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Artículos científicos

Elección de carrera e institución de educación superior: validación de instrumento de medición mediante el modelado de ecuaciones estructurales

Choice of Career and Institution of Higher Education: Validation of the Measuring Instrument by Modeling Structural Equations

Escolha de carreira e instituição de ensino superior: validação de instrumento de medida por modelagem de equações estruturais

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Resumen

La elección de institución y carrera universitaria que realiza el egresado de la educación media superior es una variable que impacta en la deserción escolar, un indicador de calidad de las universidades. En la literatura revisada se proponen diferentes modelos que describen la relación de esta variable con un conjunto de factores, sin embargo, dichos modelos no son del tipo correlacional, por lo que no es posible establecer cuál de los factores tiene más peso o impacto ni la estructura de correspondencia entre ellos. En este trabajo se valida, mediante la técnica de los modelos de ecuaciones estructurales, un instrumento de medición que se utiliza para determinar si los datos recopilados son adecuados para verificar las hipótesis que indican la forma en que se relacionan las variables latentes o constructos con la variable "Elección de carrera" y "Universidad". Para validar este instrumento de medición se conformó una muestra de 157 alumnos que cursan la carrera de ingeniería Industrial de la Universidad de Sonora. En los resultados se descubrió que las variables latentes o constructos siguientes: Costos económicos, Servicios, Imagen de la universidad e Infraestructura son apropiados para modelar la variable "Elección de carrera" mediante un modelo de ecuaciones estructurales.

Palabras clave: análisis factorial confirmatorio, ecuaciones de modelos estructurales, elección de carrera universitaria, instrumento de medición, validez y confiabilidad del instrumento de medición.

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Abstract

The choice of institution and university career is a variable that impacts school dropout, an indicator of quality in universities. In the reviewed literature, different models are proposed that describe the relationship of this variable with a set of factors; however, these models are not of the correlational type, so it is not possible to establish which of the factors has more weight or impact or the correspondence structure between them. In this work, a measurement instrument that is used to determine whether the collected data is adequate to verify the hypotheses that indicate the way in which the latent variables or constructs are related to the variable "Choice of career" and "University". To validate this measurement instrument, a sample of 157 students who are studying Industrial Engineering at the Universidad de Sonora was formed. In the results, it was discovered that the following latent variables or constructs: Economic costs, Services, Image of the university and Infrastructure are appropriate to model the variable "Career choice" using a structural equation model.

Keywords: confirmatory factorial analysis, structural model equations, university career choice, measuring instrument, validity and reliability.

Resumo

A escolha da instituição e da carreira universitária feita pelo graduado do ensino médio é uma variável que impacta a evasão escolar, um indicador de qualidade nas universidades. Na literatura revisada, são propostos diferentes modelos que descrevem a relação dessa variável com um conjunto de fatores, porém esses modelos não são do tipo correlacional, não sendo possível estabelecer qual dos fatores tem mais peso ou impacto ou a estrutura de correspondência entre eles. Neste trabalho, um instrumento de medida que é utilizado para determinar se os dados coletados são adequados para verificar as hipóteses que indicam a forma como as variáveis ou construtos latentes se relacionam com as variáveis "Escolha de carreira" e "Universidade". Para validar esse instrumento de medida, foi formada uma amostra de 157 alunos que cursam Engenharia Industrial na Universidade de Sonora. Nos resultados, constatou-se que as seguintes variáveis ou construtos latentes: Custos econômicos, Serviços, Imagem da universidade e Infraestrutura são adequados para modelar a variável "Escolha de carreira" por meio de um modelo de equações estruturais.

Palavras-chave: análise fatorial confirmatória, equações do modelo estrutural, escolha do

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título universitário, instrumento de medida, validade e confiabilidade do instrumento de medida.

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Introduction

The choice of the study program and the university or institute where this study program is to be taken are factors that influence the desertion of university students (Nieves and Vivas, 2008; Smulders, 2018). Dropout is an indicator of efficiency or quality of higher education institutions (HEIs). Thus, for HEIs that seek to improve their performance, reducing the value of this indicator is a priority task. To achieve this, it is necessary to identify the external factors that influence the student's decision. And there are many efforts by HEIs, both in the public and private sectors, that seek to shed light on this issue. For example, the National Research Center for College and University Admissions (NRCCUA) conducts an annual survey of new college students that inquires about the reasons why they chose the university in which they are enrolled. In 2018, this survey, applied to more than 100,000 students graduated from various high schools in the United States, revealed the following seven key reasons:

1) Affordability.
2) Availability of a desired program.
3) Reputation of the university.
4) Academic quality, job opportunities upon graduation.
5) Value of education for cost.
6) Social pressure (feeling of belonging).
7) Proximity to home (Guijosa, 2018).

There is also research that has addressed this topic. López (2017) models and describes the dependency relationship between the choice of study program and the university or institute with the following three factors: 1) individual-school factor, 2) family factor, and 3) institutional-contextual factor. While García and Moreno (2012), through an exploratory factor analysis (EFA), include the following factors: economic, institutional and academic quality, infrastructure and administrative. Another study is that of Montesano and Zambrano (2013), who present a descriptive analysis of the relationship between the choice in question and the economic, location and prestige factors of the institution. Finally, Lozano

(2007) and Lozano and Silva (2014) consider the lack of motivation, indecision, difficulties when it comes to knowing oneself, seeking information and resolving internal and external conflicts, and they validate the relationship between these with the university choice through a confirmatory factor analysis (CFA).

In this research work it is proposed to validate a measurement instrument whose latent variable is related to the choice of career and university by recent graduates of upper secondary education. Choosing which degree or study program and the organization in which this degree is to be pursued are two elements that anyone who wishes to obtain a university degree must weigh. For the choice of a career, people can be supported by instruments that allow identifying the skills and abilities for the development of a particular profession (placement exams) and the projection of both the demand for each of the options offered and the average salaries that can be expected as a graduate of these.

The career choice is due to internal factors and external factors. The internal factors are those that intrinsically have to do with the vocation and interest of the student, while the external factors are all the contextual elements: family, friends, educational offer, length of career, safety, costs, myths professionals and job opportunities, to name a few (Canals, 2013).

Now, validating a measurement instrument or measurement instrument consists of quantifying the relationships between the indicators (which are the observed responses, measurable variables or items) and the latent variables, constructs or unobservable concepts (Soriano, 2014). Thus, when the relationship between these is significantly strong, it makes sense to establish inferences, which can be raised and validated through structural equation models (MES). Therefore, it is necessary to have a method or procedure to quantify this relationship, in addition to defining the parameters that allow declaring this relationship significant or not.

The accuracy (validity) and precision (reliability) of the measuring instrument represent two elements that allow quantifying the relationship between the items and the latent variable, and determining whether it is significant, since this guarantees that the instrument is capable of measure what has to be measured without variations in similar conditions (Carvajal, Centeno, Watson, Martínez and Sanz, 2011). However, before carrying out this statistical analysis, it is necessary, in addition to verifying compliance with the assumptions corresponding to each statistical method, to validate the content of the

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measurement instrument, that is, to quantify to what extent the indicators are relevant and representative. of the latent variables (Aldás and Uriel, 2017).

Designing a measurement instrument for a research project involves generating a set of items that are related to latent variables or constructs, in such a way that with these items it is possible to collect and reflect all the characteristics of the construct (Clark and Watson, 2016). In order to qualitatively test the validity of the content of the instrument, it is normally submitted to the opinion of a group of experts in the area, and subsequently a comparison of the opinions arising is carried out, which is carried out in two parts: first, these experts evaluate it according to four categories: 1) sufficiency, 2) relevance, 3) clarity and 4) coherence (Escobar and Cuervo, 2008); and once their judgments have been made, the degree of agreement between them is established using the Kendall coefficient or the Friedman test (Abdi, 2007; Kendall and Smith, 1939).

Once the content has been validated, the instrument is subjected to the validation of statistical methods. The results of this process will dictate whether it is necessary to eliminate some of the items. Here it is worth mentioning the warning of Aldás and Uriel (2017), who point out that care must be taken with this elimination and not to jeopardize the validity of the initial content.

Hypothesis

The following external factors: costs, prestige, infrastructure and services that correspond to the IES, together with the emotional factor of the student, influence students when deciding which career and which university to choose for their professional training.

General objective

Develop a model that makes it possible to relate the external factors mentioned above with the students' decision of which career and which HEI to choose for their professional training.

Specific objectives

1) Reduce the dropout rate in higher education institutions.

2) Provide elements to the HEIs with which they can establish strategies to increase enrollment and raise the quality of the educational services they offer.

Goal

Validate the measurement instrument to be used in the design and construction of the model proposed in the general objective of this work through the covariance structure MES.

Methodology

The methodology of this research is of a quantitative approach, since the data collected are of a discrete nature and are used to test the hypothesis of the existence of a linear relationship between a set of latent variables and items, in addition to establishing the model that defines or regulates this linear relationship, which is achieved through the use of statistical analysis, particularly with the use of MES, with the aim of achieving a greater understanding of the phenomenon under study by using the information collected (Malhotra, 2008). The scope of the research is correlational, and has the purpose of validating the measurement instrument, and the research design is non-experimental, since it observes the variables under study in their natural context without manipulating the independent variables; and it is transectional or transversal of the correlational-causal type, since information is collected at a single moment, and it aims to describe the relationships between two or more variables, either in correlational terms or in terms of the cause-effect relationship (Hernández, Fernández y Baptista, 2014; Poblano Ojinaga, 2019).

Structure and validation of the measuring instrument

The measurement instrument is the result of the literature review. Thirteen measurable variables (13 items) and five latent factors or variables (F1, F2, F3, F4, and F5) were identified. Table 1 shows the items or measurable variables used in this work with their respective coding, while Table 2 shows the association established between the items and the factors considered for this research work.

Tabla 1. Ítems y su codificación

¿Qué tan importante fue para ti…?	Código
La imagen de la universidad	IM01
El prestigio de la carrera que elegiste	IM02
Los salones y audiovisuales	IN01
Los laboratorios y talleres de la universidad	IN02
Que la universidad cuente con biblioteca	SE01
Que cuente con estacionamiento	SE02
Que cuente con cafetería	SE03
El costo de inscripción	EC01
El costo de transporte	EC02
El costo de libros y materiales	EC03
La recomendación de un conocido	EM01
Que haya un familiar egresado de la universidad	EM02
Que un amigo esté o haya estudiado en la universidad	EM03

Fuente: Elaboración propia

Tabla 2. Codificación de factores e ítems

Selección	Factor o variable latente	Ítems
F	Costos económicos (F1)	EC01, EC02, EC03
	Infraestructura (F2)	IN01, IN02
	Imagen o prestigio de la institución (F3)	IM01, IM02
	Servicios (F4)	SE01, SE02,SE03
	Emotivo (F5)	EM01, EM02, EM03

Fuente: Elaboración propia

This measurement instrument was designed following the theory according to the theme (Canals, 2013; Ruiz, 2018 and Vergara, 2017). It is a questionnaire with 13 items, which are explained by five latent variables. The content validation of this questionnaire was carried out in two parts. First, it was submitted for validation by a group of four experts in the field, who approved it. As mentioned above, the validation of this approval was focused on four areas: 1) sufficiency, 2) relevance, 3) clarity and 4) coherence (Escobar and Cuervo,

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2008). Once the judgments have been made, the degree of agreement between them is established using the Kendall coefficient or the Friedman test for each of the four aforementioned items (Abdi, 2007; Kendall and Smith, 1939). For the above, the following hypothesis is proposed for each of them:

- H_0: All treatment effects are equal to zero.

And a significance level of 5% is used to verify them with a non-parametric analysis as an alternative to the bidirectional analysis of variance with the use of the R statistical package.

Collection and validation of the adequacy of the sample

The survey to be used for data collection consisted of 13 questions, one for each item considered in the instrument. The answer to each of these questions corresponded to a Likert scale of five categories: 1 represents the category “Totally disagree”, while number 5, the largest on the scale, corresponds to “Totally agree”. The sample data were taken according to the non-probability sampling technique, for convenience: respondents are selected by the fact that they are in the right place and time (Malhotra, 2008).

This instrument was applied to 157 students who are studying Probability and Statistics of the Industrial Engineering career at the University of Sonora. However, the previous figure was reduced to 151 after eliminating the outliers using the Mahalanobis distance procedure with a significance level equal to 0.01. During validation in which the suitability of the data obtained in this sample is established for its corresponding factorial analysis, the values of the following indicators are measured with the use of the R software: Bartlett's sphericity test (with which the null hypothesis that the variance-covariance matrix of the data in this sample is equal to the identity matrix with a significance level equal to 0.05) and the measurement of sample adequacy is verified with the Kaiser-Meyer-Olkin test (KMO), which precisely measures the adequacy of the sample for factor analysis.

Measurement instrument validation

To test the statistical hypotheses that are raised in the MES, it is necessary to validate the instrument. And for this, the identification of the model must be guaranteed; the reasonableness that includes evaluating the goodness of fit and determining if the estimated parameters are significant and take adequate theoretical values; the validity and reliability of

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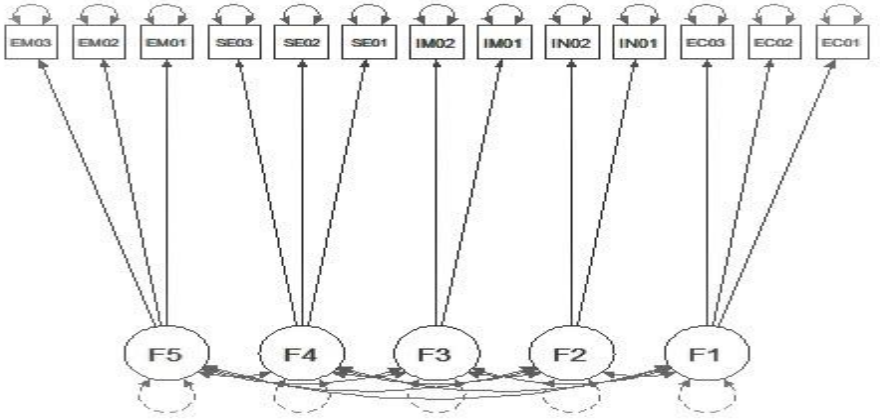
the proposed CFA model is carried out by using the lavaan package of the R software and with the robust unbiased least squares estimator (ULSM), which shows better performance, where the assumption of normality and the identification of the model is not fulfilled (Morata, 2017).

In this work, the MES are used, in particular the CFA, whose model is presented in Figure 1.

Figura 1. Diagrama del modelo para el AFC



Fuente: Elaboración propia

Identification of the model

Identifying the model consists of guaranteeing that the number of free parameters to estimate is less than or equal to the number of parameters in the variance-covariance matrix of the model, which has a number of different parameters equal to (p / 2) (p + 1), which for this model with p = 13 corresponds to 91 parameters, while the estimates of the model parameters require 36 degrees of freedom, leaving 55 degrees of freedom free, which guarantees the identification of the model.

Model reasonableness

The goodness of fit of this proposed model is carried out by comparing the values that correspond to the indicators chi squared, chi squared / gl, SRMR, RMSEA, TLI, CFI, which are obtained from the CFA, which are compared against the critical values that are considered to verify this goodness of fit (Aldás and Uriel, 2017).

The other part of the reasonableness of the model is considered adequate if there are no correlations greater than unity in the estimated parameters of the model, there are no standardized factor loads outside the range of real numbers [-1,1] and none of the estimated variances is negative.

Validity and reliability of the model

The validity of the model is evaluated in three aspects: content validity, verified with the Friedman test; Convergence validity, which is measured with the indicator of average variance extracted (AVE, for its acronym in English), and discriminant validity, which is assessed using the Heterotrait Monotrait (HTMT) radius and the confidence interval test. To assess the reliability of the model, Cronbach's alpha and composite reliability (CR) are used. In all cases, the critical values considered in Aldás and Uriel (2017) and Lin (2007).

Results

Instrument content validation

The results issued by the four connoisseurs / experts, who evaluate the measurement instrument in the aspects of sufficiency, relevance, clarity and coherence, are presented in table 3

Tabla 3. Resultado de la prueba de Friedman

	Suficiencia	Relevancia	Claridad	Coherencia
S-statistic	2.61	1.28	0.27	5.16
DF	3	3	3	3
P-value	0.457*	0.734*	0.0966*	0.160*

*Significativo a 5 %

Fuente: Elaboración propia

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Sample adequacy

Of the 157 members of the sample, six were eliminated following the Mahalanobis distance criterion, which reduces the sample size to 151. The values observed in Table 4 correspond to the KMO values and the results of the test of Bartlett's sphericity applied to sample size 151.

Tabla 4. Valores de los indicadores utilizados para evaluar la adecuación la muestra

Indicador	Valor del modelo	Valor recomendado
Esfericidad de Bartlett	*P-value* = 3.28-e08, gl = 12	*P-value* < 0.05
Kaiser-Meyer-Olkin	KMO = 0.73	KMO > 0.70

Fuente: Elaboración propia

Model reasonableness

Table 5 shows the results obtained from the CFA.

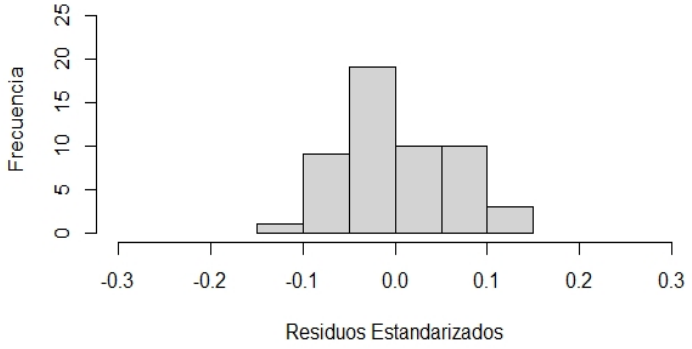
Tabla 5. Indicadores de la bondad de ajuste del modelo

Índice de ajuste	*P-value*-ji al cuadrado	Ji al cuadrado/DF	CFI	TLI	RMSEA	SRMR
Modelo	0.000	1.05	0.997	0.995	0.019	0.073
Recomendado	0.01	< 3.0	> 0.90	> 0.90	< 0.08	< 0.08

Fuente: Elaboración propia

Figure 2 shows the histogram of the standardized values corresponding to the standardized residuals of the observed linear model in relation to the estimated linear model, where it can be observed that these residuals are symmetrically distributed, centered on zero with a dispersion not outside of the normal distribution.

Figura 2. Histograma de residuales del AFC



Fuente: Elaboración propia

On the other hand, the estimates of the standardized parameters obtained in the CFA are presented in table 6.

Tabla 6. Valores estandarizados del modelo obtenido en el AFC

Variable	F1			F2			F3		F4			F5		
Ítem	EC01	EC02	EC03	IN01	IN02	IM01	IM02		SE01	SE02	SE03	EM01	EM02	EM03
Regresión	0.74	0.83	0.79	0.85	0.84	0.64	0818		0.726	0.64	0.77	0.77	0.78	0.85
Varianza	0.45	0.33	0.32	0.27		0.21	0.43	0.28	0.27	0.73	0.45	0.42	0.56	0.33
Covarianza	F2 = 0.42 F3 = 0.28 F4 = 0.16 F5 = 0.22			F3 = 0.56 F4 = 0.56 F5 = 0.19			F4 = 0.39 F5 = 0.39		F5 = 0.28					

Fuente: Elaboración propia

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Validity and reliability of the model

Tables 7, 8 and 9 show the values of the indicators to evaluate the validity and reliability of the model, the confidence intervals for the covariances of the latent variables of this model and the reliability of the model through the alpha values. Cronbach and CR.

Tabla 7. Indicadores para evaluar la validez y confiabilidad del modelo

Indicador	Alfa de Cronbach	CR	AVE	Criterio de Fornell y Larcker					
Valor observado en el modelo	F1 = 0.83	F1 = 0.83	F1 = 0.61		F1	F2	F3	F4	F2
	F2 = 0.82	F2 = 0.82	F2 = 0.71	F1	0.620				
	F3 = 0.68	F3 = 0.70	F3 = 0.54	F2	0.193	0.705			
	F4 = 0. 73	F4 = 0.76	F4 = 0.52	F3	0.077	0.308	0.536		
	F5 = 0.84	F5 = 0.84	F5 = 0.64	F4	0.025	0.312	0.156	0.519	
				F5	0.047	0.059	0.155	0.076	0.639
Valor recomendado	> 0.70	> 0.70	> 0.50	Valores de la diagonal principal mayoro igual que cualquier valor del renglón o columna correspondiente.					

Fuente: Elaboración propia

Tabla 8. Intervalos de confianza de 95 % para la covarianza

Covarianza	Límite inferior	Límite superior
F1 ~~ F2	*0.22*	*0.61*
F1 ~~ F3	*0.05*	*0.50*
F1 ~~ F4	0.08	0.40
F1 ~~ F5	0.01	0.42
F2 ~~ F3	0.36	0.74
F2 ~~ F4	0.36	0.73
F2 ~~ F5	-0.02	0.40
F3 ~~ F4	0.17	0.61
F3 ~~ F5	0.18	0.60
F4 ~~ F5	0.03	0.51
Valor recomendado: límite superior < 1.0		

Fuente: Elaboración propia

Tabla 9. Valores del HTMT para el modelo AFC del SEM

	F1	F2	F3	F4	F5
F1	1.000				
F2	0.411	1.000			
F3	0.278	0.559	1.000		
F4	0.240	0.637	0.468	1.000	
F5	0.240	0.205	0.392	0.281	1.000
Valor recomendado: < 0.90 para los valores fuera de la diagonal principal.					

Fuente: Elaboración propia

Discussion of results

According to the results of Table 3, the p-value for each item is greater than 0.05, so there is not enough evidence to reject the H0 for each of these items. Therefore, it can be concluded that there is agreement between the judgments made by the experts and thus declare the content of the measurement instrument valid.

Table 4 shows the values of the indicators of the Bartlett sphericity test and the value of the KMO index. From these it is not possible to reject the null hypothesis that the variance-covariance matrix of the data in this sample is equal to the identity matrix with a significance level equal to 0.05, from which it follows that the covariance matrix of these data is different from the identity matrix; while the value of the KMO index equal to 0.73 falls in the category of meritorious referred by Aldás and Uriel (2017). According to the previous results, it is concluded that this sample is suitable for factor analysis.

The values observed in the table and the behavior of the residuals observed in Figure 2 allow us to assume that the fit of the model is adequate, when verifying compliance with the goodness of fit of the estimated model.

Table 6 shows that there are no correlations greater than unity, nor are there standardized factor loadings outside the interval [-1.1], and none of the estimated variances is negative. These results, together with the goodness of fit of the model, lead to the conclusion that the reasonableness of the model is adequate.

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The CR indicator values observed in table 7 exceed or equal the recommended value, while the Cronbach alpha indicator values exceed the recommended values, with the exception of the latent variable F3, whose value is close to the recommended value. In this situation, the measurement instrument is considered to satisfy the reliability criterion, since CR is a more robust criterion compared to Cronbach's alpha (Fornell and Larcker, 1981).

The AVE values shown in table 7 exceed the recommended values, which leads to establish that this measurement instrument meets the criterion of convergent validity.

The values of the three criteria to assess divergent validity in the measurement instrument, namely, Fornell and Larcker, confidence intervals for covariance and HTMT, shown in table 7, 8 and 9, respectively, exceed in the three cases the recommended values, so it is established that the instrument has divergent validity.

The validation of this instrument followed the procedure established in the covariance structure MES. The preliminary analysis of the validity and reliability carried out in the CFA suggests the need to eliminate a latent variable and an item from another of these variables in order to guarantee the convergent validity of the instrument, and once this elimination is carried out, it meets the characteristics of both convergent and discriminant validity and reliability.

In this case, as a consequence of the corresponding statistical analysis, the location of the university is the latent variable that is eliminated, since the calculated value of the AVE does not meet the minimum required value, which, from a statistical point of view, indicates that the factor loadings of the items considered do not present the necessary correlation to explain the observed variability, and the latter must be attributed to the error of the items, which leads to the interpretation that this latent variable does not have any specific weight for this group of students regarding what led them to choose the career and university in which they are.

Conclusions

From the results presented in the previous section, it is concluded that the measurement instrument has content validity, that the sample is adequate and that the CFA model is reasonable, reliable and valid. In short, it is concluded that the MI is valid and reliable, that is, it is adequate to measure the criteria that influence students to choose their

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university career. And given its level of reliability and validity, the data obtained through this instrument can be subjected to the hypothesis tests of the corresponding MES.

This implies that the latent variables Costs (F1), Infrastructure (F2); Image or prestige of the institution (F3), Services (F4) and Emotional (F5) satisfy the necessary condition for these to be considered as factors that influence the decision of students when choosing which career and which HEI to choose for their vocational training.

With the results of the evaluation of this instrument, and with the validation of the hypotheses raised about the relationships between these latent variables, public or private HEIs can propose strategies to minimize the dropout rate with programs aimed at reducing the weight or burden that have the external factors that make the student select the IES, the university program or career that does not correspond to their vocation or intrinsic interest and, therefore, decide to abandon this program, in addition to allowing them to generate marketing programs with the aim of increasing the enrollment.

Future Research Lines

- Posing and validating the hypotheses about the ways in which the five latent variables validated in this measurement instrument are related through the covariance structure MES. And for this, it is suggested to raise the second-order SEM.
- Evaluate this measurement instrument in different HEIs to verify its usefulness as a tool to validate the hypotheses raised about the relationship and the impact of the six latent variables (external factors), Costs, Location, Infrastructure, Image or prestige, Services and Emotional, on the decision that the student must make when deciding which career to select and in which HEI to take it.
- Develop a model that is useful to quantify the impact that these six external factors have on the decision that the student must make when deciding which career to select and in which HEI to pursue it, and in turn, measure or quantify the relationship that this has decision in relation to the variable school dropout in HEIs.

To use the covariance structure MES, it is necessary to verify that the data corresponding to the items follow a multivariate normal distribution, that they do not present collinearity and that the sample size is greater than the number of latent variables. Of these three conditions, in practice, and especially when the Likert scale is used in the instruments, the multivariate normal distribution condition is the most difficult to fulfill. However, there

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are estimation methods in which this condition is solved by taking an adequate sample size. In addition, non-parametric methods (robust and bootstrap methods) are available in which this normality is not required. Collinearity can be resolved through the appropriate design of the questions on the instrument. But it is impossible to carry out the analysis under the ES approach of covariance structure when the number of latent variables is greater than the sample size.

The model of structural equations with partial least squares is an alternative method to validate the measurement instruments and validate the hypotheses that are raised regarding the relationship between the latent variables. This model does not require compliance with the three assumptions established in the covariance structure MES, in addition to the fact that approximately 20% of the sample size required by the covariance structure MES is sufficient.

Given the above, it is proposed to carry out a new research work that undertakes the comparison between the results obtained when evaluating the instrument with the MES of covariance structure with those obtained by the partial least squares.

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