

Propiedades psicométricas de la Escala de Niveles y Condiciones de Aprendizaje Organizacional (ENCAO) en trabajadores de una empresa privada peruana

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How to cite this article:

Suárez, G., Fazio, A., & Manzanares, E. (2019). Psychometric Properties of the Organizational-Learning Levels and Conditions Scale (ENCAO) in Employees of a Peruvian Private Company. *Acta Colombiana de Psicología*, 22(2), 331-341. doi: <http://www.doi.org/10.14718/ACP.2019.22.2.15>

Recibido, julio 10/2017; Concepto de evaluación, octubre 9/2017; Aceptado, febrero 13/2018

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Resumen

El objetivo del presente estudio fue analizar las propiedades psicométricas (evidencias de validez y confiabilidad) de la ENCAO en trabajadores de una empresa privada del sector de hidrocarburos en Lima Metropolitana. Para esto, se evaluó a una muestra de 384 participantes, 64 % mujeres y 36 % hombres, con edades entre los 19 y los 56 años ($M=29.57$ años, $DE=7.33$). Como evidencias de validez de la estructura interna del instrumento, se realizó un análisis factorial exploratorio (AFE) y un análisis factorial confirmatorio (AFC), donde se encontró una estructura de cuatro factores relacionados (*formación y cultura organizacional, aprendizaje social, aprendizaje grupal y aprendizaje estratégico individual*) con los 21 ítems de la escala, los cuales explicaron el 60.33 % de la varianza total y obtuvieron adecuados índices de bondad de ajuste ($\chi^2=371.66$; $\chi^2/df=2.03$; CFI = .99; RMSEA = .041). Como fuente de validez externa se obtuvieron correlaciones moderadas (entre .31 y .46) con la variable *satisfacción laboral*. Los coeficientes alfa de Cronbach de los cuatro factores oscilaron entre .60 y .84. Se concluye que la ENCAO y sus puntuaciones derivadas son una medida válida y fiable para medir el aprendizaje organizacional en el sector laboral evaluado.

Palabras clave: aprendizaje organizacional, validez, confiabilidad, análisis factorial.

Psychometric properties of the Organizational-Learning Levels and Conditions Scale (for its Spanish acronym, ENCAO) in employees of a Peruvian private company

Abstract

The objective of the present study was to analyze the psychometric properties (evidences of validity and reliability) of the ENCAO in employees of a private company of the hydrocarbon sector in Metropolitan Lima. A sample of 384 participants was evaluated, of whom 64 % were women and 36% men, aged between 19 and 56 years ($M=29.57$ years, $SD=7.33$). As evidences of validity related to the internal structure, an exploratory factorial analysis (EFA) and a confirmatory factorial

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analysis (CFA) were carried out, resulting in a structure of four related factors (Organizational Learning and Culture, Social Learning, Group Learning and Strategic Individual Learning) with the 21 items on the scale that explained 60.33 % of the total variance and with adequate goodness of fit indexes ($\chi^2 = 371.6$, $\chi^2/df = 2.03$, CFI = .99, RMSEA = .041). As a source of external validity, moderate correlations (between .31 and .46) were obtained with the variable Job Satisfaction. The Cronbach alpha coefficients of the four factors obtained ranged between .60 and .84. It is concluded that the ENCAO and its derived scores are a valid and reliable measure to measure organizational learning in the evaluated labor sector.

Key words: organizational learning, validity, reliability, factorial analysis.

Propriedades psicométricas da Escala de Níveis e Condições de Aprendizagem Organizacional (ENCAO) em trabalhadores de uma empresa privada peruana

Resumo

O objetivo do presente estudo foi analisar as propriedades psicométricas (evidências de validade e confiabilidade) da ENCAO em trabalhadores de uma empresa privada do setor de hidrocarbonetos na região metropolitana de Lima, no Peru. Para isso, avaliou-se uma amostra de 384 participantes, 64 % mulheres e 36 % homens, com idades compreendidas entre 19 e 56 anos ($M = 29.57$ anos, $DP = 7.33$). Como evidências de validade relacionada à estrutura interna, realizou-se uma análise fatorial exploratória (AFE) e uma análise fatorial confirmatória (AFC) com as quais foi encontrada uma estrutura de quatro fatores relacionados (*formação e cultura organizacional, aprendizagem social, aprendizagem grupal e aprendizagem estratégica individual*) com os 21 itens da escala, os quais explicaram o 60.33 % da variância total e obtiveram adequados índices de bondade de ajuste ($\chi^2 = 371.66$; $\chi^2/df = 2.03$; CFI = .99; RMSEA = .041). Como fonte de validade externa foram obtidas correlações moderadas (entre .31 e .46) com a variável *satisfação laboral*. Os coeficientes alfa de Cronbach dos quatro fatores oscilaram entre .60 e .84. Conclui-se que a ENCAO e suas pontuações derivadas são uma medida válida e fiável para medir a aprendizagem organizacional no setor laboral avaliado.

Palavras-chave: aprendizagem organizacional, validade, confiabilidade, análise fatorial.

Introduction

As the 21st century progresses, we can notice that the competitive level between organizations is increasing, which is due to current economic and demographic trends that derive from globalization and market opening based on technological advances (Martínez & Gallego, 2007; Ritter, 2008). Thus, organizations need to increase their competitive value to excel in a rapidly-changing and challenging environment (Lip, 2005; Martínez & Gallego, 2007). One way to increase the competitive advantage is through organizational learning (OL), as this allows adaptation to change and innovation. (Conde & Castañeda, 2014; López, Ahumada, Olivares & González, 2012; Martínez & Gallego, 2007; Osorio, 2003; Pomajambo, 2013).

OL is a process that occurs within the organizations based on the interpretation of different knowledge allowing a transcendent learning (Inche, 2010). Del Río and Santisteban (2011) mention that OL is experiential and should take into account the organization's stakeholders and management processes.

OL is important because it is crucial in economic development and increased productivity by obtaining intellectual capital, which together enable a competitive advantage (Armenteros, Guerrero, Noyola & Molina, 2012;

García Zapata, 2005; Osorio, 2003). Also, OL can occur at an individual, group, or organizational level; and it serves as a resource to develop the competencies expected by stakeholders (Riquelme, Cravero & Saavedra, 2008). In addition, levels of OL also refer to the context in which the processes required for the company to learn are carried out; in other words, from the individual, group, or organizational approach different ideas are generated, which contribute to a more innovative and effective decision-making. (Del Río & Santisteban, 2011, Garzón & Fisher, 2010). On the other hand, it is important that organizations implement the conditions that enable the development of OL since such learning does not take place naturally (Alcover & Gil, 2002; Garzón & Fisher, 2008; Milian, Lugo & Cespón, 2008).

In this regard, Castañeda and Fernandez (2007) attribute three conditions for OL to develop at all levels: organizational culture, training, and strategic clarity. In short, OL is important to generate competitive advantage, but it is necessary that organizations implement appropriate actions for its development, individually, as a group, and at an organizational level.

In that sense, OL measurement is relevant because it allows companies to obtain good results through the acquisition of new knowledge, which becomes a competitive advantage (Riquelme et al., 2008). Measurement of

OL should be implemented because it allows to generate measurable indicators of the intellectual capital within organizations and the extent of determining factors in the success of the business (Castellano, 2013; García Zapata, 2005). In this regard, Osorio (2003) mentions that while intellectual capital is the set of intangible assets in an organization, it must be studied because it creates potential value in companies. Previous studies on OL agree that a company's workers must have an added value through the development not only of knowledge and technical skills, but also of social and emotional ones that enable them to adapt to globalization (Calderón, Álvarez & Naranjo, 2011; Calderón, Naranjo & Álvarez, 2010; Castellano, 2013; Ospina, 2010; Pesca de Acosta, 2009).

In this regard, in Latin America the measurement evidence of this construct has gained recent interest from its conceptual analysis (Castañeda, 2004; Del Rio & Santisteban, 2011, Garzón & Fisher, 2008) to the development of measurement instruments (Castañeda & Fernandez, 2007). OL measurement, therefore, is relevant because it allows the measurement of intangibles present in an organization that work as impact value in the financial development of it (Villegas, Hernandez & Salazar, 2016). To that end, the Organizational-Learning Levels and Conditions Scale was developed in Colombia (Castañeda & Fernandez, 2007) and has been used in studies in Colombia and Chile (Conde & Castañeda, 2014; Lope et al., 2012).

The first study to report evidence of validity and reliability of the ENCAO is the construction and validation of it (Castañeda & Fernandez, 2007). In this study, the instrument was applied to 845 participants (61% men), from different socioeconomic and educational levels. A previous pilot study was conducted with students from a private university in Colombia applying the expert judge criterion which revealed content-related evidence of validity. Also, an analysis of the main components with Varimax rotation was conducted, this explained 59.51% of the variance and extracted six components for the 28 items that were drafted: (a) Group Learning (7 items), (b) Culture (5 items), (c) Training (7 items), (d) Organizational Learning (5 items), (e) Individual Learning (2 items), and (f) Strategic Clarity (2 items). With regard to reliability, the authors report a .92 Cronbach's alpha for the total scale, without reporting this coefficient for the six dimensions extracted. In a subsequent main component analysis performed in the same study, the authors report the same solution of six dimensions without considering seven items that showed .35 factorial cross-loadings in more than one component, with a final version of 21 items as a result.

In a further study, Conde and Castañeda (2014) sought to get evidence of validity and reliability of the ENCAO adding

one more condition (Support) to the original instrument to adapt it to a university academic context. The sample consisted of 111 investigations qualified by research system in Colombia (COLCIENCIAS). Data were collected from 82 research groups segmented by categories A= 3 groups, B= 17 groups, C= 22 groups, and D= 40 groups (where A top category and D minimum category; COLCIENCIAS, 2015). A peer review was performed with 6 experts exploring clarity, relevance, and grammar, shortening the original 28-item instrument to 23 items which are graded by a 5-level Likert-type scale (0 = *never*, 4 = *Very often*). The reliability of each of the subscales was calculated using Cronbach's alpha obtaining .56 for Individual Learning (IL); .85 for Group Learning (GL); .80 for Organizational Learning (OL); .70 for Organizational Learning Culture (OLC); .70 for Training; .60 for Organizational Support; .85 for Clarity, and .79 for the global scale. This study exhibits two alpha coefficients below the acceptable minimum ($\alpha < .70$, Prieto & Delgado, 2010); additionally, no report on the analysis of the internal structure of the ENCAO in the researchers' sample is evidenced.

Finally, Castañeda (2015) conducted a study whose methodological basis was the validation of an instrument on the conditions of OL (Castañeda, 2010; Castañeda & Fernandez, 2007) aiming to explore the relevance of these conditions from the modification of the original instrument. To do this, he used a convenience sample of different companies (N = 613; 58% men), divided into three groups: public (n = 304), commercial (n = 201), and advertising (n = 108). The instrument achieved content validity through a pilot study with 36 graduate students and expert opinion.

The instrument proposed in the latter study (Castañeda, 2015) consists of 28 items and 4 condition components: Organizational Learning Culture (OLC, items 16 to 19), Training (items 20-23), Strategic Clarity (items 5- 9), and Organizational Support (items 24-28). In addition, the Organizational Learning Scale consists of 10 items measuring the following levels of learning: Individual (IL) with 4 items; Group (GL) with 3 items, and Organizational (OL) with 3 items. To detect evidence of validity, a factorial analysis of main components with Varimax rotation was performed. Therefore, a significant factorial loading was considered when it was greater than .50 and it was decided to remove item 1 of Strategic clarity, items 3 and 4 of Training, and item 5 of Organizational Support. Furthermore, a .89 KMO was obtained, Bartlett's test $p < .001$ and a cumulative explained variance of 69.5% was obtained. The author reports a global mean reliability with a .92 Cronbach's alpha. Regarding the components: OLC.81; Training .78; Strategic Clarity .81, Organizational Support .81; IL.56; GL .87, and OL .80.

According to previous research mentioned it can be expressed that the instrument to be used in the study has had variations in the distribution of components in different contexts, which is evidence of good practice in measuring by on the researchers' part because evidence of validity and reliability adapted to different contexts are reported (Muñiz, Elosua & Hambleton, 2013), although it reflects also the lack of a defined factor structure. The studies mentioned also show analysis procedures not currently methodologically recommended regarding the analysis of its psychometric properties. For example, the use of the package known as Little Jiffy (main component analysis, Kaiser criterion, and Varimax rotation) to analyze the internal structure of an instrument (Lloret-Segura, Ferreres-Traver, Hernandez, & Thomas-Miguel, 2014), and the report of a total alpha when it is not a one-dimensional instrument. Moreover, the review of psychometric history of the ENCAO reflects that the learning conditions and levels gain consensus in a theoretical framework, and not necessarily on a practical level. While it is true that all scales above present conditions and levels, these vary according to the population and study objectives (Castañeda, 2004; Conde & Castañeda, 2014; Castañeda & Fernandez, 2007). For this reason, it is advisable and important to continue reporting psychometric evidence in different contexts in order to assess the consistency of the instrument as well as its dimensionality.

That is why the aim of this study is to analyze the psychometric properties of the ENCAO, specifically by reporting validity evidence related to the internal structure and external evidence of validity by association with another variable (job satisfaction); as well as evidence of reliability by the internal consistency method with Cronbach's alpha. Importantly, this research is of instrumental type, i.e., it seeks to analyze the psychometric properties of psychological measurement instruments (Ato, López & Benavente, 2013), in this case within the organizational setting.

Method

Participants

The sample consisted of 384 workers aged between 19 and 56 years ($M = 29.57$ years, $SD = 7.33$), mostly women (64%, $n = 244$), from a private company in the hydrocarbon sector in Lima (Peru). Most of them had a higher education (54%), high school (36%), and only 10% incomplete high school education. The majority of the sample had operator positions (78%), while the rest had technical / administrative positions (22%).

The sampling was of an intentional non-probabilistic type. To determine the minimum number of the sample, the suggestion of 5 to 10 participants per item was followed for the validation of an instrument (Carretero-Dios & Pérez, 2005); that is, a minimum of around 140 to 280 participants for this study.

Instruments

Organizational-Learning Levels and Conditions Scale (ENCAO; Castañeda & Fernández, 2007). Composed in its final version by 21 items distributed in six subscales: Group Learning (GL, 4 items), Culture (5 items), Training (4 items), Organizational Learning (OL, 4 items), Individual Learning (IL, 2 items), and Strategic Clarity (SC, 2 items). The general objective of the instrument is to know whether the conditions and levels for organizational learning are generated in the organization through a Likert scale from 1 to 5 (1 = *Never*, 5 = *Very frequently*). As already mentioned in the introduction, the scale has evidence of validity and reliability (Castañeda & Fernández, 2007).

Brief version of the Job Satisfaction Scale (ESL; Boluarte & Merino, 2015). This instrument was originally developed in English by Cooper, Rout, and Faragher (1989) and has been adapted into Spanish by Boluarte and Merino (2015). The scale is one-dimensional and has 10 items with a Likert-type answer format (1 = *Very Dissatisfied* up to 6 = *Very Satisfied*). Regarding the exploratory factor analysis of the adaptation, the ESL obtained a .93 KMO as a very acceptable value and the Bartlett sphericity test turned out to be statistically significant ($\chi^2(45) = 1,693.90$, $p < .001$). In terms of reliability, an internal consistency method was used by calculating the .82 Cronbach's alpha. It is inferred that the abbreviated version presents a better fit exceeding the minimum criteria as compared to the original version (S-B $\chi^2(35) = 40.29$, RMSEA = 0.04, SRMR = 0.06, CFI = 0.99). In this research, the factorial analysis was conducted using the Unweighted Least Squares (ULS) method. According to the analysis, by the criterion of eigenvalues greater than 1, it was suggested that a single factor should be extracted explaining 47.10% of the total variance. This result was in line with the one-dimensional structure put forward by the author of the original instrument. In addition, all the items had factorial loadings greater than .40 (between .52 and .78). As to reliability, a .89 Cronbach's alpha was obtained for the total scale and the corrected item-total correlation range was .63 to .64.

Procedure

For the collection of information, the respective permits were requested from the institutions involved and the author

of the original instrument. Then a pilot study was conducted with a group of 23 people with characteristics similar to those of the final sample (between 18 and 53 years old; 74% women) with varying educational levels (from incomplete high school to postgraduate studies). The objective of the pilot study was to perform linguistic adaptation. Based on the comments obtained from the participants, it was concluded that the wording of the items of the original instrument should not be altered. Next, the final sample of 384 employees of a private company in Lima (Peru) was evaluated, using the instruments already described together with an informed consent, where the voluntary participation and the confidential nature of the study were clarified, and a sociodemographic record.

Data analysis

For data analysis, we proceeded to study the validity in terms of internal structure, which allowed to establish the number of items and factors of the test by means of the Exploratory Factor Analysis (EFA) technique, allowing to detect the existing relationships between a set of variables (Ferrando & Anguiano-Carrasco, 2010). As a preliminary step, given the ordinal level of the items, an analysis of score distribution was carried out in order to evaluate the univariate and multivariate normality that will determine using the Pearson correlation matrix (in case of normality) or the polychoric (in case of absence of normality), which is the recommended procedure prior to the application of the EFA (Lloret-Segura et al., 2014). Next, the degree of relationship of the items of the ENCAO was analyzed, for which, the KMO sample adequacy test and Bartlett's Sphericity Test were applied to determine the relevance of performing the EFA (Frías-Navarro & Pascual, 2012). In addition, to determine the maximum number of factors that best explain the OL variable, we used the method of extraction of Unweighted Least Squares (ULS) and the Promin rotation; the latter was used since it is a method that facilitates the proper rotation of factors because it identifies potentially simpler items by factor and turns them into markers prior to the process. In this way, a smaller restriction is obtained in the estimation of factorial loadings (Ferrando & Lorenzo-Seva, 2014).

Additionally, in order to confirm the internal structure of the instrument, a CFA was carried out aimed at validating the hypotheses of the factorial model through the adjustment of the original instrument (Medrano & Muñoz-Navarro, 2017). Its objective is to make a comparison in terms of the internal structure of the ENCAO with the proposed model through the revision of goodness of fit indexes. The indexes analyzed to compare the models were Chi-square

between the degrees of freedom (χ^2/df), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean-Square (SRMR), Comparative Fit Index (CFI), and Akaike Information Criterion (AIC). The χ^2 contrasts the null hypothesis that the model errors are null; however, being sensitive to the sample size it is compared to the degrees of freedom, obtaining a quotient that must be less than 3 (Ruiz, Pardo & San Martín, 2010). The CFI consists of a measure of comparative adjustment which, in order to be acceptable, must oscillate in values greater than or equal to .90 and are considered excellent adjustments starting from .95 (Wu, Li & Zumbo, 2007). For the RMSEA, it is considered that values lower than .06 are optimal and lower than .08, acceptable (Medrano & Muñoz-Navarro, 2017). For the SRMR, values lower or closer to .05 are advised to indicate a good fit of the model (Byrne, 2006). Finally, the Akaike Information Criterion (AIC) adjusts the chi-square statistic to the number of degrees of freedom of the model; in this sense, it is considered that lower AIC values for a model indicate a better fit with respect to other models (Medrano & Muñoz-Navarro, 2017).

As part of the reliability analysis, Cronbach's alpha coefficient was used, including confidence intervals (Fischer, 1992). Finally, we proceeded with the convergent validity analysis, which aims to explore the interrelationships between the components of the ENCAO and the short version of the ESL. For the EFA, the FACTOR program, version 10.8.01, was used; for the convergent validity and reliability, the SPSS program, version 24, was used; and for the CFA, the EQS program, version 6.2, was used.

Results

Next, the results of the data analysis are presented according to the evidence of validity (internal structure and relationships with other variables) and reliability (internal consistency) obtained.

In the first place, the internal structure of the ENCAO (Castañeda & Fernández, 2007) was analyzed. Initially, the homogeneity of the items was analyzed by corrected item-test correlations (r_{ic}), for which values greater than .20 were retained (Kline, 1986); the range of the r_{ic} of the ENCAO items was between .30 and .72; that is why all the items were maintained for the factorial analysis. In addition, the statistics of central tendency and dispersion of the items were calculated (See Table 1) where no violations of the assumption of univariate normality were identified, since the skewness and kurtosis indices were lower than +/- 1.5 (Forero, Maydeu-Olivares & Gallardo-Pujol, 2009). However, in the Mardia (1970) analysis for skewness and

multivariate kurtosis, we found a skewness coefficient of 51.34, $df=1771$, $p=1.0$, and a kurtosis coefficient of 572.76, $p<.001$, demonstrating the absence of a multivariate normal distribution of the data; for this reason the method of extraction of Unweighted Least Squares (ULS) and the matrix of polychoric correlations were used, which turn out to be an option more in line with the ordinal level of the items and against the violation of the multivariate normality assumption (Lloret -Segura et al., 2014).

Prior to the application of the EFA, a .92 measure of sample adequacy (KMO) was found, which is considered excellent (Ferrando & Anguiano-Carrasco, 2010). In addition, the Bartlett Sphericity Test obtained a statistically significant score, $\chi^2(210)=3213.80$, $p<.001$, which means that there is a sufficient degree of relationship between the items of the instrument to be able to analyze them factorially.

The results of the extraction analysis of Unweighted Least Squares on the polychoric matrix by the criterion of eigenvalues greater than one, suggested extracting four factors that explained 60.33% of the total variance for the 21 items according to the suggestion of the original instrument (Castañeda & Fernández, 2007). Likewise, the estimates of the communalities extracted for the items of the scale were obtained (See Table 1). And, regarding this, it is important to analyze the communalities since the low values ($h^2<.20$, Child, 2006; $h^2<.30$, Costello & Osborne, 2005) can generate a significant alteration in the results of the factorial analysis (Velicer & Fava, 1998). In general, the results showed moderate communalities in most of the items (mean $h^2=.53$).

To obtain an interpretable solution, an oblique Promin rotation was performed, assuming that the extracted factors are correlated (See Table 1). The first component is the so-called Organizational Training and Culture (OTC), in which 2 items of the Culture dimension have been adjusted (items 19 and 21); the 4 items of the Training dimension (items 24, 26, 27, and 28), and one item of the Organizational Learning dimension (item 10), presenting factorial loadings between .36 and .88, which are considered as acceptable factorial loadings ($>.30$) (McDonald as quoted in Ferrando & Anguiano-Carrasco, 2010). In the second factor, called Organizational Learning (OL), 3 items of the original dimension were grouped (items 12, 13, and 14), and 3 items of the Culture dimension (items 15, 17, and 18) presenting factorial loadings between .31 and .89. The third factor is called Group Learning (GL), in which the 4 items of the original dimension (items 7, 6, 8, and 9) have been adjusted with factor loadings of .58 to .91. The fourth factor called Individual Strategic Learning (ISL) presents an adjustment of the items of the Strategic Clarity dimension (items 3 and 4) and of the Individual

Learning dimension (items 1 and 2) with .32 and .86 factor loadings. It is worth mentioning that item 18 presented a cross-loading in the OTC and OL factors.

To calculate reliability, the internal consistency method was used by calculating Cronbach's alpha coefficient. Next, the Cronbach alpha coefficients of the four subscales were reported along with their respective confidence intervals (Fischer, 1992). OTC obtained a Cronbach's alpha equal to .84 (CI, 95% = .81, .87) and the corrected item-total correlation range was .53 to .68, being acceptable values (Pérez & Medrano, 2010). OL obtained a Cronbach's alpha equal to .83 (CI, 95% = .80, .86) and the corrected total correlation range was .51 to .70. For GL, a Cronbach's alpha equal to .80 (CI, 95% = .76, .83) was obtained and the corrected total correlation range was .60 to .65. Finally, ISL obtained a Cronbach's alpha equal to .60 (CI, 95% = .53, .66) and the corrected total correlation range was .33 to .41.

To confirm the structure found in the EFA, we proceeded with a CFA considering the estimation method for Robust Maximum Likelihood and considering the ordinal level of the items by analyzing the matrix of polychoric correlations between the items. In this analysis, the adjustment of 3 measurement models was evaluated: the structure of 6 factors related to the 28 items of the first version of the ENCAO (M_1 , Castañeda & Fernández, 2007), the structure of 6 factors related to 21 items of the final version of the ENCAO (M_2 , Castañeda & Fernández, 2007) and the structure of 4 factors related to 21 items (M_3) of the EFA result previously conducted in this research. For this analysis, the total sample used for the EFA was divided into two random subsamples of 194 participants each, as currently recommended (Lloret Segura et al., 2014). The first subsample was used to evaluate the fit of the M_1 and M_2 models, while the second subsample was used to evaluate the M_3 fit.

As shown in Table 2, according to the results of the AFC and to the evaluation of the adjustment indices, the model of four factors related to 21 items (M_3) presented the best fit; although it is worth mentioning that the model of 6 factors related to 21 items (M_2) also presented an acceptable adjustment.

Then, a normality analysis was performed through the Kolmogorov-Smirnov (KS) test, taking as reference the sample size ($N>50$). It was found that none of the factors presents a normal distribution ($p<.05$) and that is why it was determined to use the nonparametric Spearman test for the convergent validity analysis. Thus, the analysis of correlations between factors was carried out in order to analyze the degree of intensity between the existing relationships between factors of the proposed model and

Table 1

Factorial loadings of the items of the Organizational-Learning Levels and Conditions Scale (ENCAO)

Items	h ²	M	SD	g ¹	g ²	Factor			
						OTC	OL	GL	ISL
24. La entidad capacita a sus trabajadores.	.73	4.08	0.86	-0.77	0.26	.88			
26. La capacitación que los trabajadores reciben de la entidad es aplicable al trabajo.	.64	4.01	0.81	-0.73	0.89	.78			
19. La entidad otorga reconocimiento a las personas que producen conocimiento.	.55	3.71	1.07	-0.59	-0.29	.59			
27. La Organización actualiza a los empleados sobre los cambios que ocurren en ella.	.56	3.91	0.91	-0.81	0.74	.46			
21. Los directivos suministran a sus grupos de trabajo información de reuniones y eventos a los que ellos asisten.	.44	3.87	0.93	-0.69	0.31	.47			
28. Cuando un trabajador se vincula recibe inducción sobre la entidad a la que ingresa.	.38	4.05	0.85	-0.94	1.34	.47			
10. El conocimiento con el que cuenta la entidad es aplicado por sus miembros.	.38	3.93	0.80	-0.52	0.28	.36			
13. La entidad mejora sus procesos con base en el conocimiento de las personas que trabajan en ella.	.71	3.88	0.89	-0.68	0.49		.89		
12. La entidad responde a las presiones de cambio del entorno aprendiendo en el tiempo requerido.	.45	3.65	0.86	-0.51	0.31		.84		
17. Los directivos manifiestan que el aprendizaje de los trabajadores contribuye al logro de los objetivos laborales.	.61	3.89	0.88	-0.79	0.92		.58		
18. La entidad promueve situaciones para que las personas intercambien su conocimiento.	.66	3.65	0.96	-0.27	-0.46	.32	.54		
14. La entidad genera nuevos productos o servicios con base en el conocimiento de las personas que trabajan en ella.	.46	3.74	0.93	-0.42	-0.20		.51		
15. En la entidad a las personas que comenten errores proponiéndose innovar se les anima para que continúen trabajando.	.36	3.69	0.95	-0.57	0.25		.31		
7. Las personas de la entidad aprenden cuando trabajan en grupo con entusiasmo.	.67	4.25	0.81	-0.85	0.21			.91	
6. Las personas en la entidad aprenden cuando trabajan en grupo.	.67	4.21	0.81	-0.93	0.89			.89	
8. Las personas de la entidad intercambian conocimiento libremente cuando trabajan en grupo.	.54	4.06	0.87	-0.73	0.28			.67	
9. Las personas de la entidad logran aprendizaje compartido cuando trabajan en grupo.	.57	4.03	0.79	-0.49	-0.05			.58	
1. Las personas en la organización aprenden observando a sus compañeros de trabajo.	.76	3.84	0.84	-0.39	0.25				.86
2. En esta entidad las personas producen conocimiento ensayando y probando.	.25	3.90	0.91	-0.65	0.17				.60
4. En esta organización los trabajadores aprenden de las directrices que reciben de su jefe o superior.	.36	4.07	0.80	-0.62	0.29				.34
3. Las personas aprenden de los documentos disponibles en la entidad.	.28	3.66	0.95	-0.49	0.28				.32
% de varianza explicada	-	-	-	-	-	42.90	7.05	5.60	4.78

Note: OTC = Organizational Training and Culture; OL = Organizational Learning; GL = Group Learning; ISL = Individual Strategic Learning.

Table 2
 Index of adjustment of the Organizational-Learning Levels and Conditions Scale (ENCAO)

Model	χ^2	gl	χ^2/gl	CFI	SRMR	RMSEA	IC (90%)	AIC
M ₁	668.53	335	1.99	.97	.057	.074	[.064, .082]	290.59
M ₂	362.60	174	2.08	.97	.055	.069	[.058, .080]	139.20
M ₃	371.66	183	2.03	.99	.052	.041	[.025, .054]	135.29

Note: M₁ = 6 factors related (28 items); M₂ = 6 factors related (21 items); M₃ = 4 factors related (21 items).

the Job Satisfaction scale (ESL, Boluarte & Merino, 2015) (See Table 3).

As for the descriptive analysis of the factors, whose scores were calculated from the sum of items divided by the number of items of the factor, it is observed that GL reaches the highest score versus the other subscales (See Table 3), although, broadly speaking, in the 4 dimensions there is a tendency toward high scores (Minimum = 1 and Maximum = 5). Regarding the relationships between the factors of the proposed model, it was found that all are positive and statistically significant ($p < .05$) with a moderate magnitude ($> .30$) (Hirzel & Guisan, 2002; Taylor, 1990). On the other hand, the relationships between the factors of the proposed model and the job satisfaction factor are positive and statistically significant, taking into account that the most direct association occurs between job satisfaction and organizational training ($r_s = .46, p < .001$) and organizational learning ($r_s = .46, p < .001$), while the lowest is with individual learning ($r_s = .31, p < .001$). In general, all the correlations account for the convergence of the ENCAO dimensions and its relation with the job satisfaction variable according to what is expected.

Discussion

The aim of this study was to analyze the psychometric properties of the Organizational Learning Levels and conditions Scale (ENCAO; Castañeda & Fernandez, 2007), to warrant its use in the business setting in Lima Peru.

The final version has four factors with reliability coefficients between .60 and .84, which is an indicator of the reliability of scores in measuring the OL construct. This factorial model fits in the sample of private sector workers in the hydrocarbons sector despite the reduction of factors comprising it. The exploratory factor analysis was performed based on the polychoric correlations matrix and through the unweighted least squares analysis criterion determining factor reduction from the original model to four and with the 21 items recommended in the study by Castañeda and Fernández (2007).

Importantly, they obtained a Cronbach's alpha between .79 and .98 in most previous studies based on the original instrument. (Lopez et al., 2012; Castañeda, 2015; Conde & Castañeda, 2014), which suggests that, despite the change in the distribution of factors, these remain highly acceptable. Although low coefficients were also observed in some theoretical dimensions analyzed (Castañeda, 2015). Differences in reliability coefficients found in this study as in those mentioned above are due to the particular characteristics of each sample, as well as to the modifications undergone by the ENCAO in various studies (Castañeda, 2015; Conde & Castañeda, 2014) and to the formation of factors with a low number of items (2 items, for example), to the absence of an analysis of the internal structure prior to calculation of the alpha coefficients (Castañeda, 2015).

In the proposed model, Organizational Training and Culture (OTC) is the one explaining more variance (42.90%). This result differs from previous studies where it is evident

Table 3
 Correlations and Descriptive Statistics of the Organizational-Learning Levels and Conditions Scale (ENCAO)

Dimension	M (SD)	1	2	3	4	5
1. Organizational Training and Culture	3.94 (.64)		.71**	.51**	.51**	.46**
2. Organizational Learning	3.75 (.67)		-	.58**	.50**	.46**
3. Group Learning	4.14 (.65)			-	.44**	.32**
4. Individual Strategic Learning	3.87 (.59)				-	.31**
5. Job Satisfaction	4.92 (.72)					-

Note. ** $p < .01$.

that Group Learning (GL) explains an 80.91% index of the variable study (Conde & Castañeda, 2014). On the other hand, the results found in this study are consistent with the original validation (Castañeda & Fernandez, 2007), where Organizational Learning Culture was the factor that explained a higher percentage of variance. Further, López et al. (2012) also found that the Learning Culture factor explains 64.73% of the variance. Which is consistent with the proposed model because OTC is understood as the development of shared cognitive skills in collaborators thus allowing to achieve the organizational goals and these levels to occur at different levels (Pucci, 2004). In addition, the fact that both conditions of OL have come together in this sample reflects the fact that consolidation of the culture of an organization stems from a gradual training process of workers at all levels (Rodríguez, 2009; Sánchez, Tejero, Yurrebaso & Lanero, 2006).

Furthermore, the confirmatory factor analysis shows that the structure of four related factors (21 items) shows the best fit to the data than the first version of the original instrument (6 factors: 28 items). That said, the proposed model allows to evaluate: (a) OTC described above; (b) Organizational Learning (OL), understood as the way workers attribute meaning to their work experiences from the social context developed in the organization (Martinez & Gallego, 2007); (c) Group Learning (GL) as the acquisition of knowledge collectively where interpretation is shared among employees and in turn, promotes integration between them (McAnally-Salas & Sandoval, 2007); and (d) Individual Strategic Learning (ISL) which refers to individual mental models created and integrated collectively into the organization for alignment with the organizational goals and strategies. The latter factor matches the original theoretical proposal (Castañeda & Fernandez, 2007) where it was assumed that the four items comprising it explore individual aspects of organizational learning.

This four-factor model also constitutes an instrumental advantage as it allows to study OL from more specific constructs that enable companies to identify needs among the collaborator-organization link to establish action plans so as to ensure the competitive advantage by that organization. Similarly, it considers the three levels of OL proposed by Castañeda and Fernandez (2007). Also, the four-factor model validated in this study takes the simpler structure criterion that exceeds three items per factor, which is a robust approach when the factorial analysis is developed in measuring instruments (Fleming & Merino, 2005; Lloret-Segura et al., 2014). However, it should be noted that as the model with six factors presented an acceptable fit, it would be required to expand the number of items for the

IL and CE dimensions in order to assess this model's fit more precisely and compare it with the structure found in his study, which was also a recommendation posed by Castañeda and Fernández (2007).

Finally, it should be emphasized that the convergent validity analysis corroborates the relationship between the four factors of organizational learning with job satisfaction, showing a highly-significant and direct relationship relative to the sample under study. Additionally, these correlations have been from moderate to high indicating that the associations found have been relevant.

Limitations

As for the limitations of the study, we can state that procedures for analyzing the factorial invariance of ENCAO by gender or education level were not considered because the sample has a heterogeneous distribution that makes it difficult to obtain representative groups according to the demographic variables already mentioned. We also found that despite the ISL dimension having an acceptable Cronbach's alpha versus the sample, it is composed of only four items. According to the theoretical review, although this alpha is considered minimally acceptable, higher scores could be obtained with the implementation of new items (Castañeda & Fernandez, 2007; Cervantes, 2005). On the other hand, a new version of the ENCAO was obtained, so the results obtained there are hardly comparable with results obtained from other versions of the same scale because when integrating conditions and levels, the definitions of the construct change. In addition, it should be noted that the results obtained come from a specific population of employees of a company of the hydrocarbons sector in the city of Lima. For this reason, we recommended conducting more studies with samples that include a larger diversity of occupational levels and that better represent the dynamics generally present in an organizational setting. Such studies could confirm or not the model proposed in this study. Finally, it is mentioned here that due to the sample size it was not possible to conduct the AFE and AFC procedures, dividing the sample into two as suggested by current recommendations (Lloret-Segura et al., 2014), so further psychometric studies with a larger sample could continue providing evidence of ENCAO's factorial structure.

The results show that the ENCAO has psychometric properties that make it a reliable and valid measure for the purpose of evaluating organizational learning in a population of workers in the hydrocarbon sector in Lima and can be used for research in study areas with a population exhibiting similar characteristics to that of the sample.

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