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Artículos científicos

Factors that influence the selection of a TecNM Campus: design and validation of a measurement instrument

Factores que influyen en la selección de un Campus del TecNM: diseño y validación de un instrumento de medida

Fatores que influenciam a seleção de um Campus TecNM: projeto e validação de um instrumento de medição

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Abstract

The paper presents the design and validation process of a measurement instrument (MI), developed to identify the factors that influence the selection of a bachelor program. The academic programs studied are offered by Tecnológico Nacional de México - TecNM, at the Ciudad Juárez, Chihuahua and Guaymas Sonora, Mexico campuses. The methodology of this study was developed in two stages, the first stage of the process is considered a preliminary version of the questionnaire with 16 items, which was tested and validated with data collected in the 2018 and 2019 enrollments. The second stage is the statistical analysis of the data and the results show that the Cronbach's coefficient values and the composite reliability values exceed the established critical values; Through confirmatory factor analysis, it is proved that the instrument also estimates the parameters identified in the literature and contained in the theoretical model of this work. The empirical results allow to conclude that the measurement instrument, in general terms, is valid and reliable for its use.

Keywords: Confirmatory Factor Analysis, Instrument of Measurement, School prestige, Validity and Reliability of IM.

Resumen

El trabajo presenta el proceso de diseño y validación de un instrumento de medición (MI), desarrollado para identificar los factores que influyen en la selección de un programa de licenciatura. Los programas académicos estudiados son ofrecidos por el Tecnológico Nacional de México - TecNM, en los campus de Ciudad Juárez, Chihuahua y Guaymas Sonora, México. La metodología de este estudio se desarrolló en dos etapas, la primera etapa del proceso se considera una versión preliminar del cuestionario con 16 ítems, el cual fue probado y validado con datos recolectados en las inscripciones de 2018 y 2019. La segunda etapa es el análisis estadístico de los datos y los resultados muestran que los valores del coeficiente de Cronbach y los valores de confiabilidad compuesta superan los valores críticos establecidos; Mediante análisis factorial confirmatorio, se comprueba que el instrumento también estima los parámetros identificados en la literatura y contenidos en el modelo teórico de este trabajo. Los resultados empíricos permiten concluir que el instrumento de medición, en términos generales, es válido y confiable para su uso.

Palabras clave: Análisis Factorial Confirmatorio, Instrumento de Medida, Prestigio Escolar, Validez y Confiabilidad de la MI.

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Resumo

O trabalho apresenta o processo de projeto e validação de um instrumento de medida (MI), desenvolvido para identificar os fatores que influenciam a escolha de um curso de graduação. Os programas acadêmicos estudados são oferecidos pelo Tecnológico Nacional de México - TecNM, nos campi Ciudad Juárez, Chihuahua e Guaymas Sonora, México. A metodologia deste estudo foi desenvolvida em duas etapas, a primeira etapa do processo é considerada uma versão preliminar do questionário com 16 itens, que foi testado e validado com dados coletados nos cadastros de 2018 e 2019. A segunda etapa é a análise Dados e resultados estatísticos mostram que os valores do coeficiente de Cronbach e os valores de confiabilidade composta superam os valores críticos estabelecidos; Por meio da análise fatorial confirmatória, verifica-se que o instrumento também estima os parâmetros identificados na literatura e contidos no modelo teórico deste trabalho. Os resultados empíricos permitem concluir que o instrumento de medida, em termos gerais, é válido e confiável para sua utilização.

Palavras-chave: Análise Fatorial Confirmatória, Instrumento de Medida, Prestígio Escolar, Validade e Confiabilidade do IM.

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Introduction

Seniors graduating from high school seeking the admittance to a Higher Education Institution (HEI's) face a complex decision regarding selecting a bachelor program and the HEI to attend (Lei y Chuang, 2010). Internal and external factors influence this decision (Beggs, Bantham, & Taylor, 2020; Sundarrajh & Zulkfili, 2019). The internal factors are those that intrinsically have to do with the vocation and interest of the student. In contrast, external factors, are all the elements of the environment that influence their choice of both career and HEI, among which are mentioned: family, friends, educational offer, career duration, safety, costs, professional myths, job opportunities (Canals 2013) (Uddin et al., 2018). Common practice supports this analysis. In high school, counselling offices help the seniors by determining their skills, capabilities, likes and dislikes, handicaps, delineating the admittance profile. In some cases, the process of selecting an HEI includes a search of occupational market demand and projections of income. Other environmental factors include the prestige of the HEI, costs, housing, and distance to home, among other factors.

The factors that influence the selection of the academic program and the HEI significantly impact the dropout of freshman (Nieves & Vivas, 2008; Ruiz, 2018; Saldaña & Barriga, 2020; Smulders, 2018; Vergara, 2017). Which is also crucial to HEI's because the student desertion is an indicator of the quality of the HEI's academic program, for which the accreditation boards measure it carefully; then, the HEI's have to commit to its reduction. Accreditation boards also study the trends because they indicate the HEI's improvement efforts. Which explains the need to identify the factors influencing the academic program's selection and knowing those factors and the HEI's can develop measures to increase enrollment and improve education quality.

Guijosa (2018) reports that more than 100,000 high school's graduates have been surveying to identify these factors, determining the seven key reasons that intervene in the students' decision, being them, affordability, availability of the desired program, reputation of the university / academic quality, job opportunities upon graduation, the value of education for the investment, social pressure (sense of belonging), closeness to home. It is a common marketing practice that on their websites HEI's discuss the relative advantages of their program and the differentiation characteristics for the positioning of their educative offer.

Our affiliation schools are concerned about this issue because their industrial engineering programs are accredited by the corresponding boards and regarded as high-quality programs. We are committed to improving quality, therefore, the objective of this study was to design an instrument for the identification and determination of the relative impact of the factors that influence students' preferences towards the selection of an academic program on campus.

Literature review

As mentioned, the academic program selection requires identify the most critical factors, and know how much effect they have on that selection. According to Lei and Chuang (2010), there are different types of factors, among which stand out: academics and non-academic. The first is subdivided into institutional, departmental/program, and faculty factors, and the second is subdivided into personal reasons and influence of other people. Related to institutional factors there are variables like infrastructure, location, image and prestige (Budur, Abdullah, and Poturak, 2018). In this sense, Alzayed and Miller (2021) reported that the factors with the greatest influence on the selection of an engineering program are, between others, state residency. While Suppramaniam, Kularajasingam and Sharmin (2019) examinated factors as school popularity, school quality that have influence om the parents' decision in selecting private schools in Chittagong city, Bangladesh. Also, Echchabi and Al-Hajri (2018) found that the main factor for

university selection is the university reputation, followed by completion time, academic quality, as well as the academic staff qualifications. These findings have significant contributions, particularly, it provides the universities with insights on the main dimensions and characteristics to emphasize in order to enhance their overall performance. Also, Manoku (2015) found several factors: Reputation of the institution, quality and location, between others

The study of reports diverse factors that have effect in school selection, mainly economic, university related, personal factors, and social factors influence student's choice of university respectively (Jafari and Aliesmaili, 2013). In the same way Marjanović and Pavlović (2018) found influence in selection school by academic, economic, socio-cultural and personal factors. The mainly variables reported in this study are location, admission process, staff, and physical environment. Also, Nuseir and El Refae (2021) found that factors such as the academic reputation, grants and funding, location and proximity, facilities and services, have an important effect on students' univirsity choice.

The studies related to the selection of university or academic program found in the literature reported in recent years show, despite the economic, cultural and social difference of the cities where said studies were carried out, that the critical factors are concentrated in the infrastructure, the location, the quality of the educational program of interest and the prestige of the university, as well as personal and economic factors.

Methodology

The validation of the Measurement Instrument quality –MI (Table 6) is carried out through a three stages process. Stage one is the assessment of the validity of the content (Rodríguez et al., 2021). In step two, an exploratory analysis of the data followed by factor analysis; in step three, the confirmatory factor analysis is performed (García et al., 2021). This section begins with the questionnaire, followed by the sampling process, which precedes the validation, ends with the data analyses.

In step one based on the theory the IM was designed (Canals Cifuentes, 2013; Ruiz Palacios, 2018; Vergara, 2017), although, given that the problem seems to be highly empirical, the review of literature be simplified, finding a relatively low number of reported factors, specifically sixteen. The complexity resides not on an ample theory, but on the individual impact of the student's preference, which is questioned on the instrument of measure (Appendix 1) and explained by six latent variables, see Table 1.

Regarding the sampling process, the questionnaire is applied for its validation at the Technological Institute of Ciudad Juarez (ITCJ) and at the Technological Institute of Guaymas (ITG), with the non-probability sampling technique known as Convenience Sampling, because of its advantages, lowest time consumption and integration of the sample of suitable elements, the respondents are selected because they are in the right place, at the right time, grouped. But caution must be exercised when interpreting the results (Malhotra, 2008). Confidentiality in the use of the information was guaranteed so that students voluntarily participated and provided reliable data.

The analysis was made with Structural Equation Models (SEM) technique because it is a useful tool when there is a need to use multiple constructs or observed variables to explain interest phenomena since it allows structuring and to analyze more advanced and complex theoretical models. Using specialized software to analyze these models (Schumacker & Lomax, 2010), using the free access software R. The Structural Equiation Modeling method has been applied in several fields in the search for predictors of effectiveness, for example, in organizational resilience (Noriega et al., 2019), competitive intelligence (Poblano et al., 2019), Total Productive Maintenance (Hernández et al., 2018), organizational philosophy (Dávila et al., 2017), between others. For the validation of the MI, a linear model is constructed with six latent factors or variables, which explain sixteen measurable variables or items, as Table 1 presents.

Table 1. Factors and Variables for the School Selection

Factor (or Latent Variable)	Variables (or items)
Location (F1)	UB02, UB03
Costs (F2)	EC01, EC02, EC03
Infrastructure (F3)	IN01, IN02
School Prestige (F4)	IM01, IM02, IM03
Services (F5)	SE01, SE02,SE03
Others (F6)	EM01, EM02, EM03

Source: Self made

The validation of the questionnaire contents is carried out in two stages, in the first one it is submitted to the validation by a group of four experts with four variables: sufficiency, relevance, clarity and coherence (Escobar-Perez and Cuervo Martínez, 2008), and once their judgment has been made, the degree of agreement between them is established (Abdi, 2007; Kendall & Smith, 1939) by the Kendall coefficient or the Friedman test for each of the four variables to test following hypotheses:

H_0: There are no significant differences among the experts' responses in the degree of sufficiency of the questionnaire.

H_1: There are significant differences among the experts' responses to the questionnaire's degree of sufficiency.

Regarding the other three variables, relevance, clarity and coherence, analogous hypotheses are established with a significance level of 5% using non-parametric analysis as an alternative to a bidirectional analysis of variance. The analyses were made using the Minitab17 statistical package. Once validated by the experts, the IM was applied to a sample of forty new students from the school.

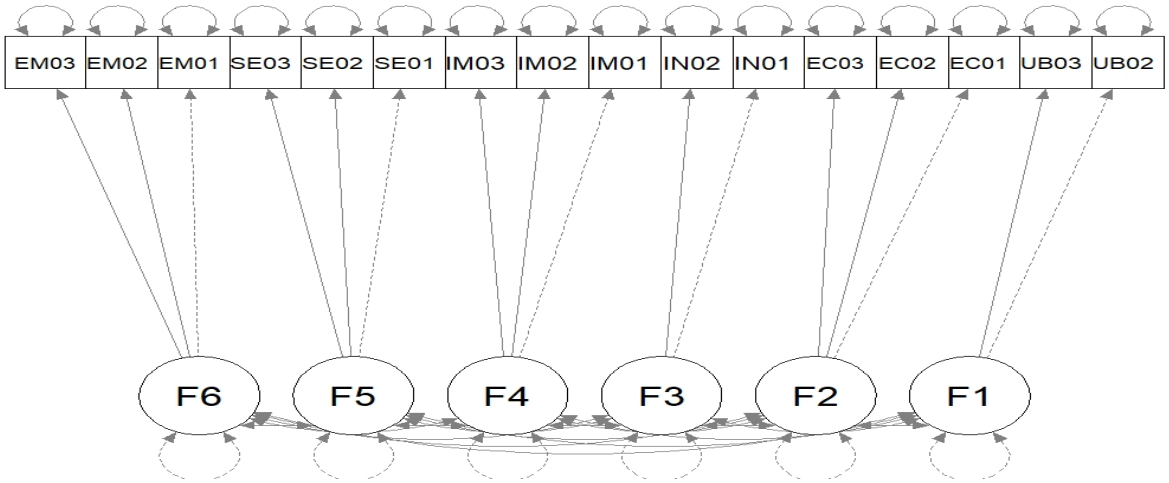
Next, in stage two, an Exploratory Data Analysis is made, two samples of seventy newly recruited students are taken, one from the ITCJ, representing 30% of the new enrollments population, and the other from the ITG (45% of the target population). They are analyzed independently to determine if they are suitable for factor analysis. The presence of outliers and the correlation of the measurable variables or sampling adequacy are determined individually and in groups. The detection of the values to be considered candidates for outliers is performed by comparing the magnitude of the Malahanobis Distance for each of the sixteen measurable variables, against the critical value corresponding to the Chi-square Distribution with sixteen degrees of freedom with a 0.975 confidence level.

The decision to declare it as an "actual" outlier is made by deleting these records from the database, then the analysis is performed with this reduced database, if the results of this analysis differ from the results obtained with the complete database, then these values are considered outliers. Otherwise, it is declared an extreme value of these values' probability distribution (Aldás & Uriel, 2017). Additionally, these candidates are compared against the aforementioned critical value, but now with a confidence level equal to 0.99, to determine whether these candidate values, -to be declared critical-, fall within the 99% variation range of this random variable corroborate them as extreme data.

Sample size validation, of both databases used in this work, was carried out proposing a null hypothesis and probe using Bartlett's sphericity test with a 5% significance level. This establishes that the matrix correlation of each data base equals the identity matrix. Next, the assumption that the variable correlations are null was done using the KMO (Kaiser Meyer Olkin) Index; finally, the proof that the partial correlations of each variable or item are valid was done

using the MSA (Measure of Sampling Adequacy) measure. These analyzes are carried out using the statistical package R.

Figure 1: Linear Model, Factors and Variable



Source: Self made

In stage three, confirmatory factor analysis is performed to test the null hypothesis that the sample covariance variance matrix (for the student samples taken from schools), is equal to the estimated covariance of the proposed model with a significance level equal to 0.05, using the Maximum Likelihood method, for which the Lavaan function of the statistical package R is used. Figure 1 shows graphically the linear model explaining the sixteen items by the six established latent factors or variables. The code can be seen in the questionnaire given in the Appendix.

The latent factors or variables are the Location (F1), measured with UBO2 and UBO3; Costs (F2), given by EC01, EC02, EC03; Infrastructure (F3), INO1 and INO2; School prestige (F4), measured with IM01, IM02, IM03; Services (F5), measured with SEO1, SEO2 and SEO3; and Others, (F6), EM01, EMO2 and EMO3. The measurement instrument –MI- is validated by analyzing three properties, reasonability, compatibility of the estimated parameters and reliability, as recommended by Aldás & Uriel (2017), and validity of the model.

The MI Reasonability is analyzed by testing the null hypothesis previously stated with the chi-square probability distribution with a significance level of 5%, and the chi-square ratio divided by the number of degrees of freedom, also are considered the Mean Root of the Standardized Residuals (SRMR), the Root of the Square of the Error of Approach (RMSEA), the Tucker-Lewis Index (TLI) and the Comparative Adjustment Index (CFI). The estimated parameters can be compatible with those of the statistical model, under the condition that there

are no correlations with a value greater than one, that the absolute value of the factorial loads is less than or equal to 1, that the standard errors are not abnormally large, there are no negative estimates of variance and that all estimated parameters are significant. To determine the MI reliability, Cronbach's Alpha coefficient and the compound reliability Index (CR) were used. The validity of the MI is determined by analyzing the validity of the content, as was commented. In contrast, the convergent validity is estimated by the indicator Extracted Average Variance (AVE) and the discriminant validity with confidence intervals to estimate the correlation coefficient with limits of plus or minus twice the standard error.

Results

The group of four experts considered the MI acceptable given levels of sufficiency, relevance, clarity and coherence as Table 2 presents.

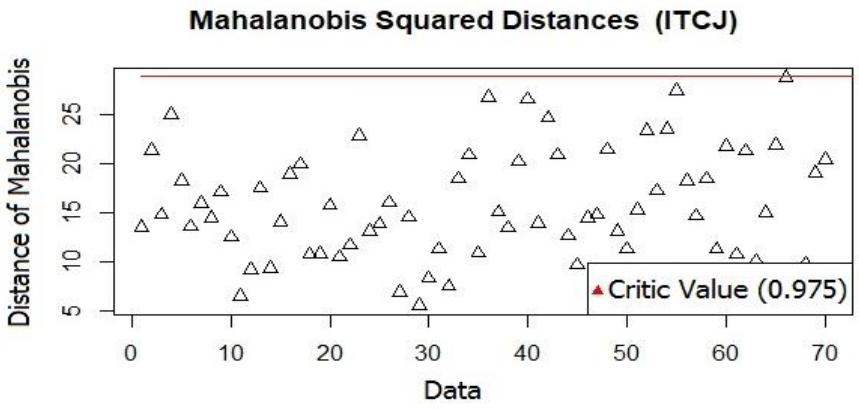
Table 2. Friedman Test Results

	Sufficiency	Relevance	Clarity	Coherence
S Statistic	2.61	1.28	0.27	5.16
DF	3	3	3	3
P value	0.457 *	0.734 *	.0966 *	0.160 *

Source: Self made

The degree of agreement between them is verified by the Friedman test for each of the four items. The results of the verification of the hypotheses are sufficient, relevant, clear and coherent, as presented in Table 2. The p-value for each is greater than 0.05, so there is no enough evidence to reject H_0 for the four items. Therefore, it can be concluded that there is an acceptable agreement between the experts' judgments.

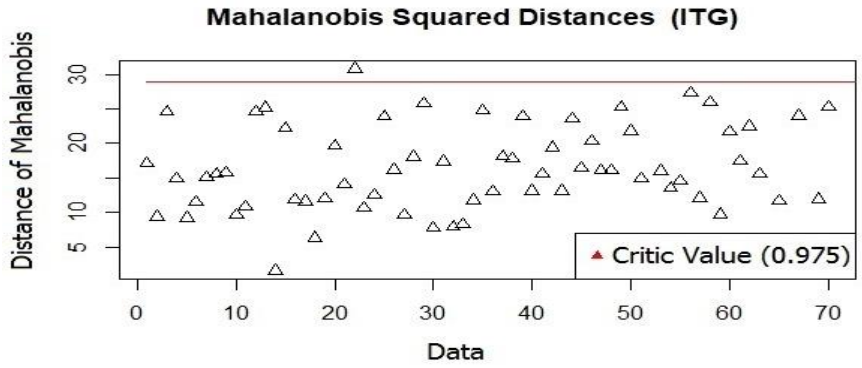
Figure 2. Mahalanobis Squared Distances – ITCJ



Soruce: Self made

Figure 2 shows the Mahalanobis Distance graph, where values for each of the 70 data that correspond to the sample of the students from one of the schools –ITCJ. With a confidence of 97.5%, that none of these values, it is an outlier.

Figure 3. Mahalanobis Squared Distances - ITG



Source: Self made

Figure 3 shows the Mahalanobis Distances graph for the 70 values that correspond to the sample of students at the other school – ITG, where it can be observed, there is only one outlier, considering a 97.5% confidence. This value is removed from the original database and the corresponding analysis is performed for the original database and the reduced database when comparing their results, no differences higher than two tenths in the values are observed, so the presumed outlier is regarded as an extreme data, so the original database is preserved for the next steps or stages. The Mahalanobis distance value corresponding to this point does not exceed the critical value of a 99% significance level, which reinforces the assumption that this is an extreme value that does belong to this probability distribution.

Table 3. KMO and Bartlett's Sphericity Tests

Test	ITCJ	ITG
KMO test for sampling adequateness	0.794	0.789
Bartlett Sphericity, Chi-Square	472.439	534.598
Approx.	120	120
Freedom Degrees	0.000	0.000
Significance		

Source: Self made

Table 3 shows the mean KMO values (Kaiser Meyer Olkin test). The Bartlett's sphericity test results for the data of the two samples of size 70 of newcomers from the two schools - ITCJ and ITG (Table 7 & 8 of appendix 2). It can be seen that the data of both samples are adequate, since the KMO value, in both cases, is greater than 0.70, and also, that there is the necessary correlation between the variables to perform a Factor Analysis, given that the p-value of the Bartlett Sphericity test is less than 0.05, Levy et al. (2003).

The confirmatory factor analysis results are carried out with the Lavaan function of the R software; for the data corresponding to the samples of 70 students are shown in Table 4-5. The comments made on the values of the indicators include both the results observed in the schools. The chi-square test does not show sufficient evidence to establish a significance level of 5%, as valid the equality between the variance-covariance matrix of the sample with the variance-covariance matrix of the model. However, the chi-square statistic value divided by the number of degrees of freedom is equal to 1,378 and 1,299 to both samples, and they are below the critical value for this criterion.

Table 4. Results of Confirmatory Analysis (software R)

	ITCJ	ITG
Model's Chi Square	119.933	115.625
Degrees of Freedom	87	86
P-Value	0.011	0.018
Model's Chi Square / Degrees of Freedom	1.378	1.299
RMSEA	0.074	0.071
SRMR	0.087	0.075
TLI	0.866	0.937
CFI	0.917	0.911
¿Correlations > 1?	NO	NO
¿Absolute Value of Factorial Loads >1?	NO	NO
¿Abnormally Large or Small Standard Error?	NO	NO
¿Are there Negative Estimations of the Variances?	NO	NO
¿Are Significant all the Regression Coefficients?	YES	YES

Source: Self made

Table 5. Results of Confirmatory Analysis (software R)

	ITCJ		ITG	
Cronbach Alpha	0.8784		0.8877	
Composed Reliability (CR):				
FACTOR 1	0.6843		0.8198	
FACTOR 2	0.7591		0.7898	
FACTOR 3	0.7576		0.6224	
FACTOR 4	0.7941		0.7073	
FACTOR 5	0.7507		0.7963	
FACTOR 6	0.759		0.8463	
Convergent Validity (AVE):				
FACTOR 1	0.5211		0.6954	
FACTOR 2	0.5160		0.5585	
FACTOR 3	0.6103		0.4626	
FACTOR 4	0.5810		0.5810	
FACTOR 5	0.5049		0.5655	
FACTOR 6	0.5162		0.6548	
Discriminant Validity (test for confidence interval)				
FACTOR 1				
FACTOR 2	[0.268,	0.800]	[0.755,	0.991]
FACTOR 3	[0.194,	0.750]	[0.30,	0.824]
FACTOR 4	[0.187,	0.739]	[0.163,	0.739]
FACTOR 5	[-0.049,	0.575]	[0.509,	0.877]
FACTOR 6	[0.441,	0.909]	[0.156,	0.628]
FACTOR 2				
FACTOR 3	[0.536,	0.936]	[0.424,	0.924]
FACTOR 4	[0.041,	0.597]	[0.045,	0.665]
FACTOR 5	[0.279,	0.771]	[0.378,	0.814]
FACTOR 6	[0.024,	0.556]	[0.321,	0.745]
FACTOR 3				
FACTOR 4	[0.130,	0.658]	[0.415,	0.991]
FACTOR 5	[0.294,	0.778]	[0.097,	0.689]
FACTOR 6	[0.122,	0.658]	[0.004,	0.576]
FACTOR 4				
FACTOR 5	[0.579,	0.935]	[0.242,	0.806]
FACTOR 6	[0.040,	0.596]	[0.247,	0.771]
FACTOR 5				
FACTOR 6	[0.039,	0.607]	[0.038,	0.558]

Source: Self made

In Table 4 the values of the CFI, TLI, RMSEA, SRMR indicators meet the established criteria, along with the fact that there are no correlations greater than one, there are no absolute values of the factor loads greater than one, and all are significant. Regarding the regression

coefficients, there are no variances with negative values. Therefore, it is concluded that MI is reasonable and that the estimated parameters are compatible with the theoretical model. Also, the MI is reliable, since the Cronbach coefficient values and the values of compound reliability exceed the critical values established. The model is regarded as valid, given the convergent and discriminant validities (Table 5).

Therefore, it is concluded that MI is reasonable and that the estimated parameters are compatible with the theoretical model. Also, the MI is reliable, since the Cronbach coefficient values and the values of compound reliability exceed the critical values established. The model is regarded as valid given the convergent and discriminant validities.

Conclusions and Recommendations

With the results obtained, the objective proposed in this study was reached, so an MI was designed and validated with the factors that influence Mid-High school graduates in the selection of an academic program at the undergraduate level. The identified factors are 5 and are composed of 16 variables, being the factors that influence the selection of the school are 1) Location, 2) Costs, 3) Infrastructure, 4) Prestige of the school and 5) Services. These factors were extracted from a review of the literature and validated from the opinion of experts on the subject, based on the hypothesis raised.

The statistical analysis shows that there is no significant difference between the opinion of the experts regarding the factors studied, therefore, the null hypothesis is not rejected, this means that the factors are precise and can be used to determine which ones affect specific programs.

The results of the confirmatory factor analysis - CFA allow us to conclude that the measurement instrument is valid, adequate to collect the necessary data for the construction of a model of structural equations, according to the set of latent and explained measurable variables.

The next step in the research is to aply the measurement instrument to build the structural equation model that identifies the relative weights of the most critical factors for the selection of the TecNM Campus (Cd. Juarez and / or Guaymas), so that the Principal Authority can develop measures to increase enrollment as well as build the structural equation model with a larger sample size.

Final Remarks

The results obtained are valuable and could be used for future research since the valid and reliable instrument would be used to identify the relative weight of the most critical factors for the selection of a TecNM Campus, so that the Main Authority can develop measures to increase enrollment, as well as a possible line of research, achieve greater retention of students in the first year.

Although the main limitation of the study is the size of the sample, several aspects indicate that the study is still valid. These include:

- Internal consistency - Cronbach's alpha of 0.879 and 0.887, greater than 0.70
- KMO of 0.794 and 0.789, higher than the recommended of .70;
- Compliance with cases of convergent validity and discriminant validity;
- Compliance with the model adjustment criteria (RMSEA, TLI and CFI).

This work constitutes evidence that SEM is a powerful tool, from the validation of a measurement instrument, the determination of total or partial, direct or indirect effects between a measurable variable and a latent variable, as well as the effects between variables or constructs latent. Also, the empirical results obtained suggest that SEM applications in the TecNM are a feasible way for the decision-making based on obtaining data in problems with multifactorial characteristics.

Future Research Line

The good results obtained from the validation and reliability of the instrument, future research will focus on the application of the measurement instrument to a larger sample and based on the analysis of the information, the TecNM campus will be able to propose strategies to minimize the dropout rate, and also implement programs aimed at reducing the weight or burden of external factors that make the student not select the TecNM campus (García et al., 2021), and therefore, will allow them to carry out strategies and work programs with the aim of increase their tuition/enrollment .

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Appendix 1

Questionnaire

The Education Board of the *Tecnológico* needs information regarding the factors you considered in the process of analysis-decision making for the selection of this school. We consider as extremely important the knowledge of the factors so we can improve and offer our students better services, please provide us with it, truthfully.

Indicate the relative importance of the factors listed in the left column. Read the list, select the most important one, in case there are factors with equal or similar level of importance, indicate them in the most important level of the right column, labeled MOST IMPORTANT, using a clear **X**; then, select the factor or factors with a lesser degree of importance, indicate their importance in the level HIGH, of the 5th column, and so on…thank you in advance.

Table 6.- Questionnaire – 16 ítems

Factor		Relative Level of Importance				
		Non Important	Low Importance	Regular Importance	High Importance	Most Important
The Institute Image	IM01					
The Prestige of the Academic Program	IM02					
The Academic Development (Profile) obtained	IM03					
The Physical Infrastructure	IN01					
The Laboratories and Shops	IN02					
The Libraries and Information Centers	SE01					
The Parking Lot	SE02					
The Cafe and Food Shops	SE03					
The Roads, Busses, ways to get to school	UB02					
The Security of the Neighborhood	UB03					
The Enrollment Costs and Fees	EC01					
The Costs Associated to Get to the School (Bus, Gas)	ECO2					
The Costs of Books, Materials (Labs, Experiments)	ECO3					
The Recommendation (Friends-Relatives-Others)	EMO1					
A Relative is or has Graduated from this School	EM02					
A Friend is or has Graduated from this School	EM03					

Source: Self made

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Appendix 2

Table 7.- ITCJ - Variance -covariance Matrix (n = 70) *

	UB02	UB03	EC01	EC02	EC03	IN01	IN02	IM01	IM02	IM03	SE01	SE02	SE03	EM01	EM02	EM03
UB02	0.6467															
UB03	0.3716	0.7978														
EC01	0.1882	0.3302	0.9339													
EC02	0.1533	0.1712	0.4833	0.7039												
EC03	0.3237	0.2539	0.5465	0.3763	1.2784											
IN01	0.3406	0.2961	0.5392	0.4022	0.7788	1.2998										
IN02	0.2349	0.2018	0.4649	0.3365	0.5988	0.7655	1.2141									
IM01	0.2986	0.1443	0.1600	0.1157	0.2657	0.3271	0.4729	1.6614								
IM02	0.3631	0.2635	0.1473	0.1798	0.2053	0.2447	0.3247	0.8986	1.1978							
IM03	0.2398	0.1194	0.3184	0.2173	0.5061	0.4153	0.3867	0.6500	0.5480	1.0378						
SE01	0.1020	0.0633	0.1020	0.1694	0.2673	0.0612	0.2898	0.6571	0.5918	0.5653	1.1755					
SE02	0.0506	0.1147	0.3192	0.2351	0.3902	0.4527	0.4269	0.6257	0.6404	0.4653	0.5612	1.2441				
SE03	0.1498	0.3380	0.4555	0.3502	0.4318	0.5539	0.5196	0.4057	0.3722	0.4020	0.4082	0.7567	1.2049			
EM01	0.1857	0.4571	0.1429	0.1571	0.1714	0.2857	0.2714	-0.0857	0.2000	0.0143	0.1857	0.0000	0.2571	1.3714		
EM02	0.3576	0.5669	0.1890	0.1424	0.1363	0.4208	0.2465	0.3886	0.4984	0.2959	0.4265	0.2580	0.4473	0.8571	1.6196	
EM03	0.0712	0.3451	0.2984	0.1716	0.1604	0.2467	0.2696	0.0557	0.1508	0.0806	0.2939	0.0853	0.3763	0.7429	0.6902	1.4263
Mean	3.843	3.729	2.743	3.157	2.514	2.986	2.586	2.900	3.129	3.071	3.286	2.686	2.771	3.000	2.457	2.271
StDev	0.810	0.900	0.973	0.845	1.139	1.148	1.110	1.298	1.102	1.026	1.092	1.123	1.106	1.180	1.282	1.203

Source: Self made

Table 8.- ITG - Variance -covariance Matrix (n = 70) *

	IM01	IM02	IM03	IN01	IN02	SE01	SE02	SE03	UB02	UB03	EC01	EC02	EC03	EM01	EM02	EM03
IM01	0.5684															
IM02	0.2388	0.5355														
IM03	0.0806	0.2580	0.6467													
IN01	0.2276	0.1910	0.2288	0.7120												
IN02	0.1061	0.2339	0.2645	0.2906	0.6620											
SE01	0.1592	0.1122	0.1653	0.1673	0.1531	0.4939										
SE02	0.1429	0.1571	0.1429	0.1286	0.0571	0.3429	0.6571									
SE03	0.0714	0.1543	0.1400	0.1743	0.1457	0.2571	0.3857	0.6171								
UB02	0.1000	0.1857	0.1571	0.3143	0.1286	0.2143	0.3143	0.3000	0.7143							
UB03	0.1388	0.1269	0.1208	0.2996	0.0567	0.2694	0.2714	0.2914	0.4571	0.6441						
EC01	0.1122	0.0706	0.0747	0.3641	0.0784	0.2347	0.1286	0.2314	0.3143	0.4792	0.7682					
EC02	0.1224	0.0576	0.1984	0.3322	0.1608	0.3327	0.2714	0.3629	0.4714	0.5176	0.5445	0.8849				
EC03	0.1724	0.0518	0.1284	0.3308	0.1094	0.1898	0.1429	0.0686	0.3000	0.3433	0.3216	0.3963	0.6549			
EM01	0.1112	0.1645	0.2206	0.2161	0.1661	0.0592	0.0286	0.1171	0.0857	0.0731	0.2151	0.1996	0.1982	0.6712		
EM02	0.1469	0.1331	0.3392	0.1976	0.0118	0.1306	0.1429	0.1486	0.2429	0.2359	0.2894	0.3482	0.3167	0.4669	0.9869	
EM03	0.1449	0.1180	0.2424	0.2188	0.0045	0.1796	0.2571	0.1657	0.2857	0.2722	0.2861	0.3641	0.2955	0.3392	0.7192	0.8196
Mean	2.7857	3.5143	3.4429	3.1286	3.6286	3.1429	3.0000	3.2000	3.0000	3.1143	3.0571	2.9714	2.8714	2.9857	2.6857	2.7429
StDev	0.7593	0.7371	0.8100	0.8499	0.8195	0.7078	0.8165	0.7913	0.8513	0.8083	0.8828	0.9475	0.8151	0.8252	1.0006	0.9118

Source: Self made

*for SPSS and AMOS purposes.

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