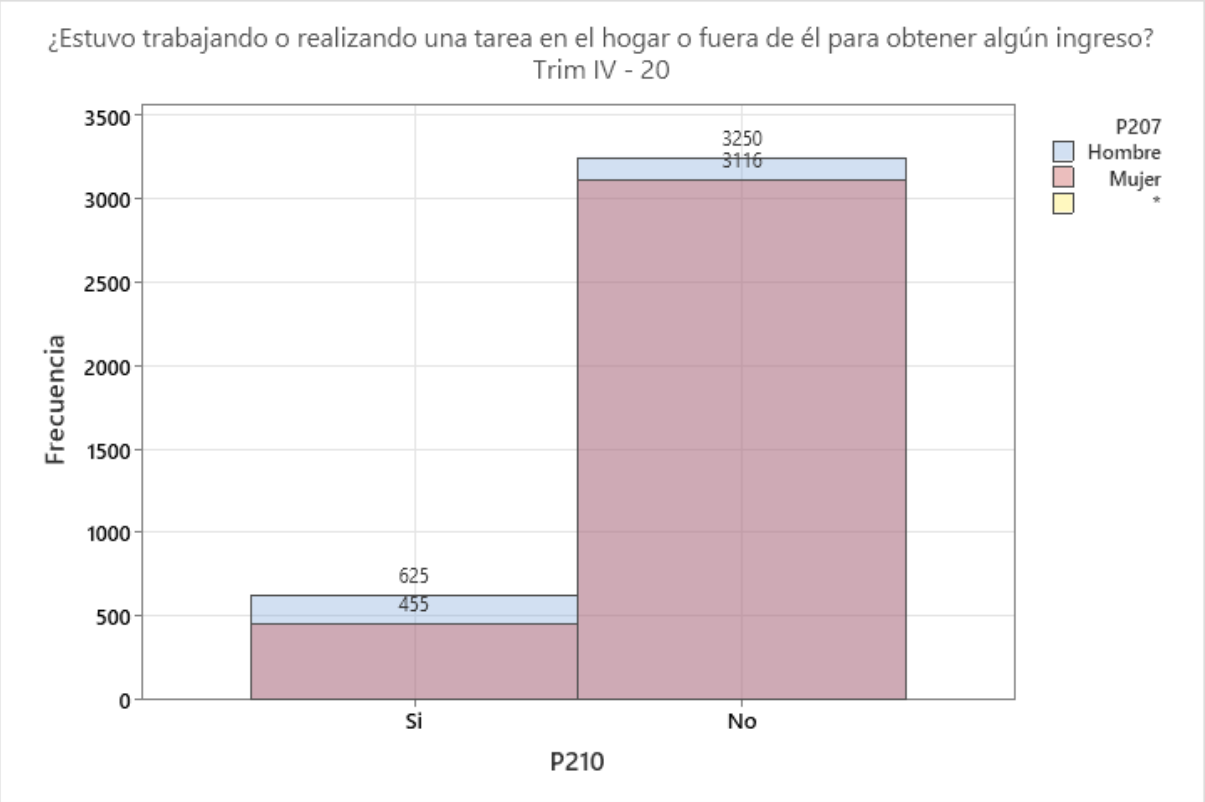

Figure 3. Task performed at home or outside the home to earn an income
Note. Source: National Institute of Statistics and Informatics (INEI) (2020), National Household Survey (ENAHO) 2020.

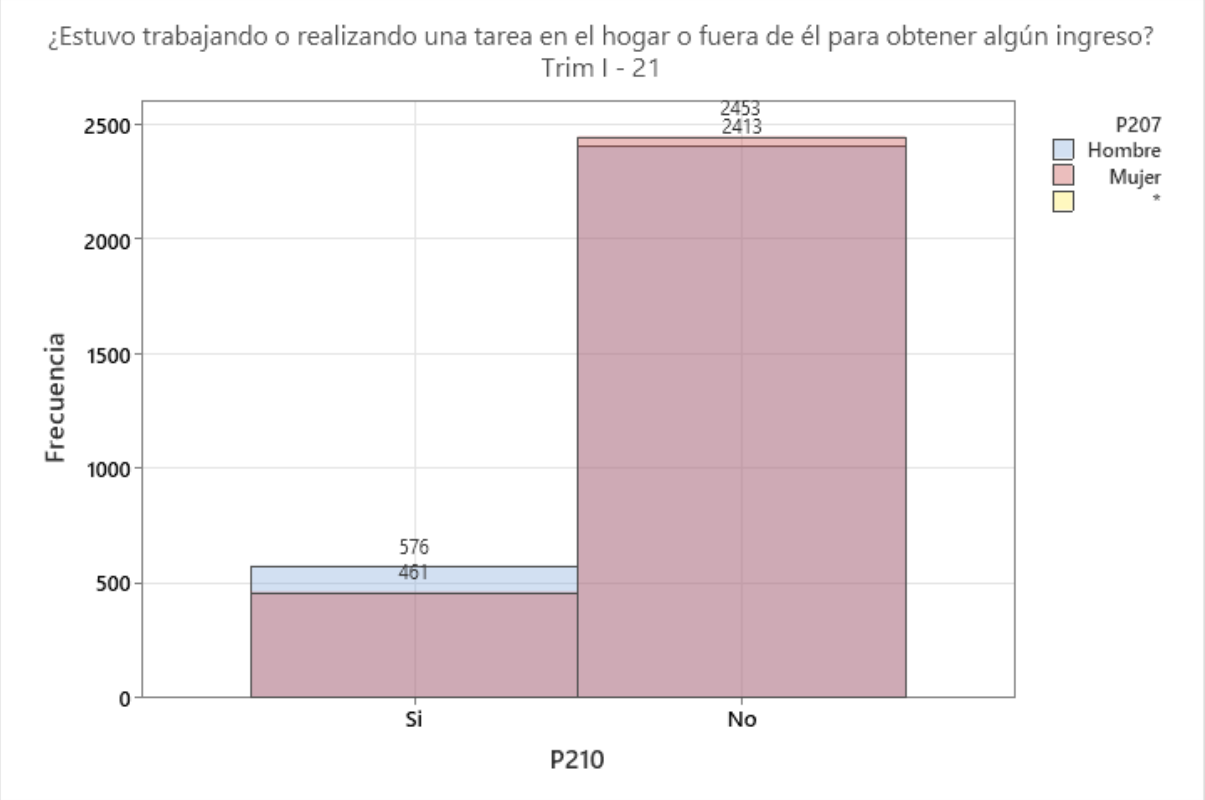

Figure 4. Task performed at home or outside the home to earn an income
Note. Source: National Institute of Statistics and Informatics (INEI) (2021), National Household Survey (ENAHO) 2021.

Accelerating social confinement and interactivity in gender relationships

There is a decrease in the activities registered, which may imply greater confinement. In the fourth quarter of 2020, 6,366 activities were recorded, while in the first quarter of 2021, 4,866 were recorded. The variation in activities carried out at home or outside the home translates into a variation in the number of instances of interaction in gender relations.

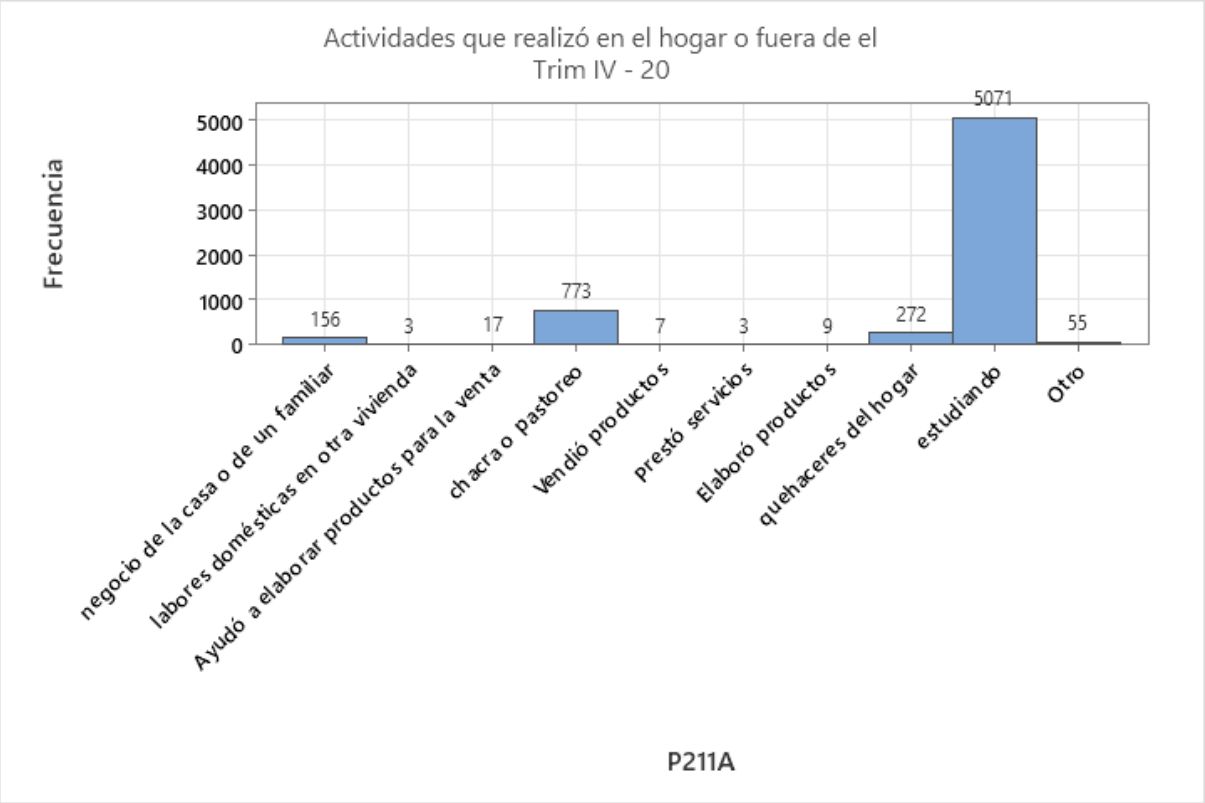

Figure 5. Activities carried out at home or outside the home to earn an income

Note. Source: National Institute of Statistics and Informatics (INEI) (2021), National Household Survey (ENAHO) 2021.

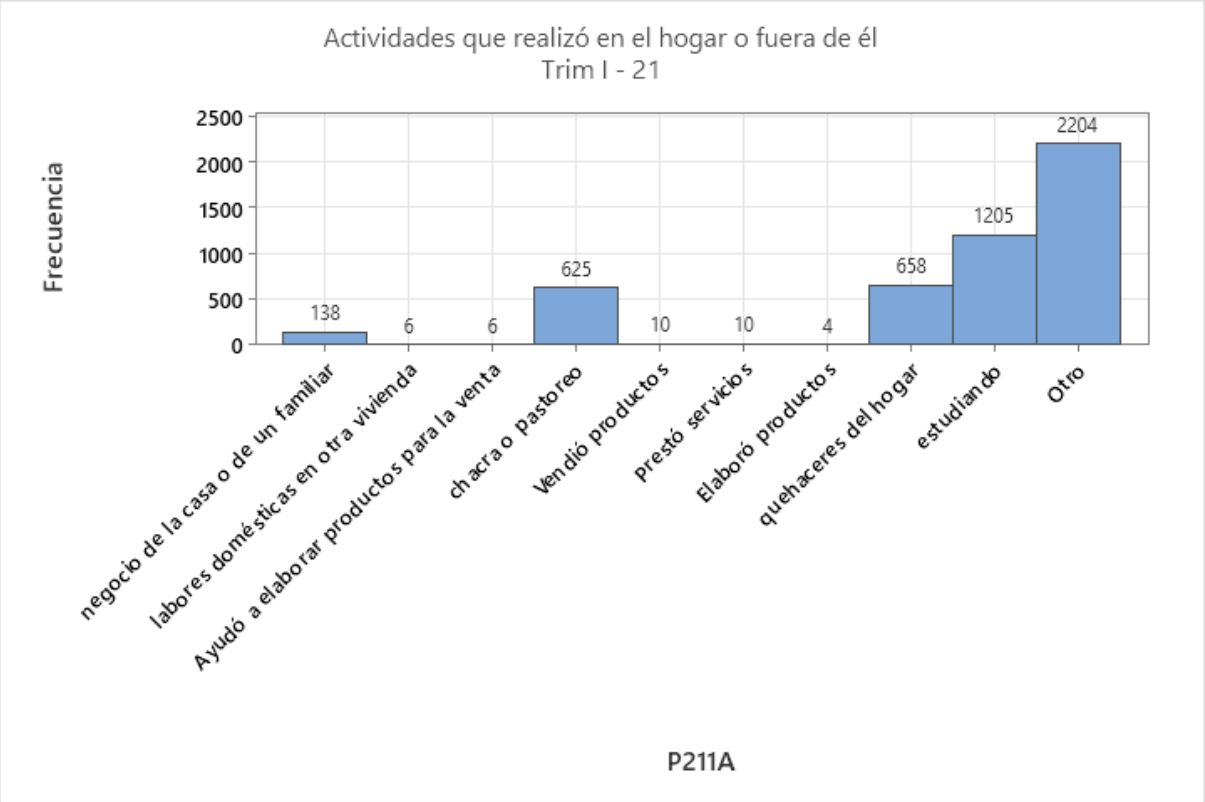

Figure 6. Activities carried out at home or outside the home to earn an income
Note. Source: National Institute of Statistics and Informatics (INEI) (2021), National Household Survey (ENAHO) 2021.

Discussion and Conclusions

Conclusions

It is indeed required to operationalize gender relations and women's work as demographic risk factors during the fourth quarter of 2020 and first quarter of 2021 as statistical devices to measure the impact of the COVID-19 pandemic. In particular, the progress of COVID-19 can be measured by the increase in COVID-19 positive cases. In addition, the economic slowdown is not necessarily measured by the number of tasks, since in the reference period there is an increase in tasks during the economic slowdown reported in the media. On the other hand, the acceleration of social confinement can be measured by measuring the variation in the number of activities done at home or outside the home from quarter to quarter.

The findings mentioned above, that is, those related to the statistical devices detected, constitute useful tools for public entities to observe the behavior of COVID-19's impact on women's work and gender relations.

Hypothesis testing

According to the findings, it is not explicitly verified that the higher the number of positive cases for COVID-19, the lower the number of female jobs. It has been detected as a variation between the fourth quarter of 2020 and the first quarter of 2021 that the activities of the female public have grown, so it could be inferred that there has been an increase in female jobs; however, along with the increase in female jobs, there is an increase in COVID-19 positive cases in the female public.

According to the findings, it appears that the economic slowdown due to the COVID-19 pandemic would not be linked to the decrease in the number of women's jobs. Given that the economic slowdown is asserted by all media, its existence is not questioned. The national statistics show that between the fourth quarter of 2020 and the first quarter of 2021, the number of tasks in the home or outside the home to earn an income have increased despite the economic slowdown, which shows the correlation between the economic slowdown and the number of jobs.

It has not been found that the increase of COVID-19 positive cases is linked to the increase of interactivity in gender relations according to the findings; this is evidenced by the decrease of activities registered at home or outside the home to obtain an income.

It has not been found that the greater acceleration of social confinement translates into an increase in interactivity in gender relations according to the findings. What is found is that the acceleration in social confinement would be linked to the decrease in interactivity in gender relations since there is a decrease in the activities recorded at home or outside the home between the fourth quarter of 2020 and the first quarter of 2021.

Recommendations

It is recommended to use the results and findings of the proposed research only to observe the behavior of the positive cases by COVID-19 the economic slowdown and women's work and the acceleration of social confinement and interactivity in gender relations; this is based on the fact that the study period is relatively short since only the six-monthly variation between the fourth quarter of 2020 and the first quarter of 2021 is analyzed.

It is recommended to carry out the proposed research in terms of operationalize women's work and gender relations as demographic risk factors using a longer time period. The study period could include the years 2020 and 2021 for a better appreciation of the behavior of certain variables. Nevertheless, it is emphasized that the benefit of the proposed research lies in the promptness of its issuance and in its quality of showing the behavior of variables at a quarterly level.

It is recommended that the results and findings be considered in the elaboration of public and private policies regarding women's work and gender relations, as they can serve as input for evidence-based decision-making. In particular, the results apply to achieving gender equality.

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KNOWLEDGE TRANSFER: THE CASE OF GRUPO SUEZ Y AGUAS DE CARTAGENA S.A. E.S.P. "ACUACAR"

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Abstract. The article describes the results of the knowledge transfer of the Grupo Suez, based on improvement solutions to eliminate or mitigate conflictive or problematic situations, risks or opportunities in the strategic processes and indicators of Aguas de Cartagena S.A. E.S.P. - Acuacar, but in turn reviews the state of the art in connection with the transfer of corporate discernment in the last 10 years, which allows the hypothesis to be configured: knowledge transfer improves corporate performance. The analysis was carried out from a qualitative quantitative approach based on the documentary analysis and the positivist paradigm. ACUACAR's own knowledge delivery registration methodology was also revised, so that its synthesis could be constructed in the 2019 period, as was the variance analysis technique to demonstrate the assumption indicated. The exploratory, descriptive and longitudinal ad hoc design was based on document review, observation, application of data collection instruments and interviews with the management team of Aguas de Cartagena S.A. It was found that the knowledge transmitted through methods, procedures and technologies exerts a positive influence on the corporate performance of ACUACAR. In conclusion, the thesis is confirmed that the knowledge transfer has a decisive influence on the improvement of the business performance of ACUACAR.

Keywords: knowledge transfer, organizational performance

TRANSFERENCIA DE CONOCIMIENTO: EL CASO DEL GRUPO SUEZ Y AGUAS DE CARTAGENA S.A. E.S.P. "ACUACAR"

Resumen. El articulo describe los resultados de la transferencia de conocimiento del Grupo Suez, a partir de las soluciones de mejoramiento para eliminar o mitigar las situaciones conflictivas o problemáticas, los riesgos u oportunidades en los procesos e indicadores estratégicos de Aguas de Cartagena S.A. E.S.P. – Acuacar, pero a su vez revisa el estado del arte en conexión a la cesión del discernimiento corporativo en los últimos 10 años, lo que permite configurar la hipótesis: la transferencia de conocimiento mejora el rendimiento corporativo. Él análisis se realizó desde un enfoque cualicuantitativo sustentado en el análisis documental y el paradigma positivista. Se revisó también la metodología propia de registro de entrega del conocimiento de ACUACAR

con lo que se pudo construir su síntesis en el periodo 2019 al igual que se utilizó la técnica de análisis de la varianza para demostrar el supuesto señalado. El diseño exploratorio, descriptivo y longitudinal *ad hoc* se fundamentó en la revisión documental, la observación, la aplicación de instrumentos de recogida de datos y entrevistas al equipo directivo de Aguas de Cartagena S.A. Se encontró que el conocimiento transmitido a través de métodos, procedimientos y tecnologías ejerce influencia positiva en el rendimiento corporativo de ACUACAR. En conclusión, se corrobora la tesis sobre que la cesión de conocimientos despliega influencia determinante en la mejora del rendimiento empresarial de ACUACAR.

Palabras clave: transferencia de conocimiento, rendimiento organizacional

Introduction

According to Ofek and Sarvary (2001) knowledge and its management can be divided into two areas: knowledge creation and knowledge transfer. The first is limited to exploration (generation of new ideas, concepts, product and service innovation), in other words, its genesis is based on existing knowledge, be it tacit (Nonaka and Takeuchi, 1995) or explicit (Kogut and Zander, 1992; Nahapiet and Ghoshal, 1999). For its part, the knowledge transfer makes it possible in an alternative way, both the exploitation and the application of existing business judgment. In the corporate framework, there are different types of knowledge classified between individual and group. Provided it is prototyping, developing goods and services, software packages and technology, an organization must take advantage of these truths, many of them because of organizational or dynamic capacities to achieve what Grant (1996) calls "knowledge integration."

In fact, the effective integration of the knowledge of a firm's collaborators leads to the improvement of unique and idiosyncratic capabilities (dynamic capabilities) that would enable it to have long-term competitive superiority. Grant (1996) then proposed that the combination and unification of organizational truth be analyzed as its main asset. In a categorical way it maintains, in line with the above, that its integration occurs when it occurs in one context, situation or location and is applied in another. It is so true how limited that today more and more business ecosystems are related to the transfer of technology and knowledge in different corporate sectors. From the academy, research centers, technology parks or the organizations that manage and transmit the knowledge, all without exception intercede, in the transformation of business truth, in economic returns through the market or the self-production of knowledge. This, in essence, supports the domain of knowledge transfer.

Under the foregoing considerations, it is therefore unavoidable to present a practical case that defends the aforementioned positions without prejudice to the review of the state of the art of business phenomenologies at the global and local level. As such, the article examines from a mixed perspective (theoretical and empirical) the role and importance of a business group like Suez, capable of producing and managing knowledge in its global operating environments to transfer and integrate it into a Colombian company called Aguas de Cartagena S.A. E.S.P "Acuacar," which manages the aqueduct and sewerage of said city. Thus, here you can find an analysis, from Suez's vision as Acuacar's operating partner, of the advantages of delivering and receiving knowledgeable methods and procedures, as well as technological developments that have improved strategic and operational performance from the last company.

In this way, it is evident how knowledge management and technology transfer from external sources and internal learning of the organization help its innovation and competitiveness (corporate performance). This interaction, unification and transfer between new knowledge, technological developments and the appropriability of discernment must be continuous over time to generate positive changes in the value added chain, both from knowledge providers and from the local company itself.

In addition, thanks to the fact that it is a composite paradigm document related to the knowledge transfer, including technology, it could be a material of great help for students, entrepreneurs and knowledgeable collaborators in the field who need to appropriate and remember concepts and renew their reflections. However, it can also become a preamble for the general public, so that they approach the concepts most used today in the knowledge transfer. With all of the above, it is expected that this document will be a guideline and serve as a reference in the international, national and local contexts, and at the same time it will be very useful both for the training of new technological and cognitive skills for Acuacar and external professionals to the corporation, as well as for academic and practical reflection associated with the transmission of knowledge.

Theoretical foundation

Knowledge transfer has had different definitions. Nelson and Winter (1982) state that the transmission of knowledge is limited to the delivery of best practices or routines (they must generate sustainable competitive advantages) that an organization performs in a superior way to another dependency of this or another company. In the same orientation, Albino, Garavelli and Schiuma (1999), consider the knowledge transfer as the process by which insight is transmitted, learned and apprehended by a company or productive units. Similarly, the knowledge transfer is required as the procedure by which its recipients obtain it from the transferors on the condition that they can accumulate, mold and modernize their production capacity (Liao and Hu, 2007).

Following the line of basic conceptualizations, researchers such as Argote and Ingram (2000) and Inkpen and Tsang (2005) argue that the knowledge transfer depends on the interaction of at least two instances, be these people or organizations, as well as that of said exchange of practices, knowledge or lessons learned benefits one or more firms based on the experience of the transferors. However, they left aside the learning factor, which for Darr and Kurtzberg (2000), Foss and Pedersen (2002) and Gray and Meister (2004) is essential in order for the host company to apply the knowledge acquired in the form of solutions to their problem situations.

In a complementary way, Gupta and Govindarajan (2000), Nissen (2006) and Renzl (2008) comprise the concept or act of knowledge transfer. Without prejudice to the interaction and learning indicated, the construct for them involves changes, movements and applications of knowledge over time. This is why they insist that the flow of knowledge (bidirectional sense) between the parts, scales components such as conversion, transmission, exchange, integration, reuse and appropriability, but at the same time it must rest on an anthropomorphic system that holds the capacity for change and conscientious, indivisible and responsible behavior, as well as a group culture that supports it.

Under the previous discussions, knowledge transfer is conceived by authors such as

Kumar and Ganesh (2009), Liyanage, Elhag, Ballal and Li (2009) and Zhou, Siu and Wang (2010) as a routine of exchange of explicit or tacit knowledge between two or more agents (companies, productive units, departments or people), in which one receives, implements and adapts the knowledge provided by another to their particular situations or contexts, usually in the midst of conflictive scenarios or problematic environments. Said procedure necessarily involves two complementary acts: providing or receiving knowledge, or receiving and using knowledge (implies learning), which is presented in Figure 1.

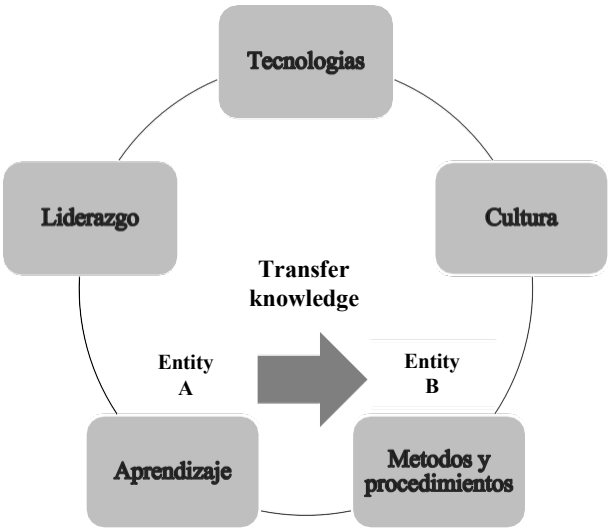

Figure 1. Knowledge transfer

Note: Taken from Kumar and Ganesh (2009), Liyanage, Elhag, Ballal and Li (2009) y Zhou, Siu and Wang (2010).

Further on, Sáenz, Aramburu and Blanco (2012) explain that the organizational culture based on the knowledge transfer entrusts the presence of trust based on moral and ethical principles, such as: collective beliefs, consonances of thought, pedagogical knowledge transfer and in the learning dialogues. Blanco-Valbuena and Bernal (2018) and Matsuo (2015) agree that knowledge transfer generates core competencies capable of creating new knowledge in business development; the outsourcing of tacit knowledge based on training, as well as on human resource development programs sponsored through communities of practice, increase the continuous productivity of companies.

It is also appropriate to analyze the vision that Prats (2019, p.107) exposes on the construct. The author maintains that both information and communication technologies (ICT) and knowledge management enrich the innovation of the company. Similarly, Chiapa-Zenón (2019, p.54) defends the paradigm of the benefits that technology transfer brings, at least with regard to the productivity and innovation of companies, also consenting to their economic returns in terms of transaction cost and market failures, given that not all firms would be in favor of the management and then the cession of the discernment, but would wait for the leading and strong market corporations to investigate and implement the improvement actions and then, through imitation strategies, replicating knowledge or simply hiring technical assistance (e.g., expiration of patents or technology transfer cooperation contracts).

The investigation of the authors who endorse the direction of the truth addressed in reciprocity to the points of view of Tautiva-Merchán (2019, p.91), who argues that

knowledge, technology, methods are transferred in collaborative workspaces will be expanded and procedures perfected by other entities, subsequently adapting them to the ecosystem and cultural contexts of each recipient company. However, Medellín and Arellano (2019, p.14), without going around the bush, disagree with the above; it is then a complex and difficult activity to implement business. They add that in the knowledge transfer, specifically in the technological field, it is common to find difficulties classified into four areas: a) Lack of information, b) Little knowledge of valuation methods, c) Level of technology development, and d) Practice technology acquisition business.

For his part, García-Lirios (2019, p.1) establishes that the knowledge transfer symbolizes the degree of learning of the parties, and that its effectiveness is measured with the results of the management, production and knowledge transfer based on tasks, rather than the objectives or goals of collaborative networks. They then propose the term of organizational self-intelligence based on four components: self-regulation, dissipation, adaptability and cognitive dynamism. It coincides with Blanco-Valbuena and Pineda (2019) in that the transfer of the unionized truth depends on the continuous experimentation and the intelligent cooperation-collaboration of their work groups. So much so that with a clear advocacy orientation of the conception of intelligent self-knowledge, they ensure that intra-learning will be effective.

Here it is convenient to stop for a moment to highlight the work of Díaz-Catalán, López-Navarro, Rey Rocha and Cabrera Álvarez (2019), who without prejudice to the fact that the knowledge transfer includes the transfer of relevant information in terms of science, methods, technology and procedures, it also involves motivation and reputational merit. However, on the other hand, they advocate rewards mainly based on the number of disclosures in international indexed journals with a high impact factor, which can ruin activities prone or related to transfer. In short, it intimates a dual system of interactive and frequent learning, as well as the formalization of awards for achievements.

Under the same discourse, Castelló-Mayo, López-Gómez and Méndez-Fernández (2019) add that the transfer of organizational truth demands a technological and cultural platform that facilitates the convergence and integration of the contents and products learned and apprehended from their collaborators, either from those who deliver or receive relevant information. In fact, they focus their interest on the correlation and combination of data under an information network protected by a constant renewal of professional rules and routines, both at the level of production and dissemination of content, because all this together represents the success of the intra-company knowledge transfer.

In the same sense, Terán-Bustamante and Mendieta-Jiménez (2019) argue in subordination of the transmission of corporate discernment, which cultural patterns are required established in frequent and effective interactions between their participants through, for example, networks, forums and communities of practice. In the same way, Marulanda, Valencia and Marín (2019, p.45) add that knowledge transfer involves, apart from having factors such as communication, learning, trust and the interaction of individuals, a solid organizational culture and, consequently, they argue that knowledge transfer requires a collective consciousness among its participants. In this regard, they assure that the firm and its members need a high cultural convergence.

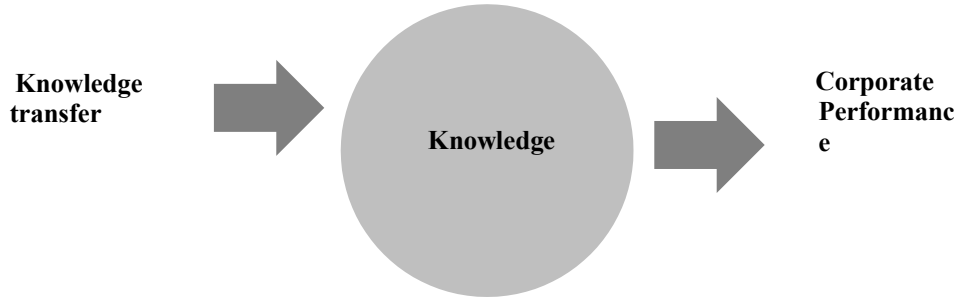

Figure 2. Relationship of variables

Note: Taken from Corsino et al., (2019), Mendoza-Betin (2018b; 2019), and Steensma, Chari and Heidl (2015).

It is now the turn of corporate performance, which will be analyzed conceptually under the variable: process improvement, which Caro-Paz and González-Gómez (2015) define as: activities that add value to products or processes, accordingly graph with Figure 2.

Once a rough review of the literature around knowledge transfer and business performance has been carried out, the theoretical relationship of the constructs is evident, and in its support the hypothesis that guided this research springs up, which is mentioned below: Knowledge transfer improves corporate performance. Therefore, it is reasonably inferred that it is convenient and pertinent to study, based on a practical exercise, the aforementioned phenomenon, since apart from being hypothetically detailed there is also no study of this characteristic in the economic context of the city of Cartagena, Colombia. De facto, this document constitutes the first analysis of the effect of the knowledge transfer of the Grupo Suez in Aguas de Cartagena S.A. E.S.P. "Aquacar."

Method

The article was carried out from a mixed paradigm (mixture of qualitative and quantitative), with an especially qualitative and quantitative methodology of a descriptive, documentary, exploratory type and a non-experimental, longitudinal and field design in reference to the year 2019. The worked variables (transfer knowledge and corporate performance) were initially analyzed by the leaders of the strategic and tactical units of Aguas de Cartagena S.A. E.S.P. based on the registry of the solutions suggested by the operating partner: Grupo Suez, to the problematic or conflictive situations raised by ACUACAR, as well as other actions suggested by the former in the period indicated, which will be detailed in the results (Tables 1 and 2).

Finally, without this meaning that it is not important, the contrast of the aforementioned factors was undertaken based on the calculation and evaluation of the effects of knowledge transfer on corporate performance, supported in a multivariate causal relationship scheme, specifically the factor of the analysis of variance (ANOVA), which was deduced when having access to the ecosystem records, which allowed the construction of an ad hoc data collection instrument. In synopsis, according to the literature review, the connection and effect between the variables was studied in the international context, but not in the city of Cartagena (Colombia). Given the knowledge gap, the following hypothesis was

proposed:

Hypothesis H1: Knowledge transfer improves corporate performance.

The non-probabilistic sample included 43 analysis units, all collaborators of the management team, who participated in the knowledge transfer registry, which began on January 1 and ended on December 31, 2019.

Techniques and instruments

In order to collect the information, it was necessary to identify the data collection sources and then define the following techniques and tools: (1) documentary analysis: access to three documents called: Registration manual of knowledge transfer from the Grupo Suez to Aguas of Cartagena S.A. E.S.P., to the structured knowledge transfer record format and to the strategic management indicators. The second is a tool to collect the aforementioned contents (see annex 1); (2) annotations resulting from non-participant direct observation: a written record was made of what was seen and heard in the context and the cases or participants in accordance with what Hernández, Fernández and Baptista (2010, p. 377) propose; and (3) analysis of management indicators; as a result of some conversations, the observations of the management team and comments delivered by them, some management indicators were compared. The ad hoc instrument was subjected to a double validation process: (1) through the judgment of three experts, and (2) through a pilot test in which an intentional sample of four directors of ACUACAR participated.

Procedure

To understand the documents and data, initially a compilation of secondary sources was carried out, mainly the knowledge transfer registration formats and strategic indicators supplied by members of the management team. Once the information was collected, a summary record was constructed with some of the most relevant examples of the knowledge transfer from Suez to Aguas de Cartagena in the 2019 period. Then the primary information was collected through some indicators and specific records of the transfer, which was taken to the *ad hoc* tool (annex 2), in such a way that once the primary numerical data had been collected, the results collected were tabulated based on annex 2, with which it was possible to perform the statistical contrast.

Results

Below, Tables 1 and 2 show the 54 most representative records of the knowledge transfer of the Grupo Suez to Aguas de Cartagena S.A. E.S.P. in the 2019 period, which have been sidelined as follows: (a) design and/or improvement of work methods, and (b) convergence between technology transfer and work methods.

Table 1

Most representative examples of knowledge transfer for the design and/or improvement of work methods (year 2019)

No.	Management	Problematic situation	Implemented solution
1	Technical	Technical shutdowns, which directly affected the supply of raw water to the Treatment Plant (DWTP El Bosque), causing service interruptions.	Reliability improvement plan at the Albornoz raw water station, based on subsystems. It consisted of dividing it into three subsystems, allowing flexibility in the operation and also allowing the maintenance of all equipment to be carried out without taking the station out of service.
2	Financial	Update of financial management only from Colombian jurisprudence and regulations.	Financial management based on international standards.
3	Financial	Update of financial audit management only from Colombian jurisprudence and regulations.	Financial audit based on international standards.
4	Financial	Update of accounting management only from Colombian jurisprudence and regulations.	Accounting analysis and management based on international standards.
5	Corporate and organizational development	Update of activities only for training and skills development.	Training and development of human talent skills.
6	Corporate and organizational development	Update of Human Resources Management activities only in aspects such as selection and hiring of collaborators.	Comprehensive management of human talent.

No.	Management	Problematic situation	Implemented solution
7	Corporate and organizational development	Update of Contractor Management activities only from the price area	Updated world order policies in contractor management
8	Corporate and organizational development	Update of Communications activities only from the user's scope	Updated policies of the world order in social management
9	Corporate and organizational development	Little participation of the employees of Aguas de Cartagena S.A. in solving problems associated with processes	Aguas de Cartagena Plan for Excellence
10	Corporate and organizational development	Little participation of service providers' collaborators in solving problems associated with processes	Service Provider Plan for Excellence
11	Communications and public relations	Update of communication activities only from the user's scope	Updated communication policies that integrate all stakeholders
12	Occupational safety and health	Increase in the frequency and severity rates of occupational accidents	"Fair Culture: I take care of myself, I report, I prevent" program
13	Occupational safety and health	The decrease in the involvement and commitment of the employees of Aguas de Cartagena S.A. around health and safety practices at work.	Implementation of the basic rules that save lives Program as a cultural path to prevent risks of this nature.
14	Internal control	Update of Internal Control activities only from Colombian jurisprudence and regulations.	Strengthening of the internal audit department based on international standards.
15	Legal	The risks may alter the economic balance of the contract when the reciprocity between the parties in terms of their benefits is broken, since this generates higher costs for some of them.	Legal prevention in the creation of habits and customs that allow the development of personal and business activities in a controlled environment, where most of the risks have been considered within contractual management.

Note: Taken from own measurements assessed in Excel (2020)

Table 2

Most representative examples of the convergence between technology transfer and work methods (year 2019)

No.	Management	Problematic situation	Implemented solution
1	Technical	Generation of sludge product of sedimentation, filter washing and coagulant residues that are taken to a sedimentation pond, where they are decanted and then the clarified supernatant liquid is recirculated at the head of the Treatment Plant.	Sludge treatment system of the El Bosque DWTP.
2	Technical	The production flow of the water treatment plant was close to the limit required to supply the entire population of Cartagena.	Improvement in the treatment, operation and maintenance processes of the El Bosque DWTP.
3	Technical	In the drinking water treatment process of the city of Cartagena, the consumption of coagulant was above the average used in some plants with similar characteristics.	Optimization of chemical inputs in drinking water treatment using the CHEMBoard method.
4	Technical	The disinfection process due to direct contact with chlorine (l) generated a high-risk situation for the water treatment plant and the community that is around it. Chlorine (l), being a highly reactive product, can generate by-products, it is also explosive and flammable with the presence of Hydrogen and/or other elements.	Substitution of chlorine gas by mixed oxidants in the drinking water treatment disinfection process (MIOX).

No.	Management	Problematic situation	Implemented solution
5	Technical	In the processes of collection, treatment, distribution and treatment of drinking and wastewater in the city of Cartagena, energy consumption was above the average used in some plants with similar characteristics.	Implementation of the technological energy management system of Aguas de Cartagena S.A. E.S.P. (Energy efficiency).
6	Technical	Seawater with sand is being collected and transported through the sanitary sewer networks, which is affecting the useful life of the submersible pumps, ductile cast iron piping system and increasing energy consumption due to the additional water flow that is arrives at the station.	Control of seawater infiltration in sewer collectors (Salinity), repair with mortar the damaged structures and application of waterproofing products.
7	Technical	The operation of the sewer maintenance process was carried out in a semi-automated manner.	Methodology for planning the preventive maintenance plan and monitoring of the sewage network through closed-circuit television technology.
8	Technical	In the built sewer collectors with concrete pipes, structural damage could occur in their walls due to the presence of H2S gases generated by wastewater.	Slip lining implementation for the rehabilitation of trenchless sewer collectors, which consists of placing a smaller diameter pipe in the host collector, allowing the sewer system to continue to operate in parallel.
9	Technical	The operation of the Aqueduct and Sewerage processes was carried out in a semi-automated manner.	Automation and remote control systems (Remote communication of equipment and infrastructure).
10	Project and Loss Control	Reduce the loss indices of Unregistered Water in order to improve the performance of each of its hydraulic sectors in Cartagena.	Analysis of sectors by hydraulic performance for technical and commercial actions based on the statistical package and data analysis called Aquacircle.
11	Project and Loss Control	On average, 1,484 damages to the network and 9,757 damages to connections occur annually. On the other hand, for the control of pressures in the network, there are pressure sensors installed in the different sectors. For the monitoring and control of the distribution infrastructure, in the Scada system and other applications of the existing instrumentation, there are more than 180 flow signals and 220 pressure signals, but all this was disintegrated.	Comprehensive technological tool for the management and hydraulic operation of the network, capable of performing statistical data analysis called: Aquadvanced.
12	Project and Loss Control	Among the hydraulic sectors identified with the highest frequency of damage are: Blas de Lezo 2nd Stage, Socorro1 and La central, for which it was defined to implement in these sectors a pilot for monitoring and analyzing the behavior of pressures in the networks, which would allow better management and operation focused on reducing failure rates, and therefore optimizing the use of resources.	Pilot project for the management of pressures in the network, capable of performing statistical analysis of data called: Inflowmatix
13	Project and Loss Control	The need to exchange knowledge and lessons learned between the different companies of the Grupo Suez, in order to improve efficiency in water distribution, taking into account the experiences of other companies in the sector.	Participation in TecRex - Suez Technical Distribution Committee
14	Project and Loss Control	Exchange of knowledge, practices and lessons learned between Grupo Suez companies.	Business exchange between Aguas de Saltillo S.A. de CV (AGSAL) and Aguas de Cartagena S.A. E.S.P. (Acuacar)

No.	Management	Problematic situation	Implemented solution
15	Information and Communication Technologies	The operation of all the management related to the energy equipment and infrastructure is carried out manually, generating possible human errors that affect the quality of the data.	Energy Efficiency System to ensure the effectiveness of the management with the Enerlogy Monitoring software (EMO), which is a WEB application to control consumption and specific parameters, having detailed information and the possibility of interpreting it in such a way that allows energy efficiency improvements to be carried out with objective criteria or the monitoring of improvements already made.
16	Information and Communication Technologies	The commercial processes of Aguas de Cartagena S.A. were carried by the commercial information system AS 400; due to the obsolescence of this application and the different interventions to which it was subjected during its use, it presented restrictions and generated inconsistencies in some of its operations.	AquaCIS CF, includes AquaCIS CF, OM Java and a universal biller Karat - Fragest.
17	Information and Communication Technologies	The commercial processes of Aguas de Cartagena S.A. they were carried by the commercial information system AS 400; Due to the obsolescence of this application and the different interventions to which it was subjected during its use, it presented restrictions and generated inconsistencies in some of its operations	Dinapsis Control Data Center, which meets the expectations, requirements and needs, covers the management needs in real time, a common environment, a centralized, secure hardware system, with a guarantee of cybersecurity, business continuity, critical infrastructure protection, based on the latest standards for the development, design, installation and management of remote control systems for industrial processes and flexibility in their implementation.
18	Information and Communication Technologies	Data analysis based on descriptive statistics.	Artificial Intelligence (AI), which fulfills the computing purpose of carrying out predictive modeling based on statistics such as linear regressions or neural networks.
19	Information and Communication Technologies	The Aguas de Cartagena database was based on a version of GISAgua prior to 2012, which was improved based on the guidelines and recommendations provided by the operating partner to accommodate new data, but it was necessary to update the current platform and data model modernization.	Portal Gisagua ArGIS; an architecture and data model of the operating partner based on the ArcGIS platform, which is what Aguas de Cartagena had, but with outdated and lag in the organization and data analysis model.
20	Environmental quality	The city has 35 pumping stations, 62 kilometers of propulsion networks and 1,118 sewers networks. Compared to the situation in 1994, it began to have sewers and propulsions of greater capacity, but due to the topography of the city the routes are longer and slower, a large part of the route is done by propulsion and therefore the number of pumping stations and rupture chambers. In addition to the above, we have: • Low content of dissolved oxygen in water. • Wastewater with a high content of organic matter and low pH. • High temperatures of wastewater. • Sedimentation due to low flow rates. The above sets up a favorable scenario for the generation of gases, such as hydrogen sulfide, which causes bad odors.	Odor Control program. The mitigation and prevention of offensive odors within the framework of the program compromise the use of good practices, best available techniques and mobile monitoring devices interconnected to a robust data collection and analysis system.

No.	Management	Problematic situation	Implemented solution
21	Environmental quality	There was no regulatory framework for the parameters and maximum permissible values for specific discharges to surface water bodies and public sewerage systems.	Control program for industrial spills. The regulatory strengthening through the formulation of the Technical Annex for Control of Discharges, which consists of a document that is an integral part of the Uniform Conditions Contract, as an instrument that allowed to specifically establish, which substances are prohibited or restricted to discharge to the sewer system and its maximum concentrations.
22	Environmental quality	Greater proximity to users through the offer of services and products that go beyond the aqueduct and sewerage, and support industry and commerce in matters related to water management and the environment in order to be more efficient, sustainable and therefore more competitive.	Responsible water management program - GRA. Provide support to its clients in the sustainable management of water resources within their processes and activities. The GRA has made it possible to share with ACUACAR users and clients all the knowledge and technologies that facilitate, not only legal compliance related to water management, but also to establish a Water Culture in their companies.
23	Environmental quality	The evaluation of the behavior of the quality of the water by controlling its quality in the receiving bodies and in the points located in the area of influence of the discharge (submarine emissary).	Water quality monitoring program. The monitoring and follow-up of surface natural bodies of water were worked on structuring the monitoring program and the different associated protocols.
24	Environmental quality	Absence of a systematic mechanism that would unify the planning, execution and control of the activities, processes and resources necessary to achieve the established objectives. Therefore, it implied the absence of a systematic vision of the organization and the failure to meet customer expectations.	Design, confirmation and implementation of ISO management systems.
25	Environmental quality	The opportunities for improvement in any quality system are those that help to strengthen every day compliance with the requirements of the implemented standard and these improvements are even more relevant when it comes to complying with a legal requirement such as the system of quality management and the accreditation of the Water Quality Laboratory.	Maintenance of the quality management system of the water quality laboratory.
26	Commercial	The process of registration, control and monitoring of urban projects was carried out in a semi-automated manner.	Technological and methodological control of contracting urban projects.
27	Commercial	The process of installing services in adverse communities was carried out in a semi-automated manner and under policies not in accordance with this market niche.	Technological and methodological control of service facilities and service facilities in communities with adverse economic situations through differentiated offers.
28	Commercial	Growth of the city.	Collection outsourcing
29	Commercial	Growth of the city.	Call Center optimization
30	Commercial	Growth of city users.	Methodological restructuring and PQR's technology module
31	Commercial	The billing process was carried out in a semi-automated way.	Technology and working methods to optimize the billing process
32	Commercial	The cash collection management process is carried out in a semi-automated way.	Policies and technological methods of collection management
33	Commercial	The portfolio management process was carried out in a semi-automated manner.	Policies and technological methods of portfolio management
34	Commercial	The process of suspension of services was carried out in a semi-automated manner.	Policies and technological methods of service suspension
35	Commercial	Only the Laboratory Meters was available.	Implementation of the Aguas de Cartagena S.A. E.S.P. meter inspection body.

No.	Management	Problematic situation	Implemented solution
36	Administrative	High number of providers within each family of materials and type of material, specialized suppliers proposing products that were not part of their catalog, becoming an additional marketer, negotiations with suppliers without price lists and decentralization of purchases, other processes that could be bought.	Purchase transformation plan and technological policies and methods for purchase management.
37	Administrative	The supplier registration process (supply chain) was carried out in a semi-automated manner	Technological policies and methods for the registration of suppliers.
38	Administrative	The process of contracting projects (works and labor) was carried out in a semi-automated manner	Technological policies and methods for contracting works and services.
39	Administrative	The analysis, control and monitoring with tools provided by the Contec system (previous technological development), it was necessary to prepare and download databases that then had to be refined and analyzed. Due to the volume of data and information, the above required the dedication of significant resources to analyze the data.	Technological tool for the management of the transport fleet, which allowed to improve the capacity for monitoring and reaction, analysis, decision-making and the design of strategies to obtain better results, creation of alarms, notification of events and creation of indicators.

Note: Taken from own measurements assessed in Excel (2020)

In the midst of the above considerations, it can be shortened that the registered examples of knowledge transfer consolidated in 54 thematic units (one solution for each problem situation) are concentrated in two types; the first is part of the transmission of knowledge, represented in 15 work methods and procedures. For its part, the difference of 39 is located as mixed, that is, a convergence between technology transfer and work methods.

Table 3
Classification of the type of knowledge transfer

Type of Assistance	Grand total
Knowledge; method	15
Mixed; Technology and methods	39
Grand total	**54**

Note: Taken from own measurements assessed in Excel (2020)

Table 4
Classification of the type of knowledge transfer by management area

Management	Type of Assistance	
	Knowledge; method	**Mixed; Technology and methods**
Technique	1	9
Projects and Loss Control		5
Information and Communication Technologies (ICT)		5
Environment and quality		6
Financial	3	
Commercial		10
Corporate and organizational development	6	
Communications and public relations	1	
Administrative		4
Occupational safety and health (OSH)	2	
Internal control	1	
Legal	1	
Total by type of assistance	**15**	**39**

Note: Taken from own measurements assessed in Excel (2020).

On the other hand, it was determined that the factor analysis of variance was the most beneficial methodological technique (Cruz and Koch, 2015; and Hollon, 2006) to assess the consequence of two or more variables (knowledge transfer: methods and mixed; technology and methods, in accordance with the indicated summary record) on the dependent transformable: business performance. The latter was obtained monthly (%) based on the average of two strategic metrics or indicators named: effective collection management and non-registered water loss index, both in percentage.

However, with regard to independent companies, there was an initial problem: their measurement was in whole numbers (monthly amount of each one), so they were changed to ordinal units, assigning them ranges of attributes together with the members of the management team of ACUACAR. Consequently, they were computed on a Likert scale, with 0.85 being those with optimal impact, and 0.15 being those with the lowest derivation, both based on corporate performance. In this way it was possible to apply the ANOVA, allowing the cardinal hypothesis to be tested. Under the aforementioned system, together with the members of ACUACAR's management staff, the consequences of the classification of the subvariables related to the knowledge transfer on performance in the limited period were analyzed and evaluated, which is consolidated in Table 5.

Table 5

Collection of the conceptual and operational variables of the study

Months	Corporate Performance	Technology and Methods	Methods
Jan-19	69%	4	2
Feb-19	72%	6	3
Mar-19	72%	8	2
Apr-19	73%	4	2
May-19	74%	6	1
Jun-19	75%	2	1
Jul-19	76%	4	1
Aug-19	75%	4	2
Sep-19	77%	5	1
Oct-19	76%	5	1
Nov-19	78%	8	1
Dec-19	79%	6	1
Total		62	18

Note: Taken from own measurements assessed in Excel (2020)

The compilation of company data, in deference to the knowledge transfer in the last year, allowed to test the hypothesis obtaining that the variables called methods and mixed: technology and methods, positively affected (sig. 0.027 and 0.028, respectively) the corporate performance. Table 6 groups the results of the variance factor contrast (ANOVA).

Table 6

Statistical - Result of the 3 factor ANOVA. Tests of Inter-subject effects Dependent variable: Corporate performance

Origin	Type III sum of squares	gl	Quadratic mean	F	Sig.
Corrected model	,019[a]	3	0,001	2,456	.002
Intersection	6,59	1	6,59	8099,789	0,025
Technology and methods	0,056	2	0,014	7867,768	0,027
métodos Methods	0,043	2	0,015	7869,431	0,028
Technology and methods*	0	0	.	.	.
métodos * Métodos Error	0,039	11	0,001		
Total	6,728	12			
Corrected total	0,059	11			

Note: Taken from own measurements evaluated in SPSS (2020).

a. R-squared = ,782 (adjusted R-squared = ,681)

Discussion and conclusions

The pertinent conclusions are presented below in the knowledge transfer framework from the Grupo Suez to Aguas de Cartagena S.A. E.P.S. in 2019. Based on its derivations, the endings associated with the central topic of the work and the general review of the literature are shown in order. Then a summary of the most important examples in the matter of knowledge transfer is presented, as well as the most notable effects of the quantitative study in terms of the contrast of the hypothesis are detailed and revealed. In the end, without meaning that it is not important, its limitations and future lines of research are proposed.

Conclusions of the report in relation to the literary framework and management

After analyzing the results presented in Tables 1 and 2, the determining role of the convergence of technology with work methods is observed, especially in the most sensitive areas of the value creation chain, which are represented by the technical management, projects and loss control, ICT, environment and quality and commercial. In all of them, solutions of this type that were implemented from the knowledge transfer processes, represent 97.2% of the total. The opposite occurs in the rest of the analyzed areas, where the predominance of actions based on the knowledge transfer with direct influence on work methods and procedures is evident (77.8%).

This is the case of the areas in which the management enabling processes are mainly developed, such as areas like: financial, administrative, corporate and organizational development, communications, public relations, safety and health at work, internal control and legal. In this regard, and by way of exception, the leading role of technology in solutions related to the administrative area is notorious, especially in terms of supplier management, project contracting and administrative control. Thus, in 2019, in general, 72.2% of all actions derived from the knowledge transfer process from the Grupo Suez to the company Aguas de Cartagena S.A. E.S.P., correspond to the search for convergence between technology and work methods.

From a point of view that refers to the context that gave rise to this study, it should be understood as a management opportunity that would invite to ask the following question: What would have happened in the management of ACUACAR in the framework of its most important indicators? How are the cash collection management and the non-registered water loss rate, if it had not been able to count on the knowledge of an operating partner such as the Grupo Suez? Obviously, it would have been difficult to incorporate significant improvements since the company lacked this knowledge, so it would have been forced to seek the support of other companies around the world, which were willing to solve the serious management problems that were identified in the different areas of the company to which this analysis refers.

The Grupo Suez has the knowledge and experience because it has consultancy contracts worldwide, but it was also willing to share it and transfer its technology to solve the problematic events mentioned in Tables 1 and 2, which in turn agreed that in a short period of time, solutions could be implemented that allowed to go from 69% to 79% improvement in corporate performance in 2019; all this thanks to the process of appropriation of the knowledge transfer by said Group, based on the management criteria, policies and business arguments that supported such solutions.

With regard to the literature update, the procedure and the techniques of the mixed-

court scrutiny (quantitative and qualitative), added to the results obtained, it is notable and commendable to point out that they will be of interest as reference and consultation to the academy, the control entities and the real sector. The outstanding role of the management and knowledge transfer, technology and innovation within organizations to increase competitiveness and productivity, has become a stop on the road for organizational reflection and, above all, for implementation of practices such as those shown in the knowledge transfer registry carried out by ACUACAR in relation to the assistance, support, guidelines and observations proposed by its operating partner: Grupo Suez, for each of the problematic situations and strategic indicators.

In the midst of the limited considerations, the paradigms of Blanco-Valbuena and Bernal (2018) are corroborated with this analysis; Marulanda, Valencia and Marín (2019); Matsuo (2015); and Terán-Bustamante and Mendieta-Jiménez (2019), who argue that the knowledge transfer, science and technology exerts a positive influence on the process indicators, which results in the competitiveness of Aguas de Cartagena S.A., as well as determining its importance to have an operating partner who has the experience and knowledge to know how to sort out each of the different queries that ACUACAR carries out regarding the improvement of its processes.

Practical implications

The study has several implications in the managerial field. Companies based on knowledge transfer will have to invest much more in training people in knowledge management, in order to transfer what they have learned to other businesses; such is the case of the Grupo Suez's relationship with Aguas de Cartagena S.A. E.P.S.

Based on the 54 examples of records or files alluding to the same number of problem situations to which a solution was found promoted or implemented by the operating partner Grupo Suez, in a pragmatic or practical way it is concluded that there was a knowledge transfer to Aguas de Cartagena S.A. in 2019, which resulted in the effective improvement of competitiveness, productivity and the improvement of its processes.

Finally, it is necessary to indicate that the adequate knowledge management of the Grupo Suez is based on applying the learned and apprehended strategies that make the knowledge transfer possible, given its operations in the five continents. The help of technology, like that of methods and procedures, is a variable that must be used; especially when it comes to sharing what is in the knowledge repositories, for example: files, education, lessons learned, communities of practice, and good routines.

Limitations and future research

This research has the following limitations: the measures to test the hypothesis are based on the psychometric perceptions of the ACUACAR management team to evaluate the impact of the independent variables: methods and mixed; technology and procedures on corporate performance, which would imply a bias with respect to the other company employees because they did not participate in the exercise. In the same sense, managers have appropriated the variables of organizational culture, strategy and leadership in subordination of knowledge transfer due to their close relationship with the members of the Grupo Suez management team, but they would not know to what extent the rest of the collaborators would evaluate the relations of the constructs in reciprocity of ACUACAR and Suez.

As next lines of research, it is suggested to carry out a study using structural equations to know the interaction of all the observable variables since in the current one only three were operated.

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Appendixes

Appendix 1

Structured knowledge transfer record format instrument

a. Introduction: The process will make an introduction to the conflictive or problematic situation, risks or opportunities for improvement of its processes, activities, tasks, tools and equipment that it is desired to improve with the transfer of technology or knowledge by the operating partner. This information will be written in prose and preferably a diagrammatic outline of the bounded problem will be presented.

b. Conflictive or problematic situation: This part will address the problem, risk or opportunity for improvement that requires a solution through technical assistance within the framework of technology transfer and knowledge with the operating partner. This information will be written in prose and will present data or empirical support of the problem situation, in other words, numerical or metric aspects consolidated in tables, indicators or figures.

c. Solution to the problematic situation, risk or opportunity for improvement: It will be provided by the operating partner but documented by Aguas de Cartagena S.A. It will be written in prose and will provide models, numerical data, photographic records, used statistical techniques, all of the above delivered in tables, indicators or figures.

d. Methodology: It will be defined by Aguas de Cartagena S.A. based on the technical assistance provided by the operating partner. It would include the following chapters:

1. Brief description of what is included in this section, also associated with the research paradigm, the methods and the research strategy to mitigate, reduce or eliminate the problematic situation, risk or opportunity for improvement.

2. Research design.

3. Hypotheses (if necessary).

4. Population and sample.

5. Analyzed variables.

6. Research methods and instruments.

7. Data analysis.

e. Results and limitations: A prose description of the results achieved after the end of the study will be made, according to the raised problematic or conflictive situation (and hypotheses, if applicable), risk or opportunity for improvement. It also includes the analysis and treatment of data, for which it is requested to present tables, photographic records and figures that guide the reader through the entire sequence of the obtained results or findings. Likewise, it should include possible innovations produced with the study, as well as limitations that have arisen and lines of continuity in subsequent analyzes (new research paths or new guiding principles: technology, methods, among other elements that the operating partner may have to provide).

1. Indicators: Tables or graphs will be presented with data on the indices or indicators related

to the problematic situation, risk or opportunity that improved because of the technical assistance of the operating partner, which will be documented by Aguas de Cartagena S.A.

f. Conclusion: Clear, precise and concise conclusion depending on the conflictive or problematic situation, proposed objectives, risk, opportunity for improvement or hypotheses, as the case may be. It is about making it clear and succinctly what was achieved with the technological or knowledge assistance, including those aspects that slowed down or hindered the proper development of the study. Precisely from the contradiction between what was thought to be done and what was achieved, gaps arise to be explored; which are those that are suggested to be investigated in the future, which is important to be written down by Acuacar.

g. Appendixes: Aguas de Cartagena based on the technical assistance provided by the operating partner will plan them. They refer to more detailed information that complements the explanation of the results of the analysis, especially in terms of the methods, techniques, results of the application of the instruments and it can be documents, graphs, tables or any other complementary information that does not need to appear in text, but are important because they add value to the report. It is suggested that they are listed.

Annex 2

Productivity measurement instrument

Months

Corporate Performance

Technology and Methods

Methods

PROJECT, DESIGN AND MANAGEMENT

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DEVELOPMENT OF A MANAGEMENT AND MONITORING SYSTEM FOR THE QUALITY OF AUTOMOTIVE LUBRICATING OILS APPLICABLE TO THE ANGOLAN CONTEXT

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Abstract. There is in the country the market scenario filled of this product, with several brands and players fruit of the dependence to 90% of imports and has been registered many drawbacks in its marketing process and sales. After a careful analysis, it was identified that this problem is caused by the lack of an adequate quality monitoring program for these products. In general terms the present study aimed to develop a quality management and monitoring system for automotive lubricant oils applicable to the Angolan context. Through a qualitative research study and as a result of an exploratory study, which involved interviews and field studies, to stakeholders in the areas of production, import, inspection, marketing and inspection of fuels and lubricants, this study presents a proposal for a monitoring program for automotive lubricant oils in order to ensure product quality. Having done this, the results allowed the identification of the drawbacks of the current model for fuel and lubricant quality management and consequently systematize a model proposal of an "Integrated System for Lubricant Quality Monitoring" with potential to be extended also to the monitoring and quality management of other classes of lubricant oils and fuels. After describing its functionality, its principles and structuring conditions for the functioning of the respective proposal, the study recommends the Ministry of Mineral Resources, Oil and Gas of the Republic of Angola to embrace the idea of creating and implementing the system proposed herein.

Key-words: Management, Monitoring; Quality, Lubricating oils, Consumption.

DESENVOLVIMENTO DE UM SISTEMA DE GESTÃO E MONITORAMENTO DA QUALIDADE DOS ÓLEOS LUBRIFICANTES AUTOMOTIVOS APLICÁVEL AO CONTEXTO ANGOLANO

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Resumo. Existe no país o cenário do mercado preenchido deste produto, com diversas marcas e players frutos da dependência à 90 % de importações e tem se registado muitos inconvenientes no seu processo de comercialização e vendas. Depois de uma análise cuidada, identificou-se que esta problemática é causada pela falta de um programa de monitoramento da qualidade adequado a estes produtos. De forma geral o presente estudo objectivou desenvolver um sistema de gestão e monitoramento da qualidade dos óleos lubrificantes automotivos aplicável ao contexto angolano. Por via de uma pesquisa do tipo qualitativa e como fruto de um estudo exploratório, que envolveu entrevistas e estudos de campo, aos intervenientes da área da produção, importação, inspecção, comercialização e fiscalização de combustíveis e lubrificantes, é apresentado neste estudo, uma proposta de um programa de monitoramento dos óleos lubrificantes automotivos a fim de garantir que o produto tenha qualidade. Feito isto, os resultados permitiram identificar os inconvenientes do modelo actual de gestão da qualidade dos combustíveis e lubrificantes e consequentemente sistematizar uma proposta de modelo de "Sistema Integrado de Monitoramento da Qualidade dos Lubrificantes" com potencialidades de se estender também para o monitoramento e gestão da qualidade das outras classes de óleos lubrificantes e combustíveis. Após descrição da sua funcionalidade, fundamentações sobre os seus princípios e condições estruturantes para funcionamento da respectiva proposta, o estudo recomenda ao ao Ministério dos Recursos Minerais, Petróleos e Gás da República de Angola, que abrace a ideia do criar e implementar Sistema que aqui é proposto.

Palavras-chave: Gestão**,** Monitoramento**,** Qualidade**,** Óleos Lubrificantes**,** Consumo**.**

DESARROLLO DE UN SISTEMA DE GESTIÓN Y CONTROL DE LA CALIDAD DE LOS ACEITES LUBRICANTES PARA AUTOMÓVILES APLICABLE AL CONTEXTO ANGOLEÑO

Resumen. Existe en el país el escenario de mercado lleno de este producto, con varias marcas y jugadores fruto de la dependencia al 90% de las importaciones y se han registrado muchos inconvenientes en su proceso de comercialización y ventas. Tras un cuidadoso análisis, se identificó que este problema se debe a la falta de un programa adecuado de control de calidad de estos productos. En términos generales, el presente estudio tenía como objetivo desarrollar un sistema de gestión y seguimiento de la calidad de los aceites lubricantes para automóviles aplicable al contexto angoleño. A través de una investigación cualitativa y como resultado de un estudio exploratorio, que incluyó entrevistas y estudios de campo, a las partes interesadas en las áreas de producción, importación, inspección, comercialización y fiscalización de combustibles y lubricantes, este estudio presenta una propuesta de programa de monitoreo de aceites lubricantes automotrices con el fin de garantizar la calidad del producto. Una vez hecho esto, los resultados permitieron identificar los inconvenientes del modelo actual de gestión de la calidad de los combustibles y lubricantes y, en consecuencia, sistematizar una propuesta de modelo para un "Sistema Integrado de Monitorización de la Calidad de los Lubricantes" con el potencial de ser extendido también a la monitorización y gestión de la calidad de otras clases de aceites lubricantes y combustibles. Tras describir su funcionalidad, sus principios y las condiciones de estructuración para el funcionamiento de la respectiva

propuesta, el estudio recomienda al Ministerio de Recursos Minerales, Petróleo y Gas de la República de Angola que haga suya la idea de crear e implementar el sistema aquí propuesto.

Key-words: Gestión, Control, Calidad, Aceites lubricantes, Consumo.

Introduction

When observing the commitments of the global energy transition, studies indicate that in addition to the challenges such as the need to decarbonize the fuel matrix of the different countries in the world, environmental sustainability, the concern for the reduced margins of a good part of the world refineries, sometimes negative, for different reasons such as the control of the prices of derivatives in the different countries, there is also the gravity factor of the specifications of the products as an element that contributes to the global energy transition. In this context, Angola has a lubricants market full of various brands and players, as a consequence of its 90% dependence on imported lubricants and 80% of imported fuel, which has had many drawbacks in its marketing and sales process, from the point of view of quality assurance and consumer satisfaction.

In recent years, the market for the production, distribution and marketing of petroleum products in Angola has been noted for the low productivity and quality of services in this sector. Several studies and management policies of different sectors in the country point out that the need to meet the demand for products and service goods offered to the market with quality is a premise to be followed by suppliers and service providers. However, this action must be complemented with the management of the quality of the products or services provided. As a consequence of the country's industrialization phase, we continue to live off the income obtained from the oil sector, so we believe that in this sector there must be productivity at all levels and quality in all services, not only for internal consumers but also to attract more external consumers.

Given the high need for imported lubricating oils to meet consumption needs, the quality control of this product becomes vulnerable, so the study presents a management and quality control system for automotive lubricating oils consumed.

How to ensure the quality of automotive lubricants sold in Angola?

To solve this question, the following research hypothesis is deduced:

It is assumed that the implementation of a the system of management and control of the quality of automotive lubricating oils in Angola would guarantee the quality of the consumption of this product.

Therefore, the overall objective of this study was to develop a management and monitoring system for the quality of automotive lubricating oils applicable to the Angolan context.

To this end, we begin by presenting an introductory framework on lubricating oils, followed by some brief considerations on quality management.

Lubricating oils are petroleum products. The petroleum industry consists of five basic downstream segments, which are exploration, production, refining, distribution, and marketing, all of which are interspersed with the transportation segment **(Neto & Gurgel, 2018)**. The following diagram presents the sequence of these activities.

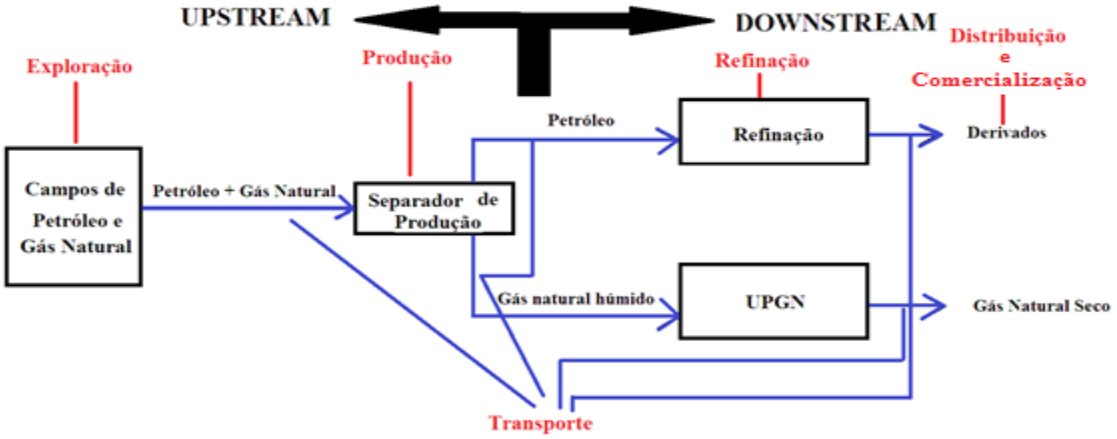

Figure 1. Segments of the oil industry
Note: Adapted from Neto & Gurgel (2018)

As a brief description of the diagram (Figure 1), we can visualize that the Upstream part is composed of the oil activities that take place offshore, such as exploration and production, linked by transportation. And the Downstream part is composed of refining, distribution and marketing activities, also interconnected by transportation.

According to Gândara (Óleos lubrificantes minerais: uma análise das potencialidades da reutilização, 2000, p. 28) « Lubricating oil is used to provide a film between the bodies, reducing wear of the materials and increasing their service life.»

Based on SENAI - ES and CST (Lubrificação – Mecânica, 1997, p. 12) we can see that lubricants have the following main functions:

a) Lubrication:
b) Refrigeration:
c) Cleaning and maintenance:
d) Protection against corrosion:
e) Sealing the combustion chamber:

In summary, the classes of automotive lubricating oils are schematized according to the applicability of the oils. Broadly speaking, the classes of automotive lubricating oils are as follows:

a) Class of lubricating oils for engines;
b) Gear lubricating oil class;
c) Transmission lubricating oil class;
d) Class of lubricating oils for brakes;
e) Class of lubricating oils for penetration;
f) Class of lubricating greases for wheel and chassis bearings; g) Class of lubricating greases for wheel and chassis bearings; h) Class of lubricating greases for wheel and chassis bearings;
g) Class of lubricating greases for high-temperature wheel bearings;
h) Class of white lubricating greases;
i) Electronic lubricating grease class;
j) Lubricating graphite class.

The set of properties must give the oil the following characteristics:

- Mobility at low temperatures;
- Oxidation resistance;
- Viscosity and its variation as a function of temperature.

All lubricating oils have special characteristics, but in general have the following properties in common:

- Viscosity;
- Viscosity index;
- Density;
- Mobility at low temperatures;
- Flash point;
- Pour point;
- Demulsibility and emulsibility;
- Detergency;
- Unctuosity

The quality management of a product or service leads us to adopt quality management systems. Management systems are understood as a set of tools and work practices that serve to manage a sector or product. A Management System (MS) serves to catalog the information of an organization in order to concentrate the data, providing more specific information, which helps to a better and correct decision making.

Adopting quality management systems follows models that start with the preparation of the organizations, extend to the implementation of the systems and to the verification of the conformities and the subsequent audits of the implemented systems.

In order to present a concept of quality, many authors have tried to present a satisfactory concept. Among them we have:

> Quality is, by definition, a relatively broad and complex concept, and there is no consensus on its conceptualization. The most widely used definitions of quality worldwide are those issued by the main quality gurus at different times. Among them are:
>
> Suitability for use - Joseph M. Juran;
>
> Compliance with requirements - Philip Crosby;
>
> Quality as a function of losses - Genichi Taguchi;
>
> Quality means a predictable degree of uniformity and reliability at low cost, being suitable for the market. - W. Edwards Deming. (Berssaneti & Bouer, 2013, p. 22)

The definitions presented and daily practice lead us to understand that the fundamental premise of quality management of any marketable product is to ensure that it has properties that meet its quality specifications, and respects a chain of steps until it reaches the consumer, with operations that do not alter the same properties.

It is impossible to talk about quality without referring to the ISO 9000 family of standards.

The ISO 9000 family addresses various aspects of quality management. The standards provide guidance and tools to companies and organizations that want to ensure that their customers' needs are met, and that continuous improvement is achieved (Vilar, 2013, p. 18).

When implementing a quality management system in an organization, it is necessary to consider the following standards of the ISO 9000 family, which are presented in the following table:

Table 1
ISO 9000 Standards

Standard		Field of application
Number	Scope	
ISO 9000:2005	Quality Management System - Fundamentals and vocabularies	Describes the fundamental principles of quality management systems that are the focus of the ISO 9000 family of standards and defines related terms
ISO 9001:2008	Quality Management System - Requirements	Specifies the requirements of a quality management system in which an organization - You need to demonstrate your ability to provide a product that meets the customer's requirements and applicable regulations - It aims to increase customer satisfaction through the effective implementation of the system, including processes for continual improvement of the system and to ensure compliance with customer requirements and applicable regulations
ISO 9004: 2019	Quality Management System - Managing for the sustainable success of an organization. Quality management approach	Provides guidelines that go beyond the requirements set forth in ISO 9001 to consider both the effectiveness and efficiency of a quality management system Compared to ISO 9001, the objectives of customer satisfaction and product quality are expanded to include stakeholder satisfaction and organizational performance. It is not intended to be used for certification purposes, nor as a guide for the implementation of ISO 9001
ISO 19011:2011	Guidelines for the audit of management systems	Indicates the guidelines for conducting management system audits

Note: Adapted from Vilar (2013)

The implementation of a quality management system in an organization to guarantee the quality of a product or service brings many advantages.

These stages are as follows:

- Organize and improve organizational effectiveness;
- Improved execution, coordination, and productivity;
- Increased focus on organizational objectives and customer expectations;
- Achieving and maintaining product quality to meet explicit and implicit customer needs;
- Holding people accountable;

- Internal and external communication;
- Systematization of tasks and procedures;
- Competencies and competency improvement;
- Demonstration to customers and potential customers of the organization's capabilities;
- Opening new market opportunities or maintaining market share;
- Certification with external visibility and internal and external recognition. (Pinto & Soares, 2018, p. 32).

Undoubtedly, these are benefits with an advantageous potential for any organization that wants to establish itself in any type of market. For this purpose, quality control systems must be used.

We understand by quality monitoring models, the mechanisms aimed at collecting data in order to provide managers and stakeholders with indicators that translate the status of a given service or product.

"There are many monitoring systems implemented in the world, with differences mainly in the mode of operation and objectives" (Lima, Assis, Raldenes, & Pereira, 2012, p. 12).

In general, in the quality monitoring programs the management of existing petroleum products in any way, the main systems of quality control of fuels and lubricants developed in the world, associated with inspection along the marketing chain of the final products, are valid.

By way of comparison, Figure 2 shows some of the main monitoring systems in the world.

País/Região	Tipo de sistema de monitoramento/fiscalização
Estados Unidos da América	Amostragem e ensaio, manutenção de registros, relatórios, auditoria, certificação, monitoramento voluntário pela indústria.
União Europeia	Amostragem seguindo norma EN 14274 e obrigatoriedade de emissão de relatório com dados anuais da qualidade dos combustíveis, segundo a Diretiva 98/70/EC [7].
Austrália	Programa governamental de amostragem, manutenção de registros, automonitoramento pelas indústrias.
Cingapura	Amostragem voluntária de cada combustível destinado à comercialização e envio de relatórios ao governo.
Coreia do Sul	Programa de amostragem em refinarias, terminais e postos revendedores.
Japão	Programa governamental de amostragem anual em todos os postos revendedores.
Canadá	Envio de relatórios com dados das características definidas como sendo de monitoramento obrigatório pelo governo.
Argentina	Programa nacional de controle de qualidade dos combustíveis, de caráter fiscalizatório, mantido pela Secretaría de Energia.
Colômbia	Marcação de produtos para identificação e quantificação, análise em postos revendedores por equipamento portátil.
Chile	Ações de fiscalização, obrigatoriedade de envio de documentos declaratórios de conformidade de produtos, organismos certificadores, automonitoramento pelos postos revendedores.
Costa Rica	Verificação de certificados e ações de fiscalizações realizadas por empresa terceirizada.
Uruguai	Programa de monitoramento realizado por empresa terceirizada e manutenção de registros.
Peru	Programa de monitoramento e fiscalização pelo Organismo Supervisor de la Inversión em Energía y Minería – Osinergmin e automonitoramento pela PetroPeru.
Guatemala	Programa permanente de fiscalização mantido pelo órgão Dirección General de Hidrocarburos – DGH.
Brasil	Programa de amostragem, manutenção de registros, obrigatoriedade de envio de dados sobre comercialização e qualidade de produtos, ações de fiscalização.

Figure 2. Fuel quality control program - FQCP
Note: Lima, Assis, Raldenes, & Pereira, (2012)

Applying the management of refineries for the management and assurance of their quality, we classify them into two types of models, which are developed as follows.

Closed Models

They are based on monitoring the quality of a given product in which all parties involved, from producers and/or suppliers, distributors, retailers, regulators, inspectors and product defect claims managers, belong to the same market sector.

In emerging countries, and without the development of regulatory aspects, the quality aspect and its rapid means of measurement, this type of model is limited by the lack of other consumer protection tools in case of defects in the products purchased and/or consumed. According to Table 1.1, we can see that the models of the United States of America, South Korea, Peru, and Chile are in line with this type of monitoring.

Open Models

These, in turn, are based on monitoring the quality of a given product in which all the parties involved, from producers and/or suppliers, distributors, retailers, regulators, inspectors and product defect claims managers, do not all belong to the same market sector.

This type of model provides those involved with a greater capacity for rigor in their activities due to the flow of information to demonstrate, or not, the quality of a service or product purchased and/or consumed, with the limitation of the model of the possibility that this information is sensitive to the business. According to table 1.1 we can see that the models of the European Union, Singapore, Japan, Canada and Argentina are in line with this type of monitoring.

Analyzing in depth we can also verify the typologies of mixed quality control models. Due to their structure, these models can be applied to lubricating oils as well as to any other petroleum product.

Methodology

The study was a qualitative type of research and the modality of the project falls into the category of quasi-experiment. The data were collected using the instrument, the documentation, since it was started by making a literature review, on the quality control of petroleum products and their management, as well as the information instructions of the main stakeholders of the research universe and the interview method was also used.

The procedure used for data analysis is content analysis, since for the practical part of the project, an objective, systematic and quantitative description of the data collected during the research was carried out.

During the practical research, we conducted field visits between March 2018 and June 2019 to stakeholders in the lubricating oil monitoring sector, selected based on the representativeness of stakeholders with a potential fit with our proposed automotive lubricant quality monitoring and management system.

These stakeholders were:

- The Petroleum Derivatives Regulatory Institute and the National Directorate of Commercialization of the Angolan Ministry of Mineral Resources, Petroleum and Gas of Angola, as representative of the Angolan State and regulator of the sector, in the role of regulator and inspector;
- The IMUL lubricant factory in Angola belongs to the Sonangol Distributor company of the Sonangol Group, in the role of both producer and importer of the lubricating oil product;
- The Angolan Institute for Quality Standardization (IANORQ), as the Angolan State control body, in the role of supervising actor;
- The National Institute for Consumer Defense (INADEC), as a public consumer defense agency, in the role of intervening representative of the consumer market.

These field visits allowed us to learn about the status of quality control and management of automotive lubricants and other petroleum products marketed in Angola.

Results and Debates

Our product under study is automotive grade lubricating oil and the study seeks to establish its quality assurance at the commercialization stage, which naturally belongs to the distribution and marketing segment. This product in Angola is produced by IMUL (Instalação da Mulemba de Lubrificantes) and to supply market demand it is also imported.

Although the large refinery parks have the capacity to produce lubricating oils, the Angolan refinery (the only one to date), i.e. the Luanda Refinery, does not have a production line for this product.

In terms of operations and industrial structure, IMUL fits into the complementary facilities of the oil derivatives production chain. IMUL is the place where blending takes place and serves to produce the different families of lubricating oils that will be classified by density, composition and other characteristics. In turn, additives are added for the specific purpose of improving the properties required for lubricating oil quality, such as greasiness, detergency, demulsibility, viscosity, freezing point, color, stability and others.

In the domestic lubricants market, we have the following types of players:

- Brands: There are the brands Ngol, Vip, Vip Extra, Global, Galp, Castrol.
- Producer: There is only the IMUL facility;
- Importers: We have the companies Pumangol, Cosal, Jambo, Sonangalp, Total, Lubáfrica and others;
- Distributors: We have the companies Sonangol Distribuidora, Pumangol, Galp, Sonagalp, NGRC;
- Traders: We have the companies Sonangol Distribuidora; Pumangol, Galp, Sonagalp, Libiauto, Sonangalo, Cosal, Jambo, Impoleos, Lubiafrica and others.
- Prosecutor's Office: The Petroleum Derivatives Regulatory Institute and the Marketing Department of the Ministry of Mineral Resources, Oil and Gas.

To date, Angola has only one lubricating oil production plant (IMUL), and due to the low processing capacity of the country's existing refinery, Angola cannot produce base oils, so these are imported.

The current production capacity for lubricating oils is 20,000 MT/year, but the industry plans to increase its capacity to 40,000 MT/year, which shows that the 20,000 MT/year capacity is no longer sufficient to meet consumer needs. The company that produces Angola's lubricating oils is called IMUL (Instalação da Mulemba de Lubrificantes) and they appear on the market under the brand name NGOL.

In the third quarter of 2018, sales of lubricants in the domestic market, fell by 62% in volume compared to the analogous period of 2017.

Imports are permanently followed by PUMANGOL, SONANGALP, COSAL, JAMBO, IMPOLEOS and LUBÁFRICA.

According to the Sales Report of the Internal Marketing Department of the Ministry of Mineral Resources and Petroleum of the Republic of Angola, the quantities in metric tons (MT) of lubricants sold give the largest supply of the company SONANGOL DISTRIBUTOR, which supplied the market with 1,526.50 MT. And about 2513.02 MT of the supply of lubricating oils sold in Angola in that period (third quarter of 2018) depended on imports.

The following table shows in more detail the state of decline of the product in the domestic market, based on the MIRMPET report.

Table 2
Lubricant sales in the domestic market, third quarter 2018

BUSINESSES	AMOUNTS (TM)
SONANGOL DISTRIBUTOR	1,526.50
PUMANGOL	1,056.58
SONANGALP	325.00
COSAL	439.30
JAMBO	591.21
IMPÓLEOS	33.79
LUBAFRICA	67.14
TOTAL	4,039.52

Note: Ministry of Mineral Resources, Petroleum and Gas (2018)

To regulate the quality of lubricating oils, there is the Angolan legal diploma, EXECUTIVE DECREE No. 536/15, for the purpose of the evaluation of their quality of automotive lubricants highlights the following standards:

In the case of lubricating oils for four-stroke gasoline engines, the API SJ or ACEA A3/B3 standard must be met.

In the case of lubricating oils for four-stroke diesel engines, the API CH-4 or ACEA B3/E3 standard must be met.

For automotive gear oils, except for automotive automatic transmissions, the following standard must be complied with standard API GL-4 o API GL-5.

In the case of lubricating greases, the degree of consistency corresponding to the applicable NLGI classification must be complied with.

For other classes of lubricating oils not provided for in Articles 3 to 9 of EXECUTIVE DECREE No. 536/15, including automotive automatic transmissions, the minimum specifications required by equipment manufacturers must be met.

Under Angola's current system, lubricating oils enter the Angolan market through imports in an amount corresponding to 62.21% of national consumption and 37.79% are produced by the Angolan company IMUL. Following the commercial authorizations, the importers have a fiscal license granted by the regulator, i.e. the Angolan Ministry of Natural Resources and Petroleum, to import and sell the product, and in turn the national producer has a license to produce the product. And in this way the lubricating oils enter the consumer market. In accordance with price regulatory policies, importers market the

product after providing the regulator with a certificate of quality of the imported product and the producer sends it to its counterpart within the Sonangol group, the subsidiary Sonangol Distribuidora, to market the oils. Sporadically and especially in case of relevant need (such as complaints of lack of quality) the regulator goes to the marketing market to certify the quality of the product, taking samples of the product and sending them to specialized laboratories for analysis based on, EXECUTIVE DECREE No. 536/15. Normally, the regulator sends them to IMUL (player of the segment) to check the quality and answer any questions. In case of infringement, suppliers found in such a situation are sanctioned, with measures ranging from fines, withdrawal of the product from the market and, in rare cases, reimbursement to customers affected by the lack of quality.

The following drawbacks are notorious in this system:

- Periodicity of surveillance, the measure of product flow into the market;
- Lack of involvement of the Angolan Institute for Quality Standardization (IANORQ), as it is a supervisory body of the Angolan State as a watchdog independent of the regulator;
- The lack of openness to independent quality certifiers;
- The scarce elaboration of an accurate report on the state of product quality and its dissemination to consumers;
- The lack of involvement of the National Institute for Consumer Defense (INADEC), being a public consumer defense agency with the creation of a correspondent in the quality control and management system to facilitate the process of consumer complaints.
- And finally, for the convenience of inspection and quality certification, the normative instrument should be more user-friendly and, in this regard, the Executive Decree 536/15, which regulates the specifications of lubricants marketed in the Republic of Angola, is not at this level, as it only refers to technical standards and does not present in detail the parameters, specifications and standardization methods of laboratory work.

In our analysis, these drawbacks are relevant to the extent that Angola continues to live on the income obtained from the oil sector, so we believe that in this sector there must be productivity at all levels and quality in all services, not only for internal consumers but also to attract more external consumers.

Hence, we present the following system to better promote the control and management of lubricant quality, with possible application to any petroleum product.

Based on the problem of the study, the research question and the solution hypothesis, the monitoring proposal involves the establishment of a system of operation around the chain of a product that outlines and identifies a functional circuit from the supply to the consumer. The functionality of this proposal is represented by the following flow diagram:

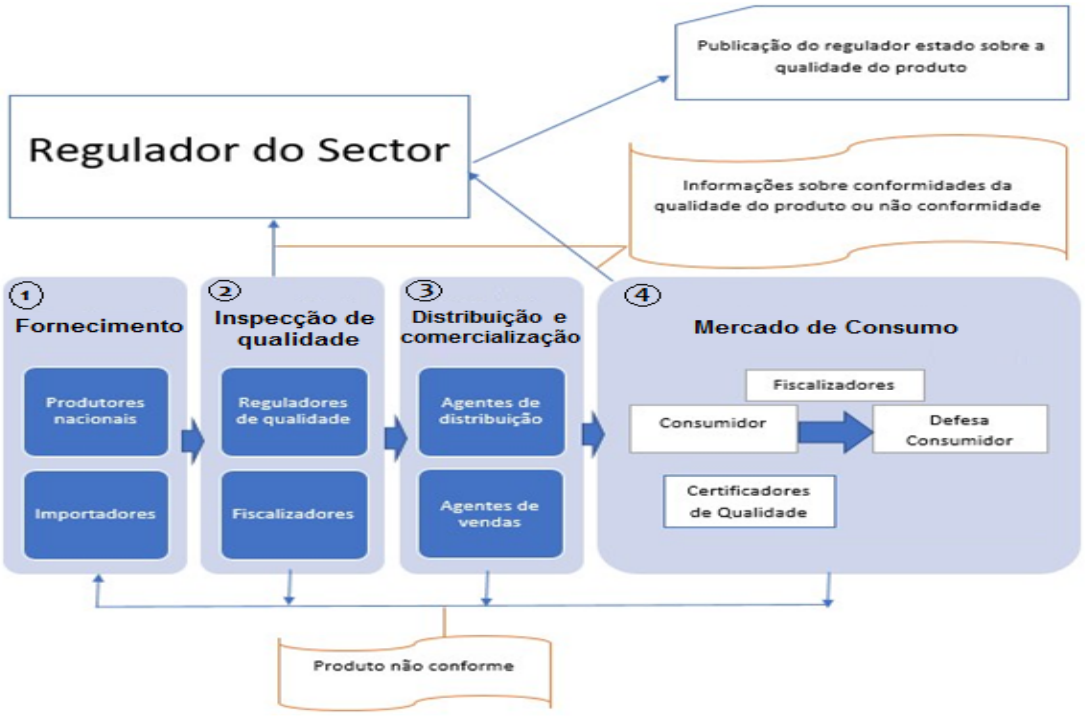

Figure 3. Systematization of the proposal for quality control and management of automotive lubricants

In this sequence we have:

The system starts with the delivery of the product to the system. The supply of the product to the system can be through import or domestic production and follows the quality inspection stage.

The quality inspection stage is carried out by the quality regulators (representative of the sector regulator), as they are the ones who have the quality standards and inspectors to safeguard the technical analysis of quality surveillance. The result of the inspection can provide two types of opinions, one of them is CONFORM and the product passes to the next phase of the product quality monitoring system, preceded by a documentary record for control purposes with the information that the batch or shipment of product is within specification, as well as the record of the destination of the possible point of marketing of the same batch or shipment of product. On the other hand, in this phase we can also have a NOT CONFORMED opinion, and the product returns to the supply phase for reprocessing. All opinions obtained at this stage are promptly communicated to the industry regulator for publication to satisfy the need for public information.

The product with a CONFORMED opinion goes on to the distribution marketing stage so that it can be effectively made available to the consumer market.

Once in the consumer market, the marketed product is certified for its quality, both by the quality certifiers and by the consumer himself, who will be represented by the Consumer Protection Agencies, through complaints in case anomalies are detected in the quality of the product. As in the quality inspection stage, at this stage the result of the quality certification can also provide two types of reports, being a CONFORM report accompanied by a documentary record for control purposes with the information that the batch or shipment of product is within specifications and we can also have a NOT

CONFORM report, and the product returns to the supply stage for reprocessing. All opinions obtained at this stage are also communicated in a timely manner to the industry regulator for publication to satisfy the need for public information.

Contextualizing the proposal to the Angolan reality, we have:

Regulator: Angolan Ministry of Natural Resources and Petroleum (Regulatory Institute of Petroleum Derivatives);

Suppliers: The Angolan production company Sonangol in its subsidiaries Sonangol Logística and Sonangol Distribuidora (IMUL) and Exporters;

Inspection: Angolan Quality Standardization Institute (IANORQ) and MINRMPET;

Distribution and marketing: Sonangol Distribuidora, Pumangol; Total, Lubafrica and others;

Consumer market: Consumers, independent quality certifiers such as Certified University Laboratories; National Institute for Consumer Defense (INADEC).

After the presentation of the proposal, for the subsequent management and its operability of the proposal, our idea of a monitored market, proposes the creation of a team that monitors the National System for Monitoring the Quality of Lubricants and/or Fuels, composed of the following working committees:

a) Working Committee, for the evaluation, quality certification and codification of the product, composed of sector regulators, certifiers and product quality inspectors, this committee must be divided into two subcommittees, which are:

(a.1) Working subcommittee, for product evaluation, quality certification and coding, upon product entry into the market prior to marketing. This committee would authorize the distribution or not of the product for sale;

a.2) Working subcommittee for product evaluation, quality certification and quality inspection in the consumer market (sale and consumption). This committee would monitor the quality of the product during distribution and consumption;

b) Working Committee, for technical and scientific research and drafting and control of product quality monitoring documentation, composed of industry regulators, quality certifiers, technical and scientific research professionals in the area of lubricant and fuel quality, quality standardizers and consumer representatives (Consumer Protection), this committee should be divided into two subcommittees, which are:

(b.1) Working subcommittee for technical-scientific research, for monitoring the technological evolution of product quality, adjustment of specifications and development of new product lines;

b.2) Working subcommittee for the drafting and technical control of product quality monitoring documentation, for the documentary treatment of the activities of the working team of the National System for Lubricants and/or Fuels Quality Follow-up.

The Integrated Quality Surveillance System follows the following dependency relationship:

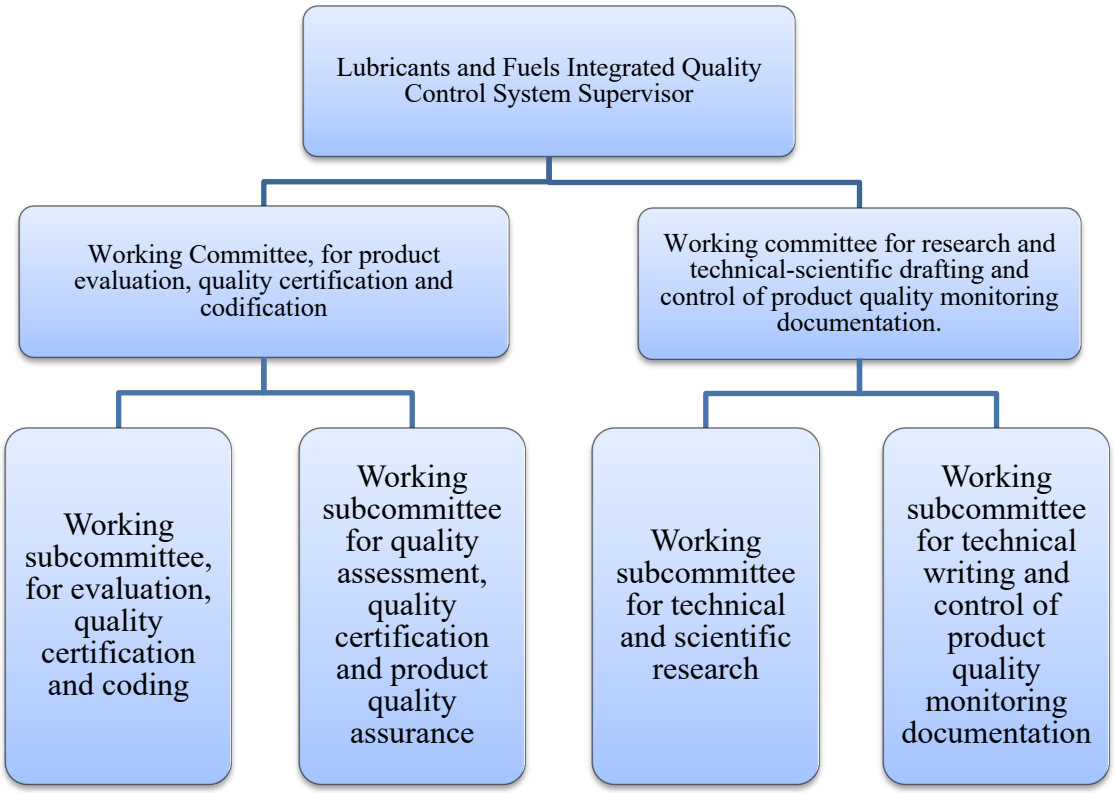

Figure *4*. Hierarchical reporting structure of the Integrated Fuel and Lubricant Quality Control System

The working committee of the National System for Monitoring the Quality of Lubricants and/or Fuels will operate with representation from the 18 provinces of the country, in the points hereinafter identified as points of reception of the product, such as producing regions (where there are factories), port regions, customs regions of frequency of this type of product and regions of high consumption of the same.

With a work team for the Quality Control of Lubricants and/or Fuels, we will have a better guarantee of the quality of these consumed products. And its structuring can provide, among other advantages, the following results:

1 - Actions to verify and certify the quality of the product at the reception points before placing it on the market

Regardless of the information from the producer or importer of automotive oil, the National System for Monitoring the Quality of Lubricants and/or Fuels must have the technical conditions to be able to check samples of the product batch received, to certify that its quality complies with the specifications pre-established by the sector regulator so that the product can be consumed.

2 - *Independent product coding and registration*

Upon certification of good product quality, the working committee for the evaluation, certification, and coding of the National Lubricants and/or Fuels Quality Monitoring System will promote an action of coding the product lots with a generic code, such as a serial number or bar code in its monitoring documentation records, to identify that the product lot or shipment is within specifications. As well as a record of the destination of the potential trading post of the same batch or shipment of products.

3 - Inspection of product quality at the point of sale

Since storage conditions also represent a reason for loss of quality, it is necessary that the National System for Monitoring the Quality of Lubricants and/or Fuels also acts to certify that at the distribution points the product continues to maintain its quality. For this we also need a clearer Executive Decree, which regulates the specifications of the lubricants sold in the Republic of Angola.

4 - Existence of an integrated quality control model

We consider that the model presented is an integrated quality monitoring model, since it contemplates the contribution of organizations whose performance is not directly framed in the oil sector, namely IANORQ (Angolan Institute for Quality Standardization) and INADEC (National Institute for Consumer Defense) and the laboratories of educational institutions to contribute as independent quality certifiers and provide periodic reports on the quality status of the products analyzed in these laboratories.

For this purpose, the following conditions must be met:

- For IANORQ (Angolan Institute for Quality Standardization)
- Creation of an office within the Quality Policy Management, with technicians with technical and scientific capacity to research, monitor, update, recommend and propose standards to evaluate and/or guarantee the quality of lubricants and fuels, as well as other products of interest for the country's useful life.
- For INADEC (National Institute for Consumer Protection)
- Creation of a technical group, within the Market Studies Department, with the technical competencies to monitor the standards for evaluating and/or guaranteeing the quality of lubricants and fuels.
- For higher education institutions

Educational institutions must be part of the national network that produces studies on the quality of lubricants and fuels in the areas where they have their headquarters or some action.

This production is carried out through practical classes in laboratories linked to the disciplines of fuel and lubricant analysis. In this regard, the students periodically collected samples from the most diverse outlets of lubricants and fuels in a geographically defined area and took them to the laboratories to check their quality, based on the normative references that regulate the quality of these products for consumption in Angola, namely Executive Decree 288/14 and Executive Decree 536/15. After this analysis, a report is prepared by the technical guides of the discipline (professors and monitors) and sent to the coordination of the National System for Monitoring the Quality of Lubricants and/or Fuels, so that decisions are made to process the information and publish it for public knowledge.

For this, the institutions must propose two indispensable aspects, which are:

1. To have human capital with technical competence to evaluate and/or guarantee the quality of lubricants and fuels and to prepare reports;

2. To have certified laboratories for the analysis of lubricants and fuels, accredited and approved with confidence to perform the tests according to the rules of Executive Decree No. 288/14 and Executive Decree No. 536/15.

In addition, it is important to open the opportunity for independent quality certifiers, i.e. independent lubricant and fuel laboratories, with the assurance that they are certified for the purpose of analysis of lubricants and fuels, accredited as approved with

confidence to carry out tests according to the standards of Executive Decree No. 288/14 and Executive Decree No. 536/15 and produce reports for the coordination of the National System for Monitoring the Quality of Lubricants and/or Fuels.

Conclusions

It is notorious to observe that modern organizations are committed to high standards of commitment to policies for promoting and defining the quality of services and products. These play a crucial role in decision making at all levels of a simple organization or society. Therefore, depending on the sector in which each country operates, a quality management system must be defined to ensure the existence of this important decision-making factor for services and products. In this sense, this study presents a system for managing and monitoring the quality of automotive lubricating oils consumed in Angola. Our study allowed us to identify the actors, the strategies and interaction of the actors within the system, and the supporting notes to complement the Angolan legislation that assesses the quality of lubricating oils.

Based on the results of the study conducted, we make the following recommendations:

1. To the Ministry of Mineral Resources and Petroleum, on behalf of the Government of the Republic of Angola, to embrace the idea of creating a management and monitoring system for the quality of lubricating oils (also applicable to fuels) and to take advantage of the results presented in this research and enable the implementation of the Integrated System for Monitoring the Quality of Lubricants and/or Fuels (SIMQLC) and , in particular, to increase the allowances (*tables, where are presented*, Characteristics, Units, Limit Values and Test Methods) to the Executive Decree No. 536/15.

To correspond to their functions within the integrated quality control model (proposed in this study), we recommend the following to IANORQ (Angolan Institute for Quality Standardization) and INADEC (National Institute for Consumer Protection) and to the laboratories of educational institutions and research centers in the area of fuels and lubricants

2. For IANORQ (Angolan Institute for Quality Standardization), the creation of an office within the Quality Policy Management Department, with technicians with technical and scientific expertise to research, monitor, update, recommend and propose standards that evaluate and/or guarantee the quality of lubricants and fuels, as well as other products of interest to the life of the country.

3. For INADEC (National Institute for Consumer Protection), the creation of a technical group, within the Department of Market Studies, with the technical competence to supervise the standards to evaluate and/or guarantee the quality of lubricants and fuels.

4. For institutions of higher education and research centers in the area of fuels and lubricants, which have human capital with technical competence to evaluate and/or guarantee the quality of lubricants and fuels and prepare reports; And that have certified laboratories for the purpose of analysis of lubricants and fuels, accredited and approved with confidence to perform the tests, according to the rules of Executive Decree No. 288/14 and Executive Decree No. 536/15.

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IMPACT OF FEMININE LEADERSHIP IN INFORMATION TECHNOLOGY PROJECTS

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Abstract. This research aims to contribute, through data, analysis, and conclusions, to the current knowledge about the impact of the leadership performed by women in information technology (IT) projects in Argentina. Starting from the bibliographic review, work has been carried out, firstly, on a qualitative research, through semi-structured interviews to female project leaders of this industry, where their experiences and perceptions were captured. Those findings enriched the design of the measuring instrument for subsequent quantitative research, carried out through surveys to 115 members of information technology project teams, led by women in Argentina. The main results of the study, which allowed to validate the hypothesis, describe that woman, IT project leaders, exercise a transformational leadership style, servant leadership, with a strong focus on people and relationships, which motivates their collaborators to develop good performance in their projects. It has also been proven that the female leaders' aptitudes and competencies are considered by their collaborators as the most accurate to motivate them, especially to young people of the socalled "Generation Y" or "Millennials". The purpose of this research is to challenge the beliefs and stereotypes that hinder women's access to leadership roles and the choice of their professional careers, seeking to generate awareness, in organizations and the community in general, of the biases and obstacles that, nowadays, persist.

Keywords: Feminine Leadership, Project Management, Information Technology, Argentina.

EL IMPACTO DEL LIDERAZGO FEMENINO EN PROYECTOS DE TECNOLOGÍA DE LA INFORMACIÓN

Resumen. Este trabajo busca aportar conocimiento, a través de datos, su análisis y las conclusiones, acerca del impacto del liderazgo que ejercen las mujeres en los proyectos de tecnología de la información (TI) en Argentina. Partiendo de la revisión bibliográfica, se ha trabajado, en primer lugar, sobre una investigación cualitativa, a través de entrevistas semi-estructuradas a mujeres líderes de proyectos de esta industria, en la que se han capturado sus vivencias y percepciones. Estos hallazgos enriquecieron el diseño del instrumento de medición para la investigación cuantitativa posterior, llevada a cabo a través de encuestas a 115 integrantes de equipos de proyectos de tecnologías de la información liderados por mujeres en Argentina. Los resultados principales del estudio, que permitieron comprobar la hipótesis, describen que las mujeres, líderes de proyectos de TI, ejercen un estilo de liderazgo transformacional, servicial, con fuerte foco en las

personas y en la relación, lo cual motiva a sus colaboradores a desarrollar un buen desempeño en sus proyectos. Se ha comprobado, también, que las aptitudes y competencias de las mujeres líderes son consideradas por sus colaboradores como las ideales para motivarlos, especialmente a los jóvenes de la denominada "Generación Y" o "Millennials". El propósito de esta investigación es desafiar las creencias y los estereotipos que dificultan el acceso de las mujeres a roles de liderazgo y la elección de sus carreras profesionales, buscando concientizar a las organizaciones y a la comunidad en general, sobre los sesgos y obstáculos que aún persisten en la actualidad.

Palabras clave: Liderazgo Femenino, Dirección de Proyectos, Tecnología de la Información, Argentina.

Introduction

Since the beginning of management theories, definitions of leadership have been related to masculine traits and skills. Books and studies on leadership studied and described men, their aptitudes and behaviors. The idea of female leaders was not conceived. Women were not considered for the studies and, in case a woman was presented in the role of leader, she was underqualified for not fitting the male stereotypes. (Ramos López, 2005, 2011)

In her 1973 study, Dr. Virginia Schein described the phenomenon called "Think-Manager - Think Male", demonstrating that the characteristics, attitudes and temperaments considered necessary for successful leadership are more frequent in men than in women, overvaluing aspects associated with them, such as competitiveness, rationality and domination in the leader's role, and undervaluing aspects considered feminine, such as sensitivity, empathy and collaboration. This study proved that the phenomenon is global and that it generated a barrier for the access of women to leadership roles, being relegated to inferior positions. (Schein, 1973)

With the irruption of women in the business world and as they began to occupy leadership and decision-making roles, well into the 20th century, studies began to be carried out on the style of female leadership and the characteristics of women leaders.

A. H. Eagly (1987) in his "Social Role Theory" states that people tend to associate certain roles and behaviors to men and other roles and behaviors to women, attributing to women the so-called "communal" characteristics, such as "warmth, kindness and solidarity" and to men the so-called "agentic" characteristics, such as "assertiveness, competitiveness and independence".

In a later study, called "Role Congruence Theory", A. H. Eagly and Karau (2002) argue that such characteristics, attributed to women and men, cause people to be expected to behave in line with the "communal" or "agentic" attributions according to their gender, leading to unfavorable attitudes towards people who do not meet these stereotypes. With respect to women, when they perform in leadership roles, they are perceived as "unfeminine" and their effectiveness is hardly recognized, since leadership is considered more congruent with the male gender stereotype, "assertive, competitive and independent", than with the female one, "warm, kind, supportive".

Reinforcing this, Lupano Perugini (2009) quotes A. Eagly and Carli (2007), who argue that the prejudice towards women leaders is generated because people tend to associate the male gender mostly with leadership traits, assigning to men qualities such as "competence, control, rationality and assertiveness", while women are assigned characteristics such as "sensitive, friendly, expressive and concerned about others".

Likewise, Isabel Cuadrado (2004) mentions in her article entitled "Values and stereotypical gender traits of women leaders", that Virginia Schein's studies (2001) show

that stereotypes of managerial positions have characteristics assigned to men, which generates difficulties for women in accessing leadership roles.

Taking up the theory of "Role Congruence Theory" by Eagly and Karau (2002), Kirk (2009) states that, by relating leadership to masculinity, it becomes difficult for women to participate in leadership roles without receiving criticism for their behavior, no matter what traits they express. If she shows concern for people, she is seen as a good woman, but very emotional, very soft, i.e., she does not fit the characteristics of a leader. On the other hand, if she is very task-oriented, assertive and rational, she will be criticized for being too hard and unfeminine.

From the above, it can be deduced that, no matter how she behaves, a woman in leadership roles will always be questioned.

However, recent studies show that female leaders possess appropriate traits and competencies to exercise leadership, to a similar extent or even surpassing male leaders. In this regard, a study by Korn Ferry Institute and Rockefeller Foundation (2017) found that female CEOs possess, to a similar extent as their male peers, the traits required for high-level positions in organizations, including persistence, need for achievement, curiosity, focus, assertiveness, risk-taking, and empathy.

At the same time, the needs of 21st Century organizations, with today's environments of volatility, uncertainty, complexity and ambiguity, commonly referred to as VUCA environments, and in particular the context generated by the Covid-19 pandemic, have revealed that today's leaders need more people and relationship-focused, collaborative and team-oriented attributes and skills than those traditionally associated with the role of the autocratic leader/manager.

Precisely, in this context of change, conflict, stress and uncertainty, transformational leaders contain, support and reassure their collaborators, fostering tolerance for uncertainty, as expressed by Lupano Perugini and Castro Solano (2006).

Spears and Lawrence (2002) state that traditional leadership styles, autocratic or hierarchical, are beginning to disappear in the 21st century, to give way to servant leadership, based on teamwork and community, involving employees in decision making and strongly based on ethical and caring behavior, seeking to improve the personal growth of employees while improving the care and quality of institutions.

These new leadership role needs, more focused on relationships, empathy and caring for employees, are more closely associated with the characteristics typically attributed to women than those traditionally attributed to men.

In a study developed on 7,280 leaders of the most successful and progressive organizations in the world, presented in the article "Are Women Better Leaders than Men?" by Jack Zenger and Joseph Folkman (2012), published by Harvard Business Review, it was found that women have greater competencies in terms of focus on the growth and development of their collaborators and relationship building, integrity and self-development. In that study, female leaders have been rated by their peers, their bosses, their direct reports and other people with whom they interacted, as better leaders, in general, than their male colleagues, with the gap increasing as the higher the level of hierarchy corresponded to female leaders. (Zenger and Folkman, 2012).

On the other hand, Eagly and Johnson (1990) explain that women tend to adopt a more democratic or participative leadership style and a less autocratic or directive style than men.

Cuadrado (2004) cites Druskat (1994), who argues that women value relationship, collaboration and discussion more, differentiating their leadership style from that of men. This author also cites B. Bass and Avolio (1994), who suggest that women develop a more "transformational" leadership style than men, as a result of their greater dedication

to parenting and educational activities, their interest in others and their greater social sensitivity. The aforementioned authors argue that women have values aligned to care and responsibility, while men are more concerned with rights and justice. Reinforces the above, the research of María Teresa Bistué (2016) on women leaders of organizations in the private sector in Panama, which concludes that, "the style of female leadership in the private sector of activity in Panama is identified with the characteristics of transformational leadership". (Bistué, 2016, p. 211)

On the other hand, studying the impact exerted by female leadership in organizations, the article "Are Women Better Leaders than Men?" by Zenger and Folkman (2012), assures that their research shows that the leadership skills that stand out in the women studied, are strongly correlated with organizational success factors, such as talent retention, customer satisfaction, employee engagement and profitability.

The report "Women CEOs Speak. Strategies for the next generation of female executives and how companies can pave the road," by Korn Ferry Institute and Rockefeller Foundation (2017), states that, when companies have gender diversity and leaders with the skills to incorporate differences, increases in performance and innovation are present.

According to the report "What Women Want - And Why You Want Women - In the Workplace" by Cathleen Clerkin (2017), recruiting women into organizations, in addition to doubling the chances of finding the right talent, can also increase your company's financial performance. This author states that Fortune 500 companies with the highest representation of women on their boards outperform companies with the lowest representation of women, plus gender-diverse teams have higher sales and profits compared to male-dominated teams, and gender-diverse business units have higher average revenues than less diverse business units.

Clerkin's (2017) study of 750 women and men leaders highlights findings why organizations should want women:

- Participants from organizations with a higher percentage of women rated their organizations more favorably in terms of job satisfaction, organizational commitment, burnout and employee engagement.
- Participants with female leaders felt more supported, especially women, and experienced less job-related burnout. (Clerkin, 2017)

Considering the benefits of transformational leadership on the performance of employees, it could be deduced that project teams led by women who exercise a transformational leadership style will perform well, favoring the achievement of their objectives, as indicated by studies that relate the success of information technology (IT) projects with the leadership style of those who lead them. (LeBlanc, 2008; Thite, 2000), as well as other studies that found that, those leaders with predominantly transformational and servant style have a higher success rate in their information technology (IT) projects (Aga, Noorderhaven, & Vallejo, 2016; Harwardt, 2020; Afzal, Khan, & Mujtaba, 2018). In the same vein, Gerald M. Weinberg (1986) and Linda A. Hill, Greg Brandeau, Emily Truelove, and Kent Lineback (2014) assert that command-and-control type of leadership style does not prove to be appropriate in these projects, but rather leadership that promotes trust and favors collaboration is required, and additionally, there are studies that link the success of these projects to the emotional intelligence of project managers. (Afzal et al., 2018).

Another important factor to take into account in today's IT projects is that the teams are increasingly composed of young people from the new generations. These generations have quite different particularities than their predecessors and require leaders who allow them to develop, provide them with frequent feedback and value them for their

achievements and principles. (Espinoza and Ukleja, 2016). The most appropriate leadership style for teams integrated by the new generations seems to have more attributes related to leadership considered feminine than to leadership styles traditionally attributed to males.

On the other hand, Andrea Linardi (2020), in her doctoral thesis "La comunicación como herramienta de gestión de las líderes mujeres con sus equipos de trabajo en la República Argentina", states that new generations require a leadership style characterized by empathy, collaboration and bidirectional communication, giving and receiving frequent feedback.

Despite the above, at present, it is still men who have the greatest participation in high-level positions in organizations and the predominant criteria in the selection of leaders continue to be male traits. Likewise, both in project management and in the IT industry, there is still a high percentage of male leaders and workers.

With respect to the competencies shown by women leaders of information technology projects in Argentina and their impact on their collaborators of different generations, as well as on the performance of the projects, no precedents have been found.

For this reason, this research seeks to provide information to enrich the current knowledge on this subject and to promote the valuation of women, by organizations, to lead information technology projects, in case the hypothesis is proved, and to generate a basis for future research.

Methodology

The purpose of this study is based on the following objectives:

1. To identify the skills and competencies of women in project leadership positions in organizations of the information technology industry in Argentina.
2. To determine the level of motivation exercised by female leadership in their project team, in the different generations, and in the so-called Millennials, of information technology projects in Argentina.
3. To analyze the impact of female leadership on the performance of projects in the information technology industry in Argentina.

To carry out the research, the General Hypothesis was formulated with 3 sub-hypotheses:

General Hypothesis (GH): Women in leadership roles within IT projects in Argentina motivate their teams, especially younger generations, with their feminine leadership style, bringing greater efficiency to the organization.

Sub-hypothesis 1 (SH1): Women project leaders in the IT industry in Argentina have a servant, transformational leadership style, which is more focused on qualities, skills and competencies oriented to relationships, collaboration, and emotional intelligence.

Sub-hypothesis 2 (SH2): This female leadership style generates greater motivation in younger generations or Millennials.

Sub-hypothesis 3 (SH3): Female servant, transformational leadership positively impacts project performance in the IT industry in Argentina.

After an extensive literature review, the research was conducted in two phases, between April and October 2020, starting with a qualitative study, through semi-structured interviews with women leaders, and then concluding with a quantitative study, conducted through anonymous surveys of members of IT project teams led by women in organizations in Argentina.

The qualitative study was conducted through an applied and field research since it focuses on responding to the performance of women IT project leaders and is developed to collect information in the context of the study. To conduct the interviews, a guideline guide was prepared with the questions, created with the objective of covering the topics related to the research objective, giving a structural guideline and allowing, at the same time, to cross-examine or incorporate clarifying questions at any time during the conversations. The aim is to allow the interviewees to express their opinions freely, spontaneously, and at the same time to inquire into emerging topics while maintaining a natural conversation.

The interviews are aimed at women leaders of information technology projects with teams that have people from the Generation Y or Millennial generation, as well as women leaders who do not have young people from this generation in their teams, with the objective of finding out if they feel that their skills motivate their teams in a diverse way or not, and if this influences the results of the projects. To conduct the semi-structured interviews, 14 women leaders were selected, considering that 7 of them had young Generation Y or Millennials in their project teams, while the remaining ones only had teams with older people.

In order to obtain a heterogeneous sample of women leaders, a selection was made in different companies within the industry and several project leaders were invited to participate in the study, considering that they were of different ages and based in different parts of the country.

The questions in the Guidelines Guide focus on identifying the ideal skills of an IT project leader, the skills needed to motivate and inspire project teams, and the skills that the interviewees identify as their own. Also included are questions about the desired attitudes and behaviors of team members that have a positive impact on the outcome of the project, as well as the barriers or obstacles that prevent or hinder the achievement of project objectives. Interviewees are asked to suggest recommendations for training a good project leader to achieve good project performance. The interviewees are also asked about the communication techniques they use with their team and if they differentiate their communication style and techniques when interacting with people from different generations. Finally, they are asked if they consider that women leaders have a higher level of development in the leadership skills mentioned as ideal for IT projects.

The interviews with the women leaders were conducted through the Zoom platform and were recorded for later de-recording and analysis of the responses. The leaders interviewed belong to national and international organizations, such as Globant, IBM, Indra, Accenture, SAP, Baufest, Tenaris, Kinetic, BGH Tech and Datastar, and are based in the cities of Buenos Aires, Córdoba and Tandil.

In order to examine the interviewees' answers, a codification of recurring themes was generated, and the topics were investigated, according to each of the focus points designed, based on the objectives of this research.

With the information gathered in the qualitative phase, we proceed to the design of the questionnaire that will be the instrument of the quantitative phase of the research.

The quantitative study is carried out through an applied, field and synchronic or cross-sectional research, since it focuses on responding to the performance of the female leader of IT projects, it is carried out to collect information in the context of the study and is developed at a certain time, without considering the evolution of the variables over time. The objective of this phase is to investigate the impact of female leadership style on the motivation of collaborators and on the efficiency of IT projects. For this purpose, a battery of specific questions was created to capture the perceptions of people who are members of project teams in the IT industry, led by women, belonging to the

"Millennials" or older generation and working in organizations with more than 50 employees in Argentina.

The research variable "female leadership" is measured through a Likert scale and becomes a quantitative variable with an ordinal scale. Likewise, the effect of female leadership style is investigated according to differences in the age range of employees, considering Millennials and Non-Millennials groups.

To estimate the population, data are taken from different sources. First, the 2019 Annual Report on the Software and IT Services Sector of the Argentine Republic by CESSI (2020), states that the Software and IT Services Sector companies in Argentina in 2019 had 115,000 employees, and according to the same report, this sector, in 2016, was represented by 4288 organizations, of which 73% were micro companies, with less than 10 employees, 21% were small companies, with 10 to 49 employees, 4% were medium-sized companies with 50 to 200 employees and 2% were large companies, with more than 200 employees. In terms of the proportion of employees, micro-enterprises only account for approximately 20% of employment in the sector. The remaining 80% is distributed more or less equally among the other 3 categories (between 25% and 30% each). (CESSI, 2019). For the purposes of this study, it is considered that, among medium and large companies, 54% of the workers in the sector are employed.

Additionally, according to CESSI's Federal Strategic Plan for the Argentine Software Industry 20182030, only 20% of the sector's employees were women in 2018. (CESSI, 2018).

Based on the aforementioned sources, the population of IT project team members led by women in companies with more than 50 employees in Argentina is estimated as follows.

*Population: 115,000 employees in the sector * 54 % of employees in medium and large companies * 20 % of projects with female leaders = 12,420 people.*

The population consists of 12,420 people over 20 years of age, from IT project teams in Argentina led by women, working in organizations with more than 50 employees at the time of the study.

From this population, we proceeded to calculate the sample with a confidence level of 95%, resulting in a sample of 90 people.

Based on this information, a sample of 100 people was defined for the study, dividing 50% into young people of the Millennials generation and 50% older people.

For the design of the instrument, we first considered the collection of demographic and classificatory data to validate the defined inclusion criteria. It should be noted that in no section of the research instrument is it mentioned that the study is conducted exclusively on women leaders, nor is there any reference to "female leadership" in order to avoid influencing or biasing the responses of the respondents. On the contrary, they are asked about the sex of their leaders and continue with the following sections only if all the inclusion criteria are met.

In the second part, we aim to conduct a correspondence analysis between the competencies that motivate the leaders' collaborators, considered by them as *ideal* characteristics of *leadership itself*, versus their perceptions of the characteristics possessed by their own leaders. The leadership characteristics included in this questionnaire arise from the interviews conducted in the Qualitative Phase.

Next, the following sections are focused on classifying the type of leadership possessed by their leader, according to Bass' (1985) transformational leadership theory and Greenleaf's (1970) servant leadership, to find which style is more present in female leaders.

First, the questionnaire used in the Doctoral Thesis of María Teresa Bistué (2016) is used to measure the transformational, transactional and Laissez Faire leadership dimensions. For the design of the research questionnaire of Bistué (2016), the Multifactor Leaderschip Questionnarie MLQ, (Bass,1985) was taken as a basis, adapting and adjusting the categories, to measure and evaluate the perception of men and women on the female Leadership style within companies, in that case, in Panama City. For the last section, a questionnaire was designed to obtain information about the servant leadership characteristics of women leaders. The statements regarding servant leadership are based on the characteristics of this type of leadership, according to the author Robert Geenleaf (1970) in his essay "The Servant as Leader" and the findings obtained from the interviews.

The validation of the research instrument is performed, measuring reliability, through five experts, with the exception of the section of statements about transformational, transactional and Laizze faire leadership, taken from the Doctoral Thesis of María Teresa Bistué (2016), which has already been validated, previously to be used in her research.

Experts in leadership issues are asked for their opinion about the statements contained in the form, to be used in the quantitative research of this doctoral thesis. The purpose of the is to validate the leadership statements to be used in the research.

Regarding the section that seeks to evaluate "Servant Leadership", in order to give a context to the experts, a brief description of the qualities and characteristics of servant leadership described by (Greenleaf, 1970) in his book "The Servant as Leader" is presented in the document sent and prior to the statements.

To verify the internal reliability of the instrument, Cronbach's alpha (α) was calculated. In the social sciences it is considered that a coefficient value greater than 0.70 implies that the instrument is reliable, i.e., if this questionnaire were applied to other similar samples, the results could be generalizable.

The calculation applied to the experts' responses yielded a Cronbach's alpha (α) value of 0.73, thus concluding that the dimensions and their respective items have internal reliability to be included in the questionnaire.

In addition, the experts consulted also confirmed that they are sufficient and clear statements.

After validation by the experts, and prior to the fieldwork, the complete questionnaire was reviewed by a group of specialists, in order to obtain their observations and find out how long it took them to answer the survey. As a response from these specialists, it was learned that answering the survey in its entirety required an average time of between 12 and 15 minutes.

The research instrument was developed with the Google Forms tool and sent to the respondents through e-mails with the corresponding link, with no possibility of being traced, in order to keep the identity of the respondents anonymous.

The field study lasted 5 weeks and managed to obtain, organically, 115 respondents who qualified with all the inclusion criteria designed, of which 52 were Millennials, representing 45.22 % and the remaining 63 were Non-Millennials, with 54.78 %. The average age of these respondents was 42 years old.

The data analysis of the quantitative phase was carried out based on the levels of measurement of the variables and by means of descriptive statistics, using measures of central tendency.

Results

The results obtained from the analysis of the Qualitative Phase interviews are summarized as follows.

When asked about the skills that a good leader should have, most of the interviewees responded that, for good project management, the so-called "soft skills", i.e., interpersonal skills, are the most valued, above technical skills. In general, the most valued skill is "understanding and knowing the team well". One of the tools they use most is "active listening" and "asking how they feel, what their concerns and needs are" and "empathy". The role of the leader is seen as that of a facilitator; he is the person who ensures that the project runs its course, by serving the needs of his team. Being a trait of the "servant leadership" type, the leader ensures that everything the team needs to carry out its tasks is available in a timely manner. Other competencies mentioned by the women interviewed are "flexibility" and "adaptability". Considering that this industry is growing at an accelerated pace, and the adoption of new technologies is required, leaders with these characteristics are needed. One difference between the responses of the leaders of teams with Millennials and those with older employees is that, for the latter, "technical skills" are more highly valued than for younger teams. The reason behind this difference is that technical knowledge inspires respect, provides status, demonstrates the experience of a track record in the industry, which is highly valued by people.

When the women leaders were asked to comment on the advice they would give to a future IT project leader, the interviewees especially mentioned that they would recommend "being attentive to what happens to your collaborators", referring to "active listening" and "observation". This serves to get to know the team better, to know their needs, their interests. In this way, the leader can fulfill his role of support and facilitator, solving problems that may arise during the project process. They also mentioned that it is important to maintain "good communication", to have an open channel through which to clearly transmit what is expected of the team in order to generate closeness with team members and to make people "feel part" of the project. Many interviewees spoke of maintaining "closeness" and "creating a bond" with their teams. For this, it is necessary to communicate well, know how to delegate and generate trust and autonomy.

Regarding the way to motivate the team, most of the interviewees talked about "Understanding what each one needs" and "Giving each one what he/she wants or needs". The way to achieve this is by getting to know each person and knowing what motivates them so that they feel like doing their job. They also agree that it is necessary to "work as a team", achieving cohesion so that they work collaboratively. Again, "active listening" and "asking questions" appear, skills that play an important role in motivation. The interviewees recommend "Generating spaces for cohesion and team dynamics" such as informal meetings, so that people feel comfortable communicating. It also emerges from the leaders that to keep the team motivated it is important to "communicate and remember purposes and objectives", keeping the objectives clear and shared, so that the collaborators feel part of the process and not as something imposed on them. Through the interviews, it is perceived that, in order to manage successful IT projects, leaders would need to focus on motivation at two levels: one focused on the individual differences of each team member and the other with an eye on the team as a whole, to understand what role each person occupies.

On the other hand, it is observed that there are motivational differences between generations. In the case of Millennial team leaders, they speak of a need to "generate a bond", a "connection", and "make the team feel like a family", to generate commitment

in this generation, which tends to be less loyal to work than more mature people. They recommend generating spaces for "professional development", making them feel "empowered".

These statements are in agreement with Daniel H. Pink (2010) that Millennials are motivated mostly by intrinsic factors, which give meaning to their work, a purpose, over economic retribution.

On the other hand, the leaders mentioned that people from other generations do not have the same aspirations, but that they look more for "recognition" for the work they do.

At the same time, some interviewees considered that the differences are more related to the family commitments of the employees than to their ages. For example, they mentioned that those who have a family and children, even though their age would be considered Millennials, are more interested in achieving stability in their professional development, and not so much in changing jobs or leaving them to take a sabbatical year and travel. For them, understanding these differences is key when generating incentives to increase productivity.

Responding to the question about the communication techniques that leaders use to motivate their teams, the first thing that comes up is "empathy" when talking to their teams. The leaders of teams of Millennials recommend "using different means of communication" depending on the objective of the message and the interlocutor. Many interviewees suggest "communicating very frequently", having a daily conversation with their teams, and keeping their doors open and even having scheduled face-to-face meetings in order to generate a closer bond. Several interviewees mentioned that they prefer an "honest and coherent communication with what they think", where they even show themselves to be vulnerable.

This coincides with what Andrea Linardi stated in her doctoral thesis "Communication as a management tool for women leaders with their work teams in Argentina", where she mentions that leaders highlight "clarity", "transparency" and "honesty" as their own qualities. (Linardi, 2020)

It also emerged that the interviewees prefer "to propose and not to impose" and "not to command" as their communication and leadership style, which is also in accordance with Linardi (2020), who states that, at present, "the leader is part of the team, works together with his collaborators looking for contributions and synergizing with their ideas. People are taken into account and decisions are co-constructed". (Linardi, 2020, p.109)

It is important to mention that the interviews were conducted at the time of the Covid-19 pandemic, with mandatory confinement in the Republic of Argentina, therefore, the leaders have considered the changes produced by this situation in the communication and motivation of their teams. In this sense, they have strengthened the need to be empathetic, to understand each of the members of their teams and to communicate frequently so that they feel the closeness. Even in communication techniques, the leaders talk again about how they adapt to the needs of their teams so that their messages are better heard, and thus achieve a greater bond and, consequently, a better productivity.

Finally, the leaders interviewed were asked if they considered that the leadership, motivation and communication skills, which they themselves had previously mentioned, were more common among women than among men. In this case, opinions were divided among respondents. Fifty-eight percent of respondents believe that the leadership skills

they consider most appropriate for IT projects, in general, are more common among women, while 42% believe that they are simply skills that can be developed by both genders.

It is worth noting that among the interviewees who mentioned not believing that these skills were more common in women, later, when asked directly, they stated that they believe that women are, by nature, more empathetic, more communicative, more emotional and attentive to what happens to others. These are precisely the soft skills they described as those most valued in a good leader.

In this sense, a contradiction is perceived among their answers; however, there is another interpretation according to which these women interviewed have had examples of male leaders with the desired characteristics of a leader, although they do not consider it as the most natural in their gender.

It is noteworthy that, among the most interesting findings observed during the interviews, practically all the interviewees related female leadership to something "maternal", in the sense that it is essential to take care of people, treat them well, take them into account, be aware of their needs and at the same time be able to mark them if there are mistakes.

As a summary of the interviews conducted, the items mentioned most frequently during the meetings with the leaders are "communication", "listening and asking questions", "building the team, working as a team and involving the team", "empathy" and "understanding the team", "knowing the people" and characteristics of "servant leadership", such as "helping, facilitating, caring and generating closeness".

Regarding the result of the Quantitative Phase research, the first question, which consists of asking respondents to prioritize the skills and competencies that they consider IT project leaders should have, to motivate them to be more efficient in the results of the projects, selecting from most to least importance the five most relevant among 15 options presented, it is observed that the employees consider as first priority - selection of greater importance - that the ideal leader "Encourages teamwork", selected by 38% of the respondents, "Communicates purposes and objectives of the project", 26%, "Listens to what I have to say and puts himself in my place" 14% and "Generates links in the team, communication spaces and informal relationships", representing 10%. Figure 1 shows the results of the first selection of desired skills and competencies in IT project leaders made by the respondents.

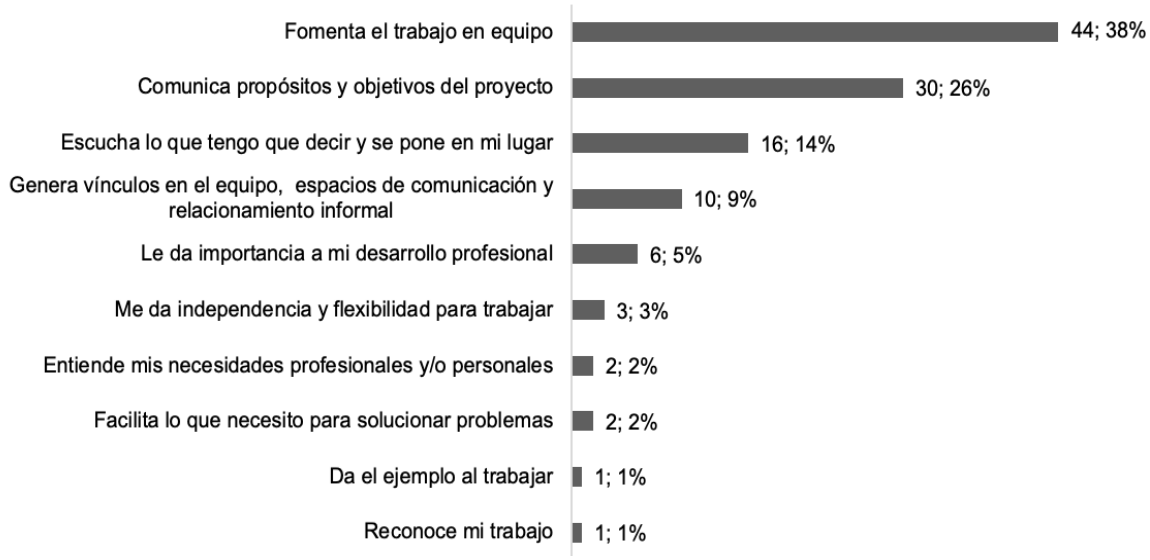

Figure 1. Ideal skills and competencies in IT Project Leaders. Priority 1.
Note: Source: Author's own creation.

The next question in the survey addresses the leadership skills and competencies that their own IT project leader possesses and/or uses to motivate their employees. Again, respondents are asked to prioritize, from first to fifth, the leadership skills and competencies they believe their leaders possess. It should be recalled that all the responses correspond to employees of female leaders, but the respondents were not aware that the study was restricted to female leadership.

The skills and competencies with the highest recurrence in this question, again, are: "Encourages teamwork", "Communicates project purposes and objectives", "Listens to what I have to say and puts herself in my place" and "Generates links in the team, spaces for communication and informal relationships", as shown in Figure 2.

As can be seen, there is a significant similarity between the skills and competencies that leaders should have, in order to motivate them and promote good performance in IT projects, and the actual skills and competencies of their leaders, according to the perception of the respondents.

This comparison allows to deduce that women leaders of real projects present the aptitudes of the ideal leaders, according to the collaborators' appreciations, proving the General Hypothesis (GH) of the study: "*Women in leadership roles within information technology projects in Argentina motivate their teams, especially younger generations, with their feminine leadership style, bringing greater efficiency to the organization*".

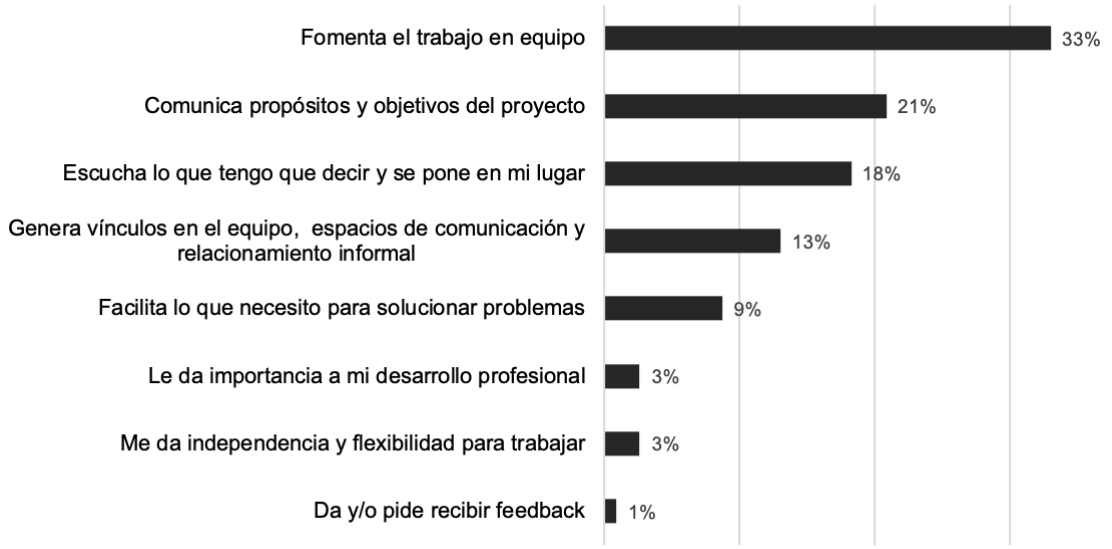

Figure 2. Skills and competencies of your IT Project Leaders. Priority 1.
Note: Source: Author's own creation.

The next question of the survey consists of a series of statements related to Transformational, Transactional and Laissez Faire leadership styles, in which respondents are asked to answer the frequency with which they agree with each statement, with respect to their project leader, using a Likert-type scale of 5 options: "Never", "Almost Never", "Sometimes", "Almost Always", "Always".

Analyzing the five dimensions of transformational, transactional and Laissez Faire leadership together, taking the responses "Always" or "Almost Always", it is found that, according to the perceptions of the collaborators, women leaders exhibit marked behaviors and aptitudes characteristic of transformational leadership, also observed, to a lesser extent, characteristics of transactional leadership, while showing a low correlation with leadership by Exception or Laissez Faire.

Figure 3 shows the above, also showing that the scores of the younger ones have been higher in all dimensions, except in "Intellectual Stimulation", where the older ones have valued them to a greater extent.

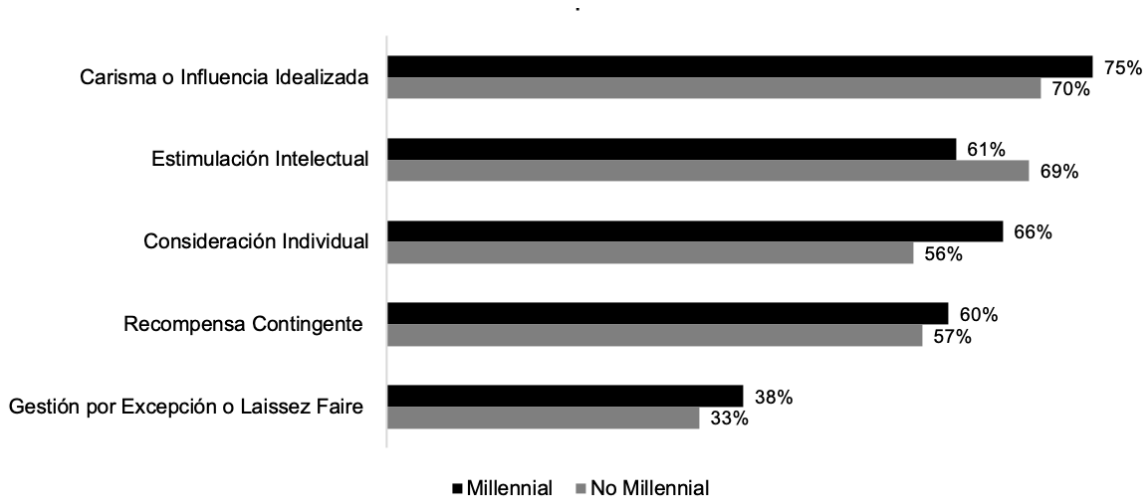

Figure 3. Transformational, Transactional and Exceptional Leadership Styles, by Ethnic Range.

Note: Source: Author's own creation.

These results are in line with Cuadrado (2004) regarding women developing a more "transformational" leadership style, as a result of their greater dedication to parenting and educational activities, their interest in others and their greater social sensitivity. Likewise, these data correspond with the findings of María Teresa Bistué's (2016) research regarding the "transformational" leadership style of women leaders of organizations in Panama.

The next section of the questionnaire addresses the characteristics and skills related to the Servant Leadership Style, through 13 statements that make up the four dimensions of this style, with a Likert-type scale of 5 options ranging from "Strongly Disagree" to "Strongly Agree".

Analyzing, as a whole, the dimensions of servant leadership, taking the responses "Agree" or "Strongly Agree", and differentiating by age range, as can be seen in Figure 4, it can be affirmed that, although all respondents have valued the skills and behaviors of the "Servant Leadership" style that their leaders possess at around 70%, the youngest have given special value to Empathic Communication and Persuasion.

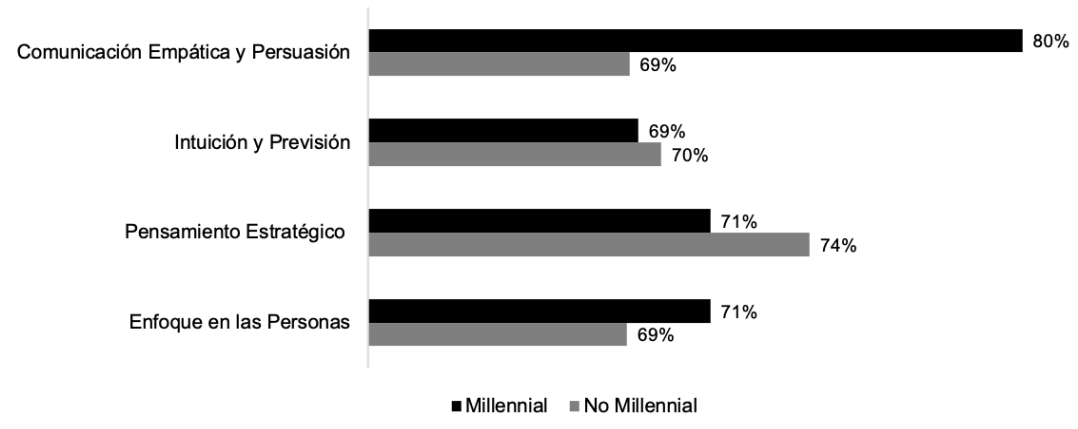

Figure 4. The Four Dimensions of Servant Leadership, by Age Range.
Note: Source: Author's own creation.

Interestingly, the surveys from the Quantitative Phase coincided with the results of the interviews with the leaders from the Qualitative Phase, who highlighted the skills of "communication", "listening and asking questions", "empathy" and "understanding the team", "knowing each person" and characteristics of "servant leadership", such as "helping, facilitating, caring and generating closeness".

As discussed in the analysis of the qualitative research data, the women interviewed defined the role of the leader as "facilitator", who takes care of the project by serving the needs of his team, so that they can focus on their tasks, without obstacles. Precisely, they have described the ideal leader with the traits of the "servant leadership" style.

Considering the results of the Transformational, Transactional and Laissez Faire Leadership Styles and Servant Leadership Styles Dimensions together, Sub-hypothesis 1 (SH1) is proven: "*Women project leaders in the IT industry in Argentina have a servant, transformational leadership style, which is more focused on qualities, skills and competencies oriented to relationships, collaboration and emotional intelligence*".

In parallel, taking into account the results of the statements Ideal and actual skills and competencies of their IT Project Leaders, which inquired about the leader's abilities

to motivate and achieve a good project performance, added to the results of the Transformational, Transactional and Laissez Faire Leadership Styles and Servant Leadership Styles Dimensions, Sub-hypothesis 3 (SH3) is also verified. "*Servant, transformational female leadership positively impacts project performance in the information technology industry in Argentina*".

Discussion and Conclusions

From the interviews conducted with the women leaders, and analyzing the terms they mentioned most frequently, it can be highlighted that the IT project leaders focus on aspects such as "communication", "communication skills", "listening and asking questions", "team building, teamwork and team involvement", "empathy", "understanding the team", "knowing the people" and "helping, facilitating, caring and generating closeness", characteristics of "servant leadership".

This focus on communication and people on the part of the interviewees, aims to validate Sub-hypothesis 1 (SH1): "*Women project leaders in the IT industry in Argentina have a servant, transformational leadership style, which is more focused on qualities, skills and competencies oriented to relationships, collaboration and emotional intelligence*".

On the other hand, through the results of the surveys conducted in the Quantitative Phase, it can be affirmed that the General Hypothesis (HO) has been proven: "Women in leadership roles within IT projects in Argentina motivate their teams, especially younger generations, with their feminine leadership style, bringing greater efficiency to the organization", as well as Sub-hypothesis 1 (SH1): "*Women project leaders in the IT industry in Argentina have a servant, transformational leadership style, which is more focused on qualities, skills and competencies oriented to relationships, collaboration and emotional intelligence*", Sub-hypothesis 2 (SH2): "*This female leadership style generates greater motivation in younger generations or Millennials*" and Sub-hypothesis 3 (SH3): "*Servant, transformational female leadership positively impacts project performance in the information technology industry in Argentina*".

In particular, the comparison between the results of the statements on the ideal and actual skills and competencies of the IT project leaders shows that the respondents consider that their IT project leaders possess the skills and competencies they consider ideal to motivate them and obtain good project performance, specifically, mentioning that their leader: "Encourages teamwork", "Communicates project goals and objectives", "Listens to what I have to say and puts himself in my place" and "Generates links in the team, communication spaces and informal relationships".

The analysis of the results of these statements, segmented by age range, shows that it is the youngest people who value the skills of their leaders the highest.

With these findings, it is affirmed that this study proves the General Hypothesis (GH): "*Women in leadership roles within information technology projects in Argentina motivate their teams, especially younger generations, with their feminine leadership style, bringing greater efficiency to the organization.*", as well as the Sub-hypothesis 2 (SH2): "*This female leadership style generates greater motivation in the younger generations or Millennial*".

These findings are extremely important considering that, according to the study "Managing in a complex environment", leadership skills are the most important factor for the success of projects. (Project Management Institute, 2013)

The results of the Transformational, Transactional and Laissez Faire Leadership Style Dimensions showed that women leaders mostly exercise a transformational leadership style, combined, to a lesser extent, with the transactional style. As expressed by Bistué (2016, p.210), "the transformational leader seeks to work with people so that they not only reach their needs, but also seek their most transcendent personal fulfillment".

On the other hand, the results of the Dimensions of Servant Leadership Styles show that women leaders of IT projects mostly exercise a servant leadership style, in accordance with what Greenleaf et al. (2002) describe, being concerned about the development and well-being of their collaborators, putting the needs of others first and helping them to grow and develop. Women leaders are willing to help others, to identify and satisfy their needs, and are concerned that they feel well and have greater autonomy in carrying out their tasks.

Reinforcing these results, Andrea Linardi, in her doctoral thesis, has found that women leaders promote high performance teams, inspire motivation, as well as the development of the talents of their collaborators. (Linardi, 2020)

Taken together, the above results allow us to affirm that Sub-hypothesis 1 (SH1) "*Women project leaders in the IT industry in Argentina have a servant, transformational leadership style, which is more focused on qualities, skills and competencies oriented to relationships, collaboration and emotional intelligence*".

Incorporating to this analysis, the results of the survey regarding the statements on the skills and competencies that IT Project leaders should have to motivate and achieve a good performance in the project, where it was found that women leaders present, according to their collaborators, the ideal skills to motivate them and obtain a good performance, such as: "*Encourages teamwork", "Communicates project goals and objectives", "Listens to what I have to say and puts him/herself in my shoes*" and "*Generates links in the team, communication spaces and informal relationships*", Sub-hypothesis is also tested 3 (SH3): "*Servant, transformational female leadership positively impacts project performance in the information technology industry in Argentina*".

This result is in line with the studies mentioned in the Theoretical Framework of this document, which state that leaders with a predominantly transformational and helpful style, promoting trust and collaboration, have a higher success rate in their information technology (IT) projects. (Aga and cols., 2016; Harwardt, 2020; Afzal and cols., 2018; Gerald M. Weinberg, 1986; Linda A. Hill and cols., 2014)

Considering the statement by Avolio and Bass (1996), cited by Bistué (2016), regarding the convenience of training leaders to use more behaviors characteristic of transformational leadership and thus generate high performance, organizations may take advantage of this, incorporating women in leadership roles in general, and in information technology projects, in particular, since they naturally exercise this style.

In conclusion, it can be stated that this research corroborates its working hypothesis, demonstrating that women leaders of IT projects in Argentina, using a transformational and servant leadership style, motivate their collaborators, especially the younger ones, to obtain a good performance of their projects, thus benefiting their

organizations, especially in a context of anxiety and uncertainty, such as the time of mandatory confinement due to the Covid-19 Pandemic, when this study was conducted.

This work, as a complement to the various previous studies on similar topics that have served as background, seeks to generate awareness and commitment in organizations and in society in general, challenging the stereotypes that limit the possibilities of professional development of women, especially in project management and in information technology careers, where female talent is very scarce, losing the benefits of their skills, competencies, and leadership style.

Having fulfilled the purpose of this research to provide new knowledge on female leadership in project management, it is expected that this will evolve through further studies, to continue developing this concept. To this end, it is suggested to approach the study of women's leadership style and its results in projects in other industries and in different countries to enrich the general knowledge of project management.

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