

On A Factorial Analysis Model On Education

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Abstract: Work satisfaction and the organizational climate are determining factors of the working conditions. The objective of this study was to determine the pressure and work satisfaction in professors of a National University in southern Peru in times of COVID-19. The research was quantitative, descriptive - correlational, cross-sectional in Universidad Nacional de Juliaca in southern Peru. The sample was 60 randomly selected professors. A questionnaire structured in two parts was used: work pressure and work satisfaction. Pearson's correlation coefficient and factorial analysis were applied to identify the dimensions associated with pressure and work satisfaction. The results showed that in times of COVID-19, in general (76.7%), professors perceive that they are subjected to work pressure, and showed work dissatisfaction (51.7%). A negative and significant relationship ($p \leq 0.01$) was observed between the dimensions of pressure and work satisfaction. Professors at the Universidad Nacional de Juliaca showed a level of work dissatisfaction expressed through recognition and benefits, and in turn correlated with work pressure through social pressures derived from educational work and daily life in the classroom.

Index Terms: factorial, components, satisfaction, recognition, benefits.

1 INTRODUCTION

PEOPLE are the most important resource within an organization, because they are the ones who provide professional and technical services for the achievement of objectives and goals planned by companies (Illanes, 1999). Hence the need for many institutions to have personnel committed to the organization, which will allow raising the performance and quality of the services offered by the institution, as well as raising the level of well-being of its workers. When organizational behavior is studied, three attitudes are considered to be evaluated: satisfaction, involvement and organizational commitment (Robbins, 2013). Of these three, work satisfaction is the main attitude studied, followed by commitment to work; that is, how much a person identifies with her job and how a worker is committed to his organization and his goals (Robbins, 2013; Robbins and Coulter, 2014). Herzberg's Motivational or Bifactorial Theory on job satisfaction states that work can be motivating in itself, and generated seven motivational or satisfaction factors: achievement, recognition, work itself, responsibility, progress, success and work challenging. These factors are directly related to how the worker feels about his job, which is why they were called intrinsic factors (Herzberg et al. 1959). The characterization of these factors allows the elaboration of instruments to evaluate job satisfaction among the workers of an organization, through two types of analysis: a) general satisfaction, defined as the attitude that the worker assumes in all facets of their employment; b) satisfaction with specific aspects, such as: recognition, remuneration, benefits, working conditions, supervision, colleagues, business policies, etc. (Pérez and Fidalgo, 1995). Various organizations have studied group constructs and factors that influence both the well-being and commitment of their workers, such as job satisfaction and organizational climate, in order to create strategies that provide better working conditions for their employees, and in this way, favor the performance, the permanence of the workers and increase the quality of the goods and / or services provided (Caballero, 2002). The organizational climate,

defined by Rodríguez as "the perceptions shared by the members of an organization regarding work, the physical environment in which it occurs, the interpersonal relationships they have around it and the various formal regulations that affect said work" (Rodríguez, 2008), is also one of the factors considered as another possible determinant of work satisfaction. It has been proven that the more participatory, dynamic and open to changes the organizational climate of an institution, the higher the productivity, the quality of working life and the performance, constituting a directly proportional relationship (García and Ibarra, 2012), which it would also impact on the work satisfaction of the officials of an organization. Universities are organizational spaces that can be studied from the perspective of job satisfaction and the organizational climate. In this sense, it is important to know the perception about some aspects of the situation of the universities, such as the recognition of the teacher and the trust in that institution. The analysis of these factors in the area of higher education teachers has been addressed in various studies at the international level. However, in Peru there are few studies, since most of the research has been oriented to institutions or commercial companies, which makes their study relevant.

With the emergence of the COVID-19 pandemic, in Peru and the rest of the world, the challenges for universities have been greater. The application of strict measures was ordered, the declaration of quarantine and confinement, which for many is an unpleasant experience, especially for those who were always active to comply with work plans, whether educational or otherwise (Cuero, 2020). For teachers, adopting virtual media as pedagogical tools and compliance with the development of educational programs, generate uncertainty and anxiety in the educational community in the face of something little used, and most without knowledge for its implementation, which imposes on university teachers difficult challenges and competences, which affects commitment and work satisfaction. In this sense, considering the changes produced by the COVID-19 pandemic in the university environment, which could influence work satisfaction and the perceived level of organizational climate of teachers, the first objective of this study was to determine pressure and work satisfaction in teachers of a national university in central Peru in times of COVID-19, stratifying according to sociodemographic variables. The second objective of this research sought to identify the relationship between work

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satisfaction and the work pressure of teachers according to their dimensions. Everything with the purpose of providing scientific evidence that allows the creation and formulation of new labor intervention strategies, in order to increase the satisfaction levels of teachers, which would have a direct impact on the levels of work pressure and the climate perceived organizational.

2 MATERIALS AND METHODS

2.1 Research design

The research constitutes a cross-sectional, descriptive-correlational, quantitative study. The population consisted of all the teachers (142) appointed and hired in the academic semester 2020- II of the Universidad Nacional de Juliaca. The sample consisted of 60 teachers selected through simple random sampling with a confidence level of 95%. Professors hired and appointed at the National University of Juliaca were included, who voluntarily agreed to participate in the study; excluding personnel who were on medical leave or on vacation.

2.2 Study data

The data were obtained through a sociodemographic and labor questionnaire, prepared by the authors of the study, in order to collect descriptive sociodemographic data: sex, age and work pressure: social pressures derived from educational work in the classroom, pressures derived from daily life in the classroom, pressures originated by the administrative organization, flexibility with regard to the teaching task, and work satisfaction: satisfaction with recognition, satisfaction with supervision, satisfaction with benefits and satisfaction with working conditions. The questionnaire is structured in two parts (work satisfaction and work pressure), it has a Likert-type scale format, which consists of 26 items with 5 response alternatives: Totally disagree, Disagree, Undecided, Agree and Totally agree; which allows obtaining a general measure of work pressure and its four dimensions: social pressures derived from educational work in the classroom, pressures derived from daily life in the classroom, pressures originated by the administrative organization, flexibility with respect to the task teacher, and evaluate work satisfaction and its four dimensions: satisfaction with recognition, satisfaction with supervision, satisfaction with benefits and satisfaction with working conditions satisfaction. The total scores were obtained from the sum of their dimensions, classifying in this way the level of work satisfaction and the work pressure of the participants.

2.3 Statistic analysis

For the statistical analysis, the data were processed in the statistical program SPSS 21 (in Spanish). Qualitative variables were described by observed frequencies and percentages. To correlate work pressure with overall work satisfaction and their respective constructs, the Pearson correlation coefficient was applied, since the data adjusted to a normal distribution in both variables. A significance level of 0.05 was used. Likewise, to identify the factors associated with work pressure and work satisfaction, a multivariate analysis method was used, factor analysis, whose mathematical model assumes that each of the p variables observed is a function of a number m common factors ($m < p$) plus a specific or unique factor. Both common and specific factors are not observable and their determination

and interpretation is the result of FA. Analytically, we will assume a total of p typified observable variables and the existence of m common factors. The model is defined as follows (for details, see Montoya, 2007):

$$\begin{aligned} X_1 &= l_{11}F_1 + l_{12}F_2 + \dots + l_{1m}F_m + \varepsilon_1 \\ X_2 &= l_{21}F_1 + l_{22}F_2 + \dots + l_{2m}F_m + \varepsilon_2 \\ X_n &= l_{n1}F_1 + l_{n2}F_2 + \dots + l_{nm}F_m + \varepsilon_n \end{aligned}$$

that we can express in a matrix form as: $X = Lf + \varepsilon$ where: X is the vector of the original variables.

L is the factor matrix. Collect the factorial loads or (saturation).

l_{jh} is the correlation between variable j and factor h .

f is the vector of common factors.

ε is the vector of unique factors.

Since both common and specific factors are hypothetical variables, it is assumed, to simplify the problem, that:

- The common factors are variables with zero mean and variance 1. Furthermore, they are assumed to be unrelated to each other.
- Unique factors are variables with zero mean. Their variances can be different. They are supposed to be unrelated to each other. Otherwise the information contained in them would be in the common factors.
- Common factors and unique factors are unrelated to each other. This hypothesis allows making inferences that can distinguish between common and specific factors.

Based on the model and the hypotheses formulated, it can be shown that the variance (information contained in a variable) of each variable can be decomposed into: that part of the variability that is explained by a series of factors common to the rest of variables called commonality of the variable and the part of the variability that is specific to each variable and that, therefore, is not common with the rest of the variables. This part is called the unique factor or specificity of the variable.

$$\begin{aligned} \text{Var}(X_j) &= l = l_{1j}^2 \text{Var}(F_1) + l_{2j}^2 \text{Var}(F_2) + \dots + l_{mj}^2 \text{Var}(F_m) \\ \text{Var}(\varepsilon_j) &= l_{1j}^2 = l_{2j}^2 + l_{mj}^2 + \text{Var}(\varepsilon_j) \end{aligned}$$

l_{jh}^2 represents the proportion of total variance of the variable X_j explained by the factor h .

$h_j^2 = l_{1j}^2 + l_{2j}^2 + l_{mj}^2$ is the commonality of the variable X_j and represents the proportion of variance that the different factors as a whole explain of the variable X_j . It is, therefore, the plot of that variable that comes into contact with the rest of the variables. It varies between 0 (the factors do not explain anything of the variable) and 1 (the factors explain 100% of the variable).

$\text{Var}(\varepsilon_j)$ is what we call specificity and represents the contribution of the single factor to the total variability of X_j .

$l_{1h}^2 + l_{2h}^2 + \dots + l_{nh}^2 = g_h$ is what is called eigenvalue (eigenvalue) and represents the ability of the h factor to explain the total variance of the variables. If the original variables were typified, the total variance would be equal to p and g_h/p would represent the percentage of total variance attributable to the h factor.

The objective of the factor analysis will be, therefore, to obtain the common factors so that they explain a good part of the total variability of the variables.

Variables: Factor 1 = Work pressure. Factor 2: Job satisfaction.

3 RESULTS

Table 1 indicates the distribution of the study participants according to the levels of pressure and work satisfaction in times of COVID-19, where it is observed that, in general (76.7%), the teachers interviewed from the Universidad Nacional de Juliaca perceive who are subjected to work pressure, and a good part of them (51.7%) perceive a certain degree of work dissatisfaction, followed by 41.7% who are doubtful in relation to work satisfaction in the institution's teachers.

TABLE 1
IDENTIFICATION OF THE PRESSURE AND WORK SATISFACTION IN TEACHERS OF A UNIVERSITY IN SOUTHERN PERU IN TIMES OF COVID-19

Level	Work pressure		Work satisfaction	
	Frequency	%	Frequency	%
Strongly disagree	0	0.0	3	5.0
Disagreement	1	1.7	31	51.7
Undecided	3	5.0	25	41.7
In agreement	46	76.7	1	1.7
Totally agree	10	16.7	0	0.0
Total (n)	60	100.0	60	100.0

In relation to the correlations obtained between work pressure and work satisfaction of the study participants, a negative relationship was observed between the different dimensions of work pressure and work satisfaction. Likewise, the strongest correlation ($p \leq 0.01$) was presented for the pressures dimensions originated by the administrative organization with a value of -0.627; pressures derived from daily life in the classroom (-0.484) and flexibility with respect to the teaching task (-0.395). While the correlation between social pressures derived from educational work in the classroom and work satisfaction was -0.263 (table 2).

TABLE 2
CORRELATIONS BETWEEN WORK SATISFACTION AND WORK PRESSURE AND ITS ASSOCIATED DIMENSIONS IN TEACHERS OF A UNIVERSITY IN SOUTHERN PERU IN TIMES OF COVID-19

Variable	Work satisfaction
Work pressure	-0,546
Social pressures derived from educational work in the classroom	-0,263*
Pressures derived from daily life in the classroom	-0,484**
Pressures originated by the administrative organization	-0,627**
Flexibility with respect to the teaching task	-0,395**
Sample (n)	60

Table 3 shows the results of the factor analysis on data that relate work satisfaction with work pressure and their respective dimensions in teachers of a University in the South of Peru during the COVID-19 emergency. In this way it has been possible to reduce the number of original dimensions to four (4); two dimensions for the case of work pressure (social pressures derived from educational work in the classroom and pressures derived from daily life in the classroom) and two dimensions for the case of work satisfaction (satisfaction with

recognition and satisfaction with Benefits).

TABLE 3
FACTOR ANALYSIS ON DIMENSIONS RELATED TO WORK PRESSURE AND WORK SATISFACTION IN TEACHERS OF A UNIVERSITY IN SOUTHERN PERU IN TIMES OF COVID-19

Factor 1 (Work pressure)	Factor 2 (Work satisfaction)
Dimension	Dimension
Social pressures derived from educational work in the classroom	Satisfaction with recognition
Pressures derived from daily life in the classroom	Satisfaction with benefits
Number of components	2
% Cumulative variance	65,55%
Sample (n)	60

4 DISCUSSION

The study of factors such as work satisfaction and work pressure in a workplace allows to generate diagnoses of the employment situation of its employees, information that if used well by the institutional level of an organization, would help in the implementation of strategies aimed at improving the work environment, considering that human resources play a fundamental role in achieving the goals of an institution (Montoya et al. 2017). The findings of this research about work satisfaction and job pressure in a University of Southern Peru in times of COVID-19, assume that this University is not successful in achieving its organizational objectives, since most of the Teachers were dissatisfied with their work and perceive work pressure, regardless of their sociodemographic and work characteristics. In relation to work satisfaction, as mentioned, it is evident that the majority of teachers and the university are dissatisfied, which is not similar to that found in other studies, where a significant degree of satisfaction was determined (Carrillo, 2000; Olivares et al. 2006; Alfaro, 2015; Regalado, 2017; Saldaña, 2017; Padilla et al. 2008). This situation can be explained by the undeniable influence of extrinsic factors, in this case the emergence of COVID-19 and the effect caused by the restrictions imposed by the new social and labor dynamics. In the case of the existence of a significant inverse relationship between work pressure and work satisfaction in teachers, which supposes the negative effect of work pressure on teacher satisfaction, similar results were reported by Alvarez (2007), in a study with teachers from state and private universities in Metropolitan Lima. In this study, sources of job pressure and job satisfaction were inversely related in university teachers in Metropolitan Lima. Likewise (Regalado, 2017) mention in their research on work pressure and work satisfaction applied to teachers at the University of Trujillo, that there is a highly significant correlation between the variables of job satisfaction and job pressure in which the influence of sources is denoted physical, psychological and behavioral that are present in the university work environment as a stimulus for the elaboration of perceptions of each worker regarding their work situation. Likewise, in the dimensions social pressures derived from educational work in the virtual classroom to flexibility in the teaching task of the variable work pressure are inversely related to work satisfaction in teachers at the Universidad Nacional de Juliaca. When work pressure increases, two things can happen "that the worker is satisfied and willingly accepts that labor policy or quite the opposite." Academic work satisfaction is not an attitude that only affects the productivity and quality of academic work; but it also affects whether an

academic teacher considers a work change and that this change is aimed at leaving the academic profession, either partial or definitive (Padilla et al. 2008). In relation to the results associated with the dimensions of satisfaction with benefits and recognition, these results coincide with the definition of work satisfaction given by Blum and Naylor (cited by Camacaro), salary and social position would be determining factors for the work satisfaction. The results of this research, which mostly contrast with the results of other research, show the undeniable negative effect that the COVID-19 pandemic has had on the new dynamics of relationships in the teaching staff of universities, in the context of the levels of work pressure and its relationship with work satisfaction, which imposes a challenge for university authorities. The teaching profession has been emphasized as the occupation that presents the highest risk of psychological distress and lowest levels of work satisfaction compared to the general population and they are among the professionals who face the greatest pressure in their work.

5 CONCLUSION

The present study concluded that in times of COVID-19, the teachers of the Universidad Nacional de Juliaca in southern Peru mostly showed a level of work dissatisfaction expressed through recognition and benefits, and in turn correlated with the work pressure through social pressures derived from educational work and daily life in the classroom.

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