RESEARCH ARTICLE

Characterization of the Main Dimensions of Working Climate from the Perspective of the Workers of a University Research Institute in the Public Sector

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ARTICLE INFO	ABSTRACT
    *Corresponding Author: jrosales@uni.edu.pe	The concept of human resources has changed from a passive role to an active one, positioning itself as the central axis of business management, a situation that generates the need to permanently evaluate the management situation of the organization through its human resources. This study is a contribution to the organizational system with a particular application in the National Institute for Research and Training in Telecommunications of the National University of Engineering INICTEL-UNI, which is a public entity aligned with the National Policy for the Development of Science, the Technology and Technological Innovation in Peru. The objective of our research is to establish the characterization of the main dimensions of the work environment at INICTEL-UNI. Applying the multivariate technique of principal components, which is based on the reduction of correlated variables, it was possible to interpret or characterize the main dimensions of the work environment from the perspective of INICTEL-UNI workers, these being: Leadership, Professional Development and Physical Conditions and Workspace. These results obtained will contribute to other organizations being interested in characterizing work environment factors perceived by their workers and prioritizing studies for the purposes of continuous improvement to achieve a good work environment.

INTRODUCTION

Today the concept of human resources has changed from a passive role to an active one, positioning itself as the central axis of business management, a situation that generates the need to permanently evaluate the management situation of the organization through the work environment due because it is an important component that determines the success or failure of an organization.

The same is based on the results of various studies that have determined that it is an element that determines the performance of workers or human talent, detailing that if they feel integrated and identified with the policies, measures, practices and various approaches of the organization, there is a high probability that they will carry out their work in a more productive and effective way (Palomino et al., 2023).

The work environment study is considered, according to specialists, as a more complete and powerful tool that allows us to evaluate and measure the influence of certain income or input factors

on the work environment variable, which acts as an intermediary factor because it is located between the input and the product obtained, the latter being the organizational productivity. In (Hutahayan, 2020) mentioned that the internal process approach (internal focus and strict controls within an organization) reflects the formalization of internal systems and controls to ensure the efficient use of resources and achieve business performance.

The concept of work environment is complex, sensitive and dynamic; It is complex because it encompasses a series of dimensions or factors, sensitive because any of the components can affect it, and dynamic because by studying the situation of its components we can improve them through corrective measures that correspond. Therefore, the studies of labor climate, nowadays become more relevant and necessary within the organizations.

According to (Goncálves, 1997) the knowledge of the labor climate provides feedback about the processes that determine organizational behaviors, also allowing to introduce planned changes both in the attitudes and behaviors of the members, as well as in the organizational structure or in one or more subsystems that make it up In addition, the importance of this information is based on the verification that the Work Climate Influences the manifest behavior of the members, through stabilized perceptions that filter reality and condition the levels of work motivation and professional performance, among others.

In (Guerrero-Chavez et al., 2019) they mentioned that labor climate studies allow for accurate interventions both at the level of design or redesign of organizational structures, strategic planning, changes in the internal organizational environment, management and motivational programs, performance management, improvement of communication systems. internal and external, improvement of production processes, improvement in remuneration systems, among others. It is important to emphasize that the most valuable business capital is found in human resources, since it is the one that possesses and develops organizational know-how. For this reason, this should be one of the main priorities that the top management bodies should have on the agenda, bearing in mind that workers from the entities will not give their best in an environment in which they do not feel at ease.

According to (Greig et al., 2021) they mentioned that a good work environment is key to maximizing the well-being of workers and the performance of organizations that include the efficiency of operations, quality and profitability of companies. In the opposite way according to (Vézina et al., 2011) they mentioned that a bad design of the work environment could cause physical and mental problems for employees. Likewise, the study of (Quan and Choi, 2023) mentions that according to the theory of social interaction, the development of employees is closely related to their organization, and that reasonable communication and leadership strategies can promote the development of companies.

In the current scenarios that our country is going through, achieving long-term worker satisfaction in public sector institutions depends not only on effective leadership; if not to attend to those main components that identify the work environment through the use of specific strategies that would allow a more effective impact on the country's economy. In that sense the Peruvian State should promote labor improvement in public institutions; it is known that there are public entities where the work environment is deteriorated, because the work that their workers do is not what they expect.

This research has focused on the National Telecommunications Research and Training Institute of the National University of Engineering (INICTEL-UNI), a public institution in Peru with a private labor regime. From a budget point of view, it is an Executing Unit of the National University of Engineering, with economic, administrative, financial and technical autonomy; made up of 130 workers who are distributed in the following regimes: Private Labor (Legislative Decree N°728),

Administrative Service Contract-ASC (Legislative Decree N°1057) and with Service Location Contract. The same ones that are assigned to the different organizational units of the institution whose main activity is research and training in telecommunications.

In this sense, the Study Entity is in a situation of budget deficit in terms of the resources assigned by the Peruvian state, which is evidenced by a low number of investigations developed by INICTEL-UNI. For this reason, the senior management of INICTEL-UNI has expectations of submitting the greatest number of research projects to competitive funds promoted by the Peruvian State through the National Policy for the Development of Science, Technology and Technological Innovation.

For this reason, the senior management of INICTEL-UNI has great expectations in terms of formulating, preparing and presenting the largest number of research projects to the various competitive funds for financing research projects, the same one that is within the context of incentives for research and technological innovation promoted by the Peruvian State through the National Policy for the Development of Science, Technology and Technological Innovation.

To access these incentives, it is important that the organization's senior management achieve a good relationship with its Human Resources or Human Talent, which makes its main concern to provide an adequate and encouraging work environment for its workers, which enhances them. the commitment with the organizational objectives, in order to achieve greater productivity in the generation of research projects that meet the requirements established in the various competitive funds for the financing of projects promoted by the Peruvian state.

To date, no studies have been carried out at INICTEL-UNI on the work climate, which causes a lack of knowledge of the aspects that constitute it, causing the organization to not have a precise indicator that defines the measurable factors about the perceived work environment, directly or indirectly, by the individuals who work at INICTEL-UNI and that influences their motivation and work behavior; fact that has motivated the present study, being this the first one that is carried out for the INICTEL-UNI under the current of organizational thought, especially in the strategic perspective.

Through an intuitive vision of the work environment of the entity under study, the existence of a problem linked to ignorance of the factors that determine the work environment at INICTEL-UNI is revealed, which motivates it to be studied in an exploratory and correlational manner to scientifically discover the characterization of the main dimensions or predominant factors from the perspective of its workers, so that decision-making aimed at improving the work environment is subsequently improved. The objective of our research is to establish the characterization of the main dimensions or factors of the work environment at INICTEL-UNI.

In our research, it is proposed as a hypothesis that it is possible to characterize the main dimensions of the INICTEL-UNI work environment from the perspective of its workers by applying a multidimensional data analysis method such as the analysis of principal components and that these dimensions are particular, because its public purpose is scientific and technological research for the development of the country. Therefore, for this study, an exploratory and correlational research is proposed, through a principal components analysis, which allows mapping the characterization of the main dimensions or factors that INICTEL-UNI workers perceive as main determinants of their environment labor; which will allow us to validate the proposed hypothesis.

Independently, various authors have proposed various models, each with their theories that contribute to facilitating the understanding of the factors that structure the work environment such as (Steers, 1977), (Alvarez, 1992), (Brunet, 1987), (Davidson et al., 2001), (Parker et al., 2003), (Toro, 2001), (Björnberg and Nicholson, 2007), (Bordas, 2016). For the present study, the various models presented by different authors have been considered, such as: McClelland and Littwing, (Bordas, 2016) among others.

The present work is divided up as follows, in Section 2 we mention about the literature review, in Section 3 we mention the materials and methods used. In Section 4 we indicate the results obtained from the work developed. In Section 5 we indicate the discussion of results obtained. Finally, in Section 6, the conclusions and future works are expected and indicated.

LITERATURE REVIEW

The following works related to the research topic found in various electronic databases will be reviewed. The study of the organization's climate begins with the work done by (Lewin et al., 1939), who through their research determined that the behaviors of individuals in groups do not depend solely on the personal characteristics of them; but also, the atmosphere or social climate surrounding the group, which is perceived by individuals and has a particular influence on the behavior of each member. Later (Morse and Reimer, 1956) analyze the influence of workers' participation in decision-making processes, noting that when workers do not participate, there was a considerable decrease in interest in them, commitment and loyalty to the development of the work entrusted to such personnel.

Over time, the studies carried out about the work atmosphere in the organizations have been diverse, the same ones that have been focused on the particularities of each entity under study, such as those presented by (Palma, 2004). In his work atmosphere research on workers from three university entities in Peru, work that allowed him to establish the validity and reliability of two scales under the approach of McClelland and Litwing to measure it. These instruments were duly demonstrated and data from a sample of 473 workers were processed under the SPSS program. The results showed in relation to the work atmosphere the need for adequate management in decision-making and communication systems to optimize organizational performance.

Then, in (González-Romá et al., 2002), they worked with a sample of 197 workers of a public company, testing 3 hypotheses about the influences of the work climate on work achievements. The results of this study showed a positive and statistically significant correlation between the following dimensions of the company's work climate: Support, innovation and orientation, with achievements at work. Independently (Pastor, 2005), proposed in their study a conceptual and quantitative model that allowed to analyze the most important factors for an evaluation of the work atmosphere in an institution, being these: job performance, job instructions, human relationships, communication, motivation, wage aspect and stability, identification with the labor entity, work environment, policies and resistance to change, and other benefits.

Also, (Chaparro Espitia, 2006) developed research to describe and compare motivational factors and its relationship to the climate in the organization; it was applied to employees of a public and private company in the telecommunications sector in Bogotá. The results of this research were based on a comparative analysis between the averages of motivational factors and the dimensions of the work climate, which were related to some of the demographic variables that enabled the purposes of the study to be achieved. This research concluded that there are no significant differences in climate and job motivation between employees of a public and private business in the telecommunications sector, on the contrary, according to popular belief, there would be a relatively low commitment in state business.

On the other hand, (Olaz, 2010) made a methodological proposal for multivariate modeling aimed at measuring the work climate through a set of symptoms, variables and scenarios, contributing to its analysis approach that helps to explain the expected behavior of organizations in the work atmosphere.

Independently (Yu and Miller, 2005), (Jiménez, 2010) mentioned that reviewing the management model of the organization is becoming increasingly necessary due to the growing expectation of staff and managers in the face of new scenarios that will include new dimensions. The intrinsic motivation

and commitment of staff over the past decades has given way to workers who demand inclusion, participation, challenge and recognition.

Then, the work of (Acosta and Venegas, 2010), they mentioned that they aim to identify the work climate in a Mexican brewing company from the model proposed by (Litwin and Stringer, 1968). With the participation of 49 workers who were applied a questionnaire of 53 items distributed in the 9 dimensions of the model. The results of the research determined that workers perceived a positive climate in the dimensions of support, structure, risk, responsibility and relationships. While negative perception was identified in the dimensions of conflict, identity, productivity standards and reward.

Independently from the work of (Zenteno-Hidalgo and Silva, 2016), by applying statistical techniques of factorial analysis and logistic regression used in a natural resources company in Chile, they measured and evaluated the construct or non-observable factor (work atmosphere) through a set of observable variables. This research included responses from a sample of 84 workers to a climate survey, identifying the following factors: pay and justice; self-managed teams, teamwork and leadership; quality and effectiveness; communication; environmental sustainability; reducing fear and increasing confidence; job security and performance support. Identifying as most relevant and influential factors the first 4 mentioned. In (Awan and Tahir, 2015) mention that the work environment plays an important role in an organization, where the level of productivity can be increased by developing a conducive environment in the organization. In their work, the authors found certain factors that are useful to develop a work environment that has a positive impact on the level of productivity of employees, such as: supervisor support, relation with co-workers, training and development, attractive and fast incentives and recognition plans, adequate workload.

Then in (Fernandes et al., 2015), mentioned that the objective of their work was to analyze the dimensions and particularities of the organizational climate in public and private organizations. From surveys applied to employees, the authors found that the leadership dimension was the most relevant in the study carried out. In (Tsai et al., 2015), developed and tested a model where organizational support affects the organizational work environment and the work atmosphere facilitates employee creativity. In their study they used structural equations and found how their work environment model is related to the following dimensions: procedural justice, motivation, knowledge sharing and promotion.

Another research work on the subject was (Collave Segura, 2017), which analyzed the way the Work Atmosphere influences the performance of the personnel of the company CINEPLANET, for that purpose, it worked on a sample of 132 collaborators (personnel on sheets), using a survey as a data collection tool. The authors evaluated the work environment considering the criteria of communication, needs and motivation, objectives and roles, integration, leadership, changes, working conditions, satisfactions and self-evaluation; while performance was evaluated with the criterion of teamwork, results orientation, commitment and integrity. The authors concluded that the most important dimensions that influence the work environment of the company CINEPLANET TRUJILLO are the motivation, the promotion of development and promotion of workers.

Then in (Utami et al., 2016), mentioned that one of the aspects that plays an important role in organizations is the work climate. This work environment shares a crucial role in improving the performance of employees in a company could affect their behavior and determine the level of productivity of their work. The authors in her investigation carried out several study analyses, one of them being the analysis of the influence of the work environment on the performance of employees. The research carried out used a quantitative approach that involved 117 respondents, obtaining satisfactory results.

In their literature review study (Greig et al., 2019) identified 12 dimensions for the work environment, some of which are: labor demands, leadership structure, learning and development, work structure.

In (Itzkovich and Dolev, 2021), mentioned that mistreatment in the workplace damages employees and organizations. Based on this, the authors present a program to promote a safer organizational climate in a public sector organization. Then, in (Petcu et al., 2021) evaluated job satisfaction under teleworking conditions, for which an opinion questionnaire was prepared, the information was processed with correlation analysis and regression analysis. The authors in their work propose a multidimensional model where the values of job satisfaction are associated with high values of competences, autonomy, emotional exhaustion and organizational climate. The processing of the results of the opinion questionnaire showed a statistically significant positive relationship between competencies, autonomy, organizational climate and job satisfaction.

MATERIALS AND METHODS

The concept of work atmosphere has been rising in levels of importance in organizations, this is based on the latest currents of organizational thinking, especially in the strategic perspective, along with the concept of worker and organization, on which there are various theories of motivation that deal with work-oriented attitudes. Some of these works have been carried out by (Porter, 2010), (Noriega Bravo and Pría Barros, 2011), (Bordas, 2016), (Collave Segura, 2017). Among the results of these published research papers, various structures of work atmosphere have been proposed, trying to encompass them, postulating that these dimensions or structure of work climate are identical for all organizations, likewise, they have evidenced the influence of the work climate on the productivity of organizations, they have also shown the influence of the working climate on the productivity of organizations, among others.

The present research work focuses on the school of thought of the Strategic Perspective, the same one that according to (Bordas, 2016), postulates that success in organizations revolves around two basic pillars, human resources and customers. Likewise, in (Blau, 1964) consider that social exchange theory postulates that, when an employer takes care of an employee, the employee repays the organization with a more positive work attitude and behavior. In (Cropanzano et al., 2001) they mention that this interaction with a sense of obligation leads to the formation of a social exchange relationship between the employee and the organization. In (Suleiman, 2023), indicated that the work environment is a multidimensional concept that includes several domains.

It is important to point out that our study mapped the main factors, perceived, within the work environment of the Research Institute under study, which can serve as a metric to measure the feeling of its workers about the policies and practices of the INICTEL Organization- UNI. By measuring the readings of this metric, the INICTEL-UNI organization can undertake new policies, actions, strategies or changes that allow maintaining a good working environment that achieves important advantages in human resources; which translated into the Institution will be to increase the number of research projects developed in Telecommunications that win competitive funds for economic incentives for research and technological innovation oriented to the development of the Country.

The result of this study will be a contribution to the high management of the institute, in order to have the necessary actions to know, analyze and diagnose the work environment of the institution considering the factors obtained and thus manage to adequately manage their work environment. with a view to achieving its institutional objectives.

In Figure 1 we show the scheme to obtain the dimensions of the work environment of our research.
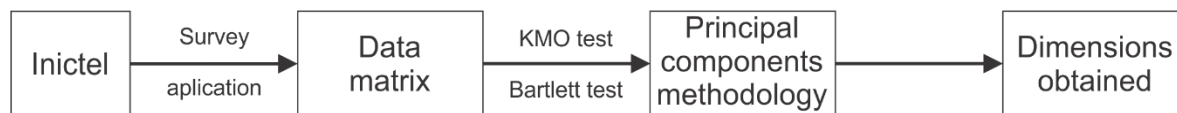
Figure 1: Flow to obtain the dimensions of the work environment

Population and sample

Population

The population under study is made up of all INICTEL-UNI workers until December 2019; being 130 workers, with labor regimes of Legislative Decree No. 728, Legislative Decree No. 1057 (Administrative Service Contract-CAS) and non-personal services contract (SNP) (Decreto Legislativo 728 and Decreto Legislativo 1057, 2021).

The study population is made up of 44\% female personnel and 56\% male. By age group, it is made up of: 44\% of workers aged between 23 and 40 years old, 41\% aged between 41 and 58 years old and 15\% over 59 years old. The time that the employees of the Institute, who make up the population of our research, have been working: 39\% for those who are under 15 years old, 52\% for those who are between 15 and 35 years old and finally 8\% for those who work with more than 35 years.

Sample

Given the ease in the geographic, temporal and numerical location of the population, it was decided to carry out a census of the population of INICTEL-UNI workers to obtain data for the present study.

Research design

The study is quantitative, exploratory and correlational in scope. The research was carried out at the National Institute for Research and Training in Telecommunications of the National University of Engineering (INICTEL-UNI).

Quantitative instrument

The survey consists of two parts; the first part consists of four questions corresponding to demographic data. The second part consists of 55 propositions that will be qualified by the respondents, for this purpose the vigesimal scale with a range of values from 0 to 20 was used. The statistical methodology that is proposed to apply, is the multivariate technique through the method of the principal components analysis (Rosales-Huamani et al., 2019).

Reliability

The reliability of the survey tool was tested through the alpha de Cronbach. This coefficient was developed by Lee J. Cronbach and requires a single administration of the measuring instrument, its advantage lies in the fact that the instrument is applied and the coefficient is calculated. It is used to know the internal consistency of a scale, that is, the correlation between the items analyzed and also to evaluate the reliability or homogeneity of the questions (Cronbach, 1951).

This coefficient ranges from 0 to 1, where zero means null reliability and one represent total reliability. In addition to this, internal consistency is considered to be high if it is between 0.70 and 0.90. Values below 0.70 indicate a low internal consistency and those above 0.90 suggest that the scale has several items that measure exactly the same thing (Oviedo and Arias, 2005).

The values of this coefficient range from 0 to 1 where the unit implies a high reliability of information. We will only get negative values if the relationship between the items is negative; in which case we would not calculate a reliability index on the scale. With the help of the SPSS Software (IBM SPSS Statistics Base, 2021), the data obtained from the application of the pilot survey was processed,

obtaining the calculation of the Cronbach's alpha coefficient to evaluate the reliability of the instrument.

The Cronbach alpha value (α = 0.966) indicates that the instrument used has a high reliability to obtain the required information, as it shows a high internal consistency.

Validity

The validity of the survey is based on the analysis of the construct through the Factor analysis of Principal Components (Hernández-Sampieri and Torres, 2018), (Kerliger and Lee, 2002).

The Kaiser-Meyer-Olkin coefficient (KMO) and the Bartlett Sphericity Test were used to examine whether the items defined in the survey adequately measure the concept to be measured.

The Kaiser-Meyer-Olkin coefficient (KMO), indicates the proportion of variance that the analyzed variables have in common, from 0.6 it is considered to be a good sample suitability for an analysis of principal components (Cerny and Kaiser, 1977).

Based on the calculations made, we obtain the coefficient of KMO = 0.664, which indicates that the data obtained with the questionnaire contained in the survey provides us with a good sample suitability for an analysis of primary components.

Then under the Bartlett Test, with a significance level of 5%, it is validated that the data provided by the questionnaire allow an adjustment to a principal component model, validating the survey construct. Then the following data were obtained: chi-square=4604.88, df=1485.00 and p-value=0.000.

Procedure for data collection

The data were collected through a survey, the same one applied individually to INICTEL-UNI workers, to whom, individually, they were explained the process for filling it and how it should be completed. The survey was given to each worker leaving it to them to complete, giving them the freedom of time to do so, thus avoiding any influence on their response, requesting that upon completion of the survey be delivered by inserting it into an amphora placed in one of the offices of INICTEL-UNI, which assures the worker of the anonymity of their responses in the survey. All eligible workers participated in the study, response rate 100%.

RESULTS

Nowadays statistical methods face challenging tasks when there is a lot of information for a single experiment. However, in many cases the data is highly redundant and can be efficiently reduced to a smaller number of variables without significant loss of information (Sorzano et al., 2014).

In (Obaid et al., 2019) mentioned that data preprocessing is considered the central stage in data mining. Where normalization, discretization and dimensionality reduction are techniques used for data preprocessing.

In our study to characterize the main dimensions or factors of the work environment from the perspective of the INICTEL-UNI workers, an analysis was carried out based on correlations of the explanatory variables of the work environment that were rated by the workers through a Vigesimal scale. made up of 21 points (0-20) in the applied questionnaire. These scores, considering the implication of one variable in another, allowed the grouping of the variables and, through the Principal Component Analysis (PCA) method, made it possible to explain and characterize those main factors that, from the perspective of the workers, determine their work environment in the study institute.

Principal component analysis

With the help of the Statistical Package for the Social Sciences (SPSS) for Windows (version 22.0, SPSS, Inc., Chicago, IL, Us) and the free software R 3.2.1 (The R project, 2021), the results of the eigenvalues and the variability explained by the first 3 principal components are obtained, the same ones indicated in Table N°1. Due to the variance criterion, those components that explain no less than 5% of the variance of the data have been considered. Thus, the first 3 components that meet the criteria were selected, obtaining a 61% cumulative variance.

Table 1: Total variance explained

Component	Initial self-values			Sum of squared saturations of extraction		
	Total (λi)	% de variance explained	% cumulative	Total (λi)	% variance	% cumulative
1	23.94	47.61	47.61	23.94	47.61	47.61
2	4.47	7.09	54.70	4.47	7.09	54.70
3	3.08	6.26	60.96	3.08	6.26	60.96

Characterization of components in terms of observed variables}

We will establish the correlation matrix between the original survey variables and the extracted components. These coefficients are shown in Table N° 2.

Table 2: Correlation matrix between observed variables and extracted components

Variable	Qualified propositions (original survey variables)	Comp. 1	Comp. 2	Comp. 3
Q_P_1	INICTEL-UNI is a strong group that is moving forward successfully.	0.73	0.18	0.11
Q_P_2	I know perfectly well how inictel-uni is organized (who are the directors, who depends on whom, what areas exist, etc.)	0.34	0.08	0.04
Q_P_3	I know perfectly well what INICTEL-UNI is dedicated to, who its users are, where it is going and what it intends to achieve in the medium and long term.	0.53	0.21	0.11
Q_P_4	INICTEL-UNI meets my professional expectations.	0.55	-0.83	- 0.003
Q_P_5	In the INICTEL-UNI, innovation is promoted and favored.	0.56	0.20	0.23
Q_P_6	I feel integrated into INICTEL-UNI.	0.64	0.12	0.08
Q_P_7	I knew about INICTEL-UNI before I joined it.	0.26	0.11	0.52
Q_P_8	The Directors and Heads of INICTEL-UNI are concerned to keep the level of personal motivation high.	0.74	0.22	0.12
Q_P_9	I am aware of the policies of INICTEL-UNI	0.54	0.17	0.17

Q_P_10	I have sufficient information on the strategies and objectives of INICTEL-UNI.	0.58	0.24	0.07
Q_P_11	INICTEL-UNI gave me a start of work with support and training.	0.64	0.25	0.04
Q_P_12	At INICTEL-UNI, professional development opportunities are clearly communicated.	0.75	0.33	0.13
Q_P_13	The Executive Director clearly reports on those matters which are important and which concern me.	0.76	0.24	0.19
Q_P_14	The Executive Director of INICTEL-UNI practices by example (his actions are consistent with his speech).	0.79	0.27	0.02
Q_P_15	The Executive Director shall take steps to resolve the problems revealed in this survey.	0.76	0.27	0.06
Q_P_16	I am confident in the decisions taken by the Executive Directorate of INICTEL-UNI.	0.73	0.28	0.12
Q_P_17	My boss talks to me on a regular basis about the quality of my work and how I could improve.	0.79	0.32	-0.29
Q_P_18	My boss clearly explains what is expected of me.	0.82	0.31	-0.27
Q_P_19	My boss helps me understand the strategies and evolution of INICTEL-UNI and how it relates to my work.	0.81	0.34	-0.25
Q_P_20	My boss encourages me to make decisions and take on new responsibilities.	0.82	0.32	-0.27
Q_P_21	My boss practices by example (his actions are consistent with what he says).	0.79	0.39	-0.29
Q_P_22	My boss has the ability and authority to solve the most frequent problems that arise at work.	0.81	0.31	-0.23
Q_P_23	My boss encourages me to develop new and better ways to do the job even though mistakes are made.	0.81	0.32	-0.33
Q_P_24	My boss recognizes my contribution	0.71	0.26	-0.25
Q_P_25	My boss takes my ideas and suggestions into account.	0.74	0.29	-0.19
Q_P_26	My boss accepts ideas and suggestions from the team or workgroup.	0.74	0.32	-0.24
Q_P_27	My boss recognizes his mistakes.	0.63	0.32	-0.29
Q_P_28	My boss separates personal situations from work situations.	0.50	0.25	-0.13
Q_P_29	My boss reacts in a good way when it's an unexpected situation or one that has gone wrong.	0.66	0.32	-0.25
Q_P_30	My boss fosters a positive relationship between co-workers.	0.68	0.29	-0.17
Q_P_31	My manager plans and organizes group activities appropriately.	0.76	0.26	-0.20
Q_P_32	My boss is involved in the execution of the activities of the team or workgroup.	0.75	0.36	-0.18

Q_P_33	My boss is most interested in the results, that is to say that things are done.	0.53	0.15	-0.08
Q_P_34	There are good working relationships between me and my boss.	0.68	0.26	-0.16
Q_P_35	The specialized courses or programs offered by INICTEL-UNI are effective in enhancing my professional development.	0.55	0.06	0.33
Q_P_36	Attempts to provide creative alternatives are not questioned in my work group.	0.51	0.12	0.19
Q_P_37	There is collaboration between the people who work at INICTEL –UNI..	0.66	0.16	0.38
Q_P_38	There is good coordination between the different units of INICTEL-UNI.	0.73	0.15	0.25
Q_P_39	It is easy to get collaboration from the other INICTEL-UNI units with which I interact.	0.62	0.12	0.27
Q_P_40	I can talk openly with my co-workers.	0.42	0.06	0.35
Q_P_41	There is respectful treatment between the members of my team or working group.	0.43	0.09	0.16
Q_P_42	There is union in the group or work team.	0.46	0.15	0.20
Q_P_43	I feel comfortable in my team or workgroup.	0.45	0.16	0.17
Q_P_44	Coworkers are trustworthy people.	0.51	0.13	0.32
Q_P_45	The space where I do my work has adequate lighting.	0.36	0.03	0.41
Q_P_46	The space where I do my work has an adequate temperature.	0.42	0.08	0.19
Q_P_47	The noise level is adequate for my work.	0.42	0.17	0.28
Q_P_48	The facilities are clean.	0.42	0.20	0.40
Q_P_49	The cleanliness of my workspace is what I expect.	0.47	0.18	0.39
Q_P_50	I have enough space to perform my work.	0.36	0.03	0.30
Q_P_51	I have enough time to do my usual job.	0.35	-0.01	0.38
Q_P_52	I have the right means to do my work.	0.35	0.03	0.30
Q_P_53	INICTEL-UNI's clients are satisfied with the services they receive.	0.55	0.07	0.29
Q_P_54	At INICTEL-UNI, a commitment made to a customer becomes a priority for everyone.	0.58	0.11	0.37
Q_P_55	I recommend INICTEL-UNI's services to people close to me (family, friends,others).	0.63	0.18	0.39

To characterize or name each of the three components in terms of the observed survey variables, the most important correlation coefficients were identified, whether positive or negative, that are close to 1 or -1, the same ones that are shaded for each component in Table N° 2.

Based on the most important correlation coefficients shown in Table N°2, it is evident that in the first component the variables that contribute the most are those that deal with the leadership skills of the Directors and Heads of INICTEL-UNI. Therefore, component 1 will be Leadership.

The second component is determined by a greater contribution of variables related to motivation and growth of the profession. Therefore, component 2 will be the Professional Development Component.

As for the third component, it is linked by variables dealing with issues that affect the development of work activity. Therefore, component 3 will be that of Conditions and Physical Working Space.

Finally, these dimensions can be grouped to indicate their influence on the perception of INICTEL-UNI work environment. This can be summarized in the Table N°3.

Table 3: Main Dimensions of the Work Environment identified at INICTEL-UNI and the Number of variables that determine them

Dimensions	Number of contributing variables
Leadership	12
Professional Development	6
Conditions and Physical Work Space	8

Figure 2 explains how the work environment (represented by the dimensions: "Leadership", "Professional Development" and "Physical Conditions and Work Space"), affects the motivation or behavior of its Human Resources or Human Talent; where it is, it generates a wide variety of consequences for the INICTEL-UNI organization (such as: productivity, innovation, satisfaction, turnover, adaptation, among others), which allows feedback to the INICTEL-UNI Organizational System, thus completing the circuit. The work environment of INICTEL-UNI, together with its organizational components, its Human Resources and its behavior are shown as an interdependent and highly dynamic integrated system.
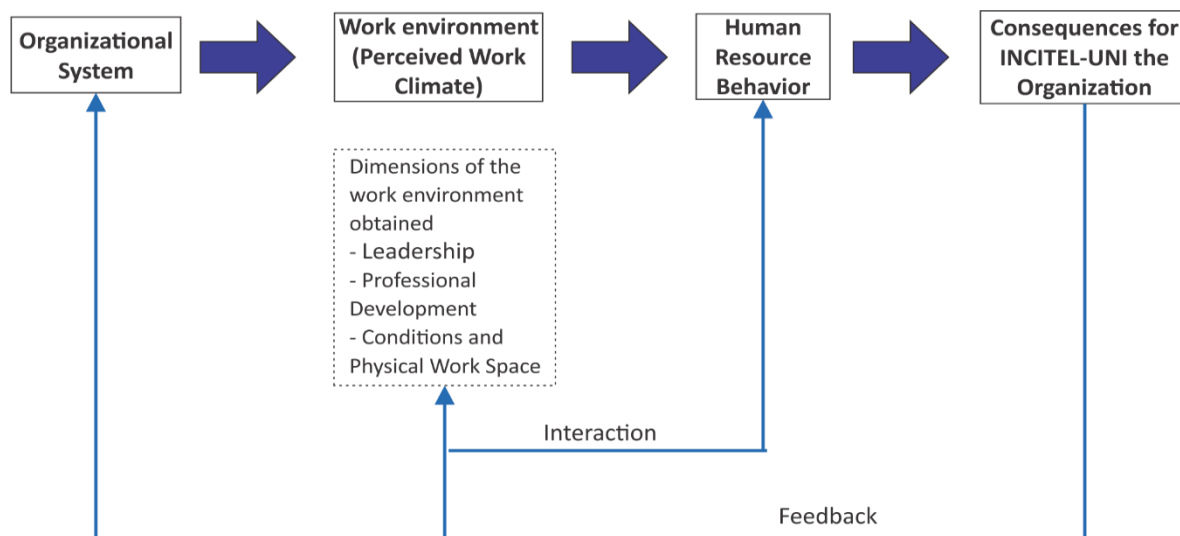

Figure 2: Diagram of the intervention of the work environment of INICTEL-UNI

DISCUSSION

The following works that we mention below, are focused on explaining the dimensions that influence the performance of the worker and their productivity, from the perception of their workers in their work environment related to the study organization. Although these investigations are focused on

explaining the performance of the worker and his productivity, we can observe that the factors that explain them include the main dimensions that influence the workers' perception of the work environment discovered by our research.

Regarding the leadership dimension, it is present in various studies that focus on the performance and satisfaction of workers in the workplace.

For example, in (Pawirosumarto et al., 2017), (Arifin, 2021) found that leadership styles, the work environment and organizational culture have a positive effect on worker satisfaction, but only leadership has positive and significant effects on performance.

Independently in (Habibullah and Sinha, 1980) found in a study at the level of company managers that leadership styles and determining factors of the work environment are correlated.

Then in (Pérez-Vallejo and Fernández-Muñoz, 2020), show that the relationship between the quality of leadership and the work environment is not modified or altered if the recognition of achievement is admitted, because this is an innate or necessary condition of good leadership. Therefore, it is necessary for the organization to establish its own leadership style that allows it to achieve its objectives and improve the quality of life of workers. Independently in the study carried out by (Greig et al., 2019) identified from their systematic review the leadership style as an important dimension in the work environment.

The dimension conditions and physical work space is present in various studies such as (Al-Omari and Okasheh, 2017), which confirms that the limitations in the physical factors of the environment such as: noise, office furniture, ventilation, lighting and physical design, are the main environmental working conditions that have a negative impact on job performance. Then in (Abdulhamid and Majid, 2020) mentioned that the change of the physical work environment contributes to the transformation of public and private organizations from the point of view of the satisfaction and performance of the workers. This is reinforced in the study by (Agbozo et al., 2017) being a different social setting and organization, they found that the physical work space influences the satisfaction of workers, also verified, with the results found by (Tabassum et al., 2021), who determined that the environmental factors of the physical workspace impact the productivity and performance of workers, showing an increase in their performance. Likewise, in the study by (Adikoeswanto et al., 2020) revealed that the work environment is a form of physical and psychological well-being of the quality of work life of employees and is a key factor that influences the employee's organizational commitment by guiding their capabilities and resources to achieve organizational goals of the company.

Regarding professional development, it can be seen that this largely coincides with the work carried out by (Ashraf, 2019), which verified that professional development is one of the factors that, together with the cooperation of the supervisor, have a direct influence and significant in the work environment.

Then in the work of (Vukotic´ et al., 2019) mentioned that the professional development of workers produces creative work environments for the benefit of the entire organization. Then training becomes inevitable for all those who strive for creativity, this being an essential requirement to achieve and maintain a competitive advantage, while allowing the organization to follow its mission and vision. This is reinforced by what was established in the study by (Ceric et al., 2022) which mentions that training programs for employees must be designed and delivered considering the various forms of learning.

In our case, when validating the model proposed by (Bordas, 2016), we found particular dimensions of the work environment of the organization under study in the context offered by the Peruvian Government in 2018. These results independently agree with the findings of other researchers

carried out in organizations and conditions different from the Institution of study, which gives a certain degree of generality to our work.

As strengths, the present study had the predisposition of the INICTEL-UNI staff, managing to apply the surveys to the total number of members of the institute. The anonymity of the surveys allowed employees to give their answers freely and without any influence. Therefore, our study had reliable data. A limitation of our study was in the number of propositions raised by dimensions in the survey, due to the exhaustion that could occur to the respondents.

LIMITATIONS AND FUTURE RESEARCH

This research has the following limitations: first it has been applied to an organization whose main function is research and training in telecommunications within a public university, so the results could vary when applied to workers from an organization with a different core business that of the institute under study. Second, variables of economic conditions such as: remuneration, incentives, rewards, among others, have not been included in the study.

For future research, an attempt could be made to use the methodology of structural equations to determine the characterization of the work environment factors incorporating variables of economic aspects. Likewise, the research could be expanded to identify the relationship between the dimensions of work environment identified and the commitment of workers with the institute under study.

CONCLUSIONS

Nowadays dimensionality reduction is very important due to the large amount of data that is used in various experiments and it is quite important to use it in the pre-processing of information. However, it is a technique that requires knowledge and adequate equipment to carry it out, since it can eliminate more data than it should and generate an erroneous model.

This research was carried out to contribute, through practical theoretical contributions, with organizations that are interested in knowing the main factors of the work environment that are perceived by their workers from the study of a particular organization as proposed in this research, whether or not they have the same profile of the institute under study, because they will be able to have a scientific reference to characterize these factors and prioritize studies for the purposes of continuous improvement to achieve a good work climate that guides their organization to an increase in its productivity and an improvement in the quality of the services it provides.

According to (Gibson et al., 2011), state policies linked to constant changes at an economic, administrative and technological level explain the existing work environment in a certain organization. For our case study, the national policy for the development of science, technology and technological innovation requires the senior management of INICTEL-UNI to take entrepreneurial actions to strengthen the dimensions perceived in their work environment.

The main dimensions of the work environment identified in our work for INICTEL-UNI were "Leadership", "Professional development" and "Physical conditions and work space"; the same ones that have an impact on the sustainable entrepreneurship of the Institution, the same ones that can be described as follows:

Regarding Leadership, the economic expansion of the productive sector always requires innovation and schemes of organizations that seek development and productivity (Argudo-García et al., 2021). For this reason, leadership becomes a fundamental element for INICTEL-UNI, which will be an important contribution in the creation of an adequate work environment, reducing errors in processes and improving results in a greater number of development projects. externally funded research. Regarding Professional development, it is important that INICTEL-UNI consider

professional training in relation to its training processes as an element of added value for human resources or human talent, which will allow the development of skills in the labor area as attitudes, values, effective communication, teamwork, among others. Then the Physical conditions and work space, are related to the basic conditions that allow working at INICTEL-UNI and relates us to a physical plant with areas necessary to carry out the activities of the Institution that allow achieving the sense of belonging to the institution.

Authors' contributions

RGL: designed the project, wrote the manuscript

JRH: conceived the idea, wrote the manuscript

LHdC: performed statistical analysis and studies

LSA: helped in writing the manuscript

MAP: participated in the design of the study

All authors contributed equally to this work

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