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Influencing Factors in the Perception of Private Higher Education: A case study in Monterrey, México

Elías Alvarado Lagunas, Jeyle Ortiz Rodríguez, Mario César Dávila Aguirre

Abstract— **This paper presents an analysis of perceived quality in a higher educational institution in Mexico. To conduct the study, a semi-structured interview applied offsite from the institution is done. With the information gathered structural equation model (SEM) that helps explain how students rank their perceptions of the quality of various components offered by this. Among the main findings is that students give more weight to the modern facilities and technology innovation in the classroom, as well as national and international conventions or agreements they have with other universities worldwide.**

Index Terms—**Quality, Perception, Structural Equation Method, Private higher education.**

I. Introduction

Nowadays having a university degree or even better a postgraduate is of great relevance to compete in an increasingly strong and competitive labor market. Knowing this context, the higher educational institutes through diverse programs, infrastructures and educational models, contribute to the vocational training capable of analyzing and contribute improvements to the society.

At higher educational institutions – whether public or private – not only the information is received, but they are a place in which are develop capacities and learn schemed evaluative judgments by the ones who hold the symbolic and moral power. In this sense, the education is now a necessity proclaimed by society, since through this, the labor market demands skilled labor, which contributes to the creation of a more stable and integrated social base to the country (Scanlon, 1984).

In the case of the private higher education in Mexico there is historical data that the Secretaría de Educación Pública (SEP) shows, where it is appreciated that the tuition fees of students in private universities at higher studies as the percentage of the total (public and private) has had a growing tendency since school year 1970-1971 (13.96%) until 2000-2001 (32.12%), with a slightly fall for the year 2010-2011 (31.62%). This means, almost the 32% of the university students are attended by private universities, which highlights the importance of these institutions in the national educational offer.

The most recognized private higher educational institution over 80 years in Mexico is the Instituto Tecnológico de Estudios Superiores de Monterrey (TEC), this educational institution has been the economic, social and cultural development driving in some states of Mexico, such as Nuevo León. In this state the TEC has driven the progress of the Nuevo León families, with the strength of peace, innovation, and a safe support in terms of social aspect. Undoubtedly, at the TEC is appreciated that the higher educational level tends to have not only a national but global growth, besides an important diversification of the educational offer process.[1]

For this reason, the purpose of this work consists in analyzing the perception students have about the educational quality and the services received from a private institution of such prestigious recognition. Similarly, it is pretended to know, which are the factors students appreciate or value the most from educational institution? From this question, in this study is analyzed the perception students have about the quality of the educational services received in the TEC. The "quality" dimension is related in this work through four factors: a) the physical infrastructure, b) the teaching/learning process carried out by the teachers, c) the ability to transmit the knowledge, and d) the integral development of academical programs promoted to the students.

Elías Alvarado Lagunas, Facultad de Contaduría Pública y Administración, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, México, e-mail: eliaxalvarado@gmail.com
Jeyle Ortiz Rodríguez, University of Texas in Arlington, United States of America.
Mario César Dávila Aguirre, Facultad de Contaduría Pública y Administración, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, México.

[1] TEC is a private higher education institution with main headquarters in Monterrey's Metropolitan Area, although it has diverse campus on the main cities of the country. TEC is one of the higher education institutions with academical recognition in Latin America with the most active and characteristic academical presence in the business, innovation and technological areas. In national level the TEC has with almost 100 students enrolled, from which little more than 20 thousand studies in the installations of Monterrey's Metropolitan Area. 12 thousand in the professional level, 3 thousand in postgraduate and 5 thousand in high school. Regard to the faculty, in the TEC work almost 9 thousand professors at national level, from which 248 are members of the Sistema Nacional de Investigadores. In Monterrey's Metropolitan Area, the TEC has a campus, 5 high schools and 2 graduate schools (Figures extracted from the official page: www.itesm.mx).

II. Literature review

The theoretical discussion about the educational systems quality is a topic that has have diverse theoretic-methodological debates, since there are many theoretical ways that can argue or support the different ways of measure the quality and efficiency of the education. Exists a great study diversity that tries to explain this phenomenon. The theoretical base about measuring the quality of a service is linked to the classic works of Grönroos (1982-1984) and Parasuraman, Zeithalm and Berry (1985-1988). These authors consider that the nature of how to define and measure the quality term in any service is not an easy job, since one of the principal criticisms comes from the intangible nature of these. The authors argued that the definition and measurement of this term can be addressed from an objective and subjective approach, using more the last one, this is because speaking of perceived quality of any product or service is really obtaining those value judgments individuals give to the object to study.

In an international context it has a wide variety of studies that deal with this phenomenon of study. The classic examples are the researches of Casanueva, Perianez and Rufino (1997), Joseph and Joseph (1997), LeBlanc and Nguyen (1997) and Kwan and Ng (1999), which investigates the quality perceived by the students of such items as: facilities, technological innovation and care services. These authors also studied the relationship between students and teachers, arguing that this aspect is fundamental in the personal and professional development of students.

On the other hand, case studies as Astin (1985), George (1982), Gimenez (2000) and Marzo et al. (2005) stress, within the concept of perceived quality by the university community, six categories in the services offered by the universities: 1) quality such as reputation, 2) quality by availability of resources, 3) quality through the results, 4) quality of the content, 5) quality as value added and 6) plant well-trained teacher.

In the case of Mexico, specifically in the state of Nuevo León, there are few the quantitative studies that address the issue about the perceived quality regarding the service of higher education. Hence the interest to make a contribution to the research on those topics. To mention some there are the works of Alvarado et al. (2015), De Garay (1998), Jimenez et al. (2011), Morales (2010), Silas (2012), Torres and Arras (2011) and Vera et al. (2010). In general, these authors used in their studies a non-probability sampling, and through different statistical techniques (factorial analysis, analysis of variance, descriptive, regression, and structural equations) doing their assessments in relation to the professor's performance, attitude and behavior, powers of the administrative, facilities, research and technology investments, integral development by the teacher to the students, etc. Researchers agree that students have a pragmatic view and slightly idealized in relation to the uses and benefits of higher education. Claiming that the students have built a utilitarian image of higher studies where factors such as reputation and projected image of their study centers are considered relevant.

In this sense, in the state of Nuevo Leon, the studies about the perception students have regarding the service provided by the private universities are still rare. Hence the interest of making a contribution to research in these topics. In this case, it is used a structural equation model (MES), which will enable us to identify and integrate the way in which the students at private universities build their perceptions about the quality of the different services that these universities are able to provide.

III. Data

In order to determine the characterization and students perception, a semi structured questionnaire was designed, applying the technique of direct interview with the students that form the region of study, during the second quarter of 2012. There was a non-probabilistic sampling that combines quota sampling and the casual or incidental.[2] We obtained a total of 594 complete surveys off-site TEC. The questionnaire applied is composed of 40 questions organized in two blocks following the structure of the survey developed by Mancebon and Perez (2007)[3]: in the first block refers to the general characteristics of the student, such as gender, age, current semester, carrier, income of the head of household, number of family's members, etc. In the second block is inquired about the perception regarding the quality of educational services, such as the reasons why it was decided to study at the educational institution, the services that demand, the qualities, and constraints of the teaching staff and infrastructure, the relevance of the programs of study, etc.

To measure the quality of education received by students through their perception of the different characteristics or attributes of the educational institution, it is applied the Likert scale to each of the 22 items of the second section of the questionnaire. The Likert scale has a valuation of 1-5, 1 = totally agree, 2 = disagree, 3 = I'm not neither agree nor disagree, 4 = disagree, 5 = strongly disagree (in the annex is detailed the full redaction of the questions about quality and the name assigned to each variable for the present work).

[2] The casual or incidental sampling is based on the fact that the researcher selects directly and intentionally to the individuals in the population who will be interviewed. On the other hand, the quota sampling is to facilitate the interviewer the profile of the people who will have to interview, leaving his approach the choice of the same, always and when covering the desired profile. In our case, the target are all the students who were at the time, place and Off-site TEC during the fieldwork. Likewise, it was given all the facility to the interviewer to interview the students with this profile but it was his approach to the selection of the individual to be interviewed. We used this type of sampling for budgetary reasons

[3] It was chosen to follow the questionnaire of Mancebon and Perez (2007) due to the fact that, unlike other studies, this contains a small number of questions with answers categorized, allowing better capture students' perception of 22 characteristics or attributes of the quality of education received. The complete questionnaire is included in the appendix of Mancebon and Perez (2007).

IV. ANALYSIS OF THE SAMPLE

Table 1 shows the general characteristics of the students interviewed. It is noted that the interviews were almost evenly between men and women, the majority of students surveyed reported having between 18 and 24 years of age. Most of these young people argued belong to the middle class and noted that their parents have a college degree. Likewise, the majority of these young people noted that chose the TEC by the best level of the academic program, relative to other private universities. Similarly, it is noted that the majority of the students work and study (78.5 %).

Table 2 shows the descriptive statistics of the questions that seek to measure the various attributes regarding the quality of education received by students. In a general way, it is appreciated that the items are best evaluated within the dimension of facilities and the knowledge and compliance of the teachers who give professorship. It is noteworthy that the attribute best evaluated was the good condition of its *facilities* while the worst evaluated was the organization of *extracurricular* activities (conferences, visits to companies and museums, etc.).

Table 2
Questions about the quality perception

Variables	TEC	
	Average	Standard Deviation
Installations	1.91	.945
Equipment	2.05	.932
Materials	2.09	.921
Air conditioner	1.98	1.006
Lighting	1.95	.889
Library	2.34	1.090
Guarantee	2.10	.931
Promises	2.12	.982
Program	2.06	.903
Mistakes	2.25	.985
Knowledge	1.94	.891
Explanation	2.03	.870
Updated content	2.07	.919
Theory and practice	2.11	.913
Mean	2.03	.910
Disposition	2.00	.916
Formation	2.06	.936
Extracurricular	2.36	1.119
Necessity	2.32	.969
Promotion of interest	2.07	.898
Teaching	2.03	.887
Orientation	2.02	.919

Source: Self prepared base on survey data.

Table 1. General characteristics of the interviewed individuals

Concept	TEC	
	Frequency	Percentage
Sex		
Female	310	52.2
Male	284	47.8
Total	594	100
Age		
Under 17 years old	124	20.8
From 18 to 24 years old	421	70.9
From 25 to 38 years old	34	5.7
Total	594	100
Socioeconomic Class to which they belong		
Low class	52	8.8
Medium Class	483	81.3
High Class	59	9.9
Total	594	100
Schooling of the family parent		
Elementary School	22	3.7
Middle School	93	15.7
High School	139	23.4
Bachelor's Degree	280	47.1
Master's Degree	47	7.9
Doctor's Degree	13	2.2
Total	594	100
Working and studying at the same time		
Yes	466	78.5
No	128	21.5
Total	594	100
Factors that have influenced to study in your school		
Friends	51	8.6
Boyfriend/Girlfriend	13	2.2
Parents	56	9.4
Your academic program is strict and hard	266	44.8
Your academic program is easier	150	25.3
The chance to study in other institutions was rejected	49	8.2
Others*	9	1.5
Total	594	100

* Scholarships, publicity of the study house, representative teams, etc.
Source: Self prepared base on survey data

V. ANALYSIS METHOD

To achieve the proposed objective of this research, and analyze the current perception of the students about the service provided by TEC, it is necessary to perform an association about the different types of variables included in the survey, such as: the skill, knowledge and integral formation that conveys the teaching staff to the students, the facilities, academic programs, satisfaction achieved, among others.

The foregoing is accomplished through the application of the structural equations method, which enables to test and estimate presumably causal relations that use a combination of statistical data and causal assumptions. This procedure proposes two components: the measurement and the structural. The first one, called confirmatory factor analysis (AFC), reflects the relationship between the latent variables (constructs or factors[4]) and indicators manifests (variables observed). The second reflects the relationship between the latent variables.

In the first instance is carried out the AFC, which allows us to know in advance the number of factors or latent variables and set restrictions on the elements in the array of loads.[5] This is done for a Principal Components Analysis (AFCP).[6] Its implementation helped to reduce the initial twenty two questions to four factors or groups which explains approximately 58.6 percent of the total variability, which represent the dimensions regarding the quality of service perceived by the students of both houses of studies (see Table 3).

Overall, it can be argued that, given the nature of the variables, these four factors or groups are related to four particular characteristics regarding the quality of education: 1) the physical components (CF) required for the academic training of students , such as facilities, computer equipment, teaching materials, air conditioning, lighting and bibliographic collection; 2) the qualifications of the teaching staff (PD) such as the organization, the commitment of the teachers, preparation courses for the teachers, their knowledge, updated content and compliance with the course program; 3) the combination of theoretical and practical aspects and the use of modern means of education (ME); and 4) the interest of the teaching staff with the work of formation and development of the student (DI), as well as the provision of aid, human training, extracurricular activities, understanding the needs of students, promoting academic interest and future career orientation of students.

Once the four groups or dimensions regarding the quality of service in the field of college' educations were identified, it continues to know the valuation made by students, distinguishing the mean scores of groups about the perceived quality of the sample.

Table 3. Components Matrix

Components	Rotated components matrix			
	1	2	3	4
Installations	.768			
Equipment	.770			
Materials	.758			
Air conditioner	.747			
Lighting	.754			
Library	.692			
Guarantee		.756		
Promises		.753		
Program		.782		
Mistakes		.682		
Knowledge		.731		
Explanation		.762		
Updated content		.772		
Theory and practice			.739	
Mean			.734	
Disposition				.782
Formation				.790
Extracurricular				.641
Necessity				.744
Promotion of interest				.768
Teaching				.754
Orientation				.715

* Factors were chosen whose own value exceeds the 0.60 level and to facilitate the interpretation there of, the Varimax rotation method was applied. Source: Based on data obtained from surveys

Table 4 shows that the average student perceptions regarding the quality of service they receive in their respective houses of study was 2.08 on a maximum score of five points. Note that the dimension of better service quality was valued for the physical component (CF), followed by the category of teaching means (ME).

After identifying the four groups or components with which to assess the educational quality of the school, the next step is to apply a MES which, as mentioned above, allows us to know how they relate to each other such factors or latent variables. The most characteristic aspect of the MES is that they are based on multiple regression method, but they are more stringent in terms of the treatment given to interactions, nonlinear relationships, correlations between independent variables, measurement error, correlation between the error terms, multiple independent variables measured by various

[4] The latent variables are variables not directly observed, such as the satisfaction at the university, its administrative work, institutional commitment; these variables are also called "factors" and are estimated with indicators or measures or variables that are observed, such as the reagents are a questionnaire (Ruiz, Pardo and San Martin, 2010).

[5] For a more detailed analysis of the factorial analysis see the studies of Peña (2002) and Revelle (2004).

[6] In this first step it is advisable to perform a series of tests that will tell us if it is relevant, from a statistical point of view, carry out the AFCP with the data and samples available. The first of these was the test of the adequacy of the sample of KMO that was 0,964 and the test of sphericity Bartlett was significant (p<0,000), with which it was reject the hypothesis that the correlation matrix is an identity matrix. This indicates that there are significant correlations, probably high, given that the value found in these test are significantly higher.

indicators and consideration of latent independent variables measured by several indicators.

The MES have causal relationships on the one hand, between a set of observable variables, and secondly, between both observable and unobservable variables. Beside, enable analyze the variables behavior in terms of causality, that is, allows to know if a variable can be caused by another system variable and simultaneously within the same model, cause by another variable. That is why this technique is a robust alternative compared to multiple regression, path analysis, analysis of time series and analysis of covariance in the validation of scenarios (Littlewood and Bernal, 2011).[7]

Table 4. Dimension of perceived quality

Institutions	Total	Physical component (CF)	Teaching Staff (PD)	Media education (ME)	Integral Development (DI)
TEC	2.08	2.05	2.08	2.06	2.12

Source: Based on data obtained from surveys

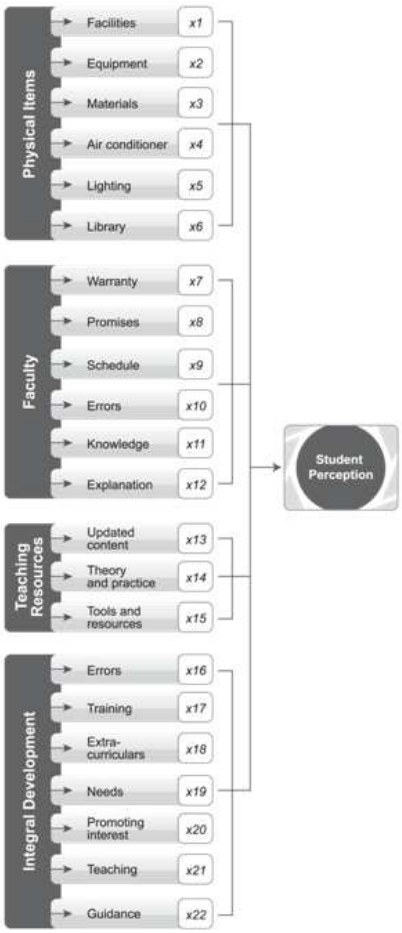
The proposed structural model validation is shown in Figure 1, checking whether the estimated coefficients presented in this figure are significant and do not vary for different groups considered simultaneously. It means, it would validate the proposed factors which are essential for students to build their perceptions about the quality of services offered by the Technological Institute.

The central hypothesis to be implemented in this model is that the estimated coefficients between the including constructs, as presented in Figure 1, are significant and have a positive impact among the different constructs. In other words, there is no difference between the results of the four dimensions (Physical Component, Teaching Staff, Educational Media and Integral Development) discussed at TEC. This means, that the way in which students construct their perceptions of quality in the institute is similar in each department or faculty on this.

To validate the structural model, it is necessary to make some adjustment measures. Jaccard and Choi (1996) recommend that at least three rounds of the thirty that exists must be consulted.[8] Moreover, Kline (1998) suggested to consult at least four and these depend on the interpretation that the investigator wants to do.

In the present study shows the indices that have a better fit for research (total sample), as the indices for the sub-samples have shown the same pattern. The fit indices were the index of goodness of fit-GFI (0.901), the comparative index d-CFI (0.972), set the goodness index-adjusted AGFI (0.917) setting and the approach of the root mean square error -RMSEA (0.061).[9]

Figure 1. Structural Model



* To assess the reliability or internal consistency of the scale for measuring the quality of service has been estimated, for the total sample, the Cronbach alpha coefficient takes a value of 0.921.
Source: Prepared based on data obtained in the AFCP.

[7] For a more detailed method of structural equations see Littlewood studies and Bernal analysis (2011).

[8] Ji square, square Ji climbing Satorra-Bentler, goodness of fit index (GFI), adjusted goodness index adjustment (AGFI), Residuals mean square root (RMS RMSR or RMR) Residual standardized root mean square (SRMR) Hoelter critical N, Akaike information criterion (AIC), BICP, BCC or criterion-Cudeck Browne, ECVI or expected cross-validation index, MECVI, CVI or index cross validation, BIC or Bayesian Information Criterion, non-centrality parameter (NCP), etc.

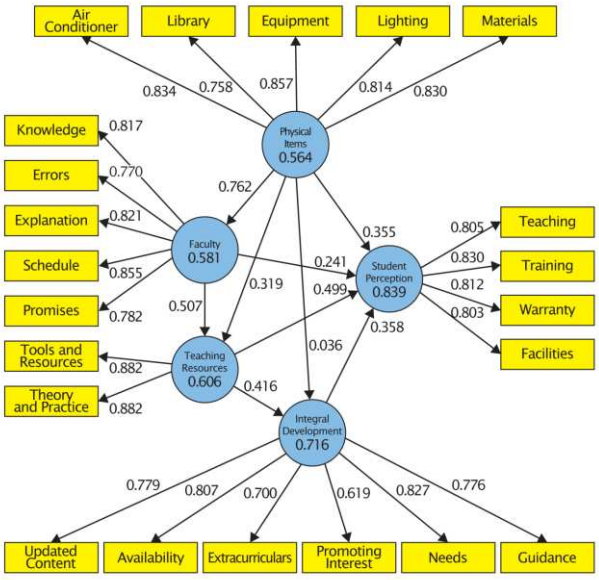
[9] **AGFI**. It is a variant of GFI, as it is set by its degrees of freedom: the quantity (1-GFI) is multiplied by the ratio of the degrees of freedom divided by the degrees of freedom of the model base line model, then AGFI It is 1 minus the result. AGFI should also be greater than .90.
CFI. It is also known for the comparative fit index Bentler and compares the theoretical model with the null model that assumes that the latent variables in the model are not correlated with each other (model independent). That is, it compares the covariance matrix of observed data with the covariance matrix of the null model (matrix with zeros). CFI is similar to NFI, but penalizes the sample size. CFI and RMSEA statistics are less affected by the sample size, and CFI near 1.0 indicates a very good fit and values above .90 are considered acceptable. The CFI is also used to evaluate modifying variables (those that create a heteroscedastic relationship between independent and dependent variables, such that the ratio varies by type of modifier).
GFI. It is known as gamma-hat or Jöreskog-Sörbom GFI. The GFI value varies between zero and one, but can be obtained negative values. A large sample favors the GFI. Although there analogy square R, the GFI cannot be interpreted as the error rate explained by the model. It is the percentage of the observed covariance explained by the theoretical covariance. It is a deal that values above .90 support the model.
RMSEA. It is also known as RMS or RMSE or discrepancy per degree of freedom. It is considered that a RMSEA equal or less than 08 is satisfactory. RMSEA index is popular because it requires adjustment compared to a null model and the proposal does not require an independent model. RMSEA has a related non-central chi-square distribution and therefore does not need a bootstrap type show to set confidence intervals.

VI. RESULTS

The results of the analysis performed with the technique of MES are presented in Figure 2. In this figure the best estimate of the structural model was made using the 2.0 software SmartPLS highlights, trying the missing values with the option *Replacement Case Wise* weighing the observations with *Schame Weighting Factor* option. Also, weights were observed to evaluate individual reliability of each indicator, external weight (*outer weight*) or simple correlations of the indicators with their respective construct. That is, the rule of accepting those items with standardized loads equal to or greater than 0.70 is applied as latent variables that have greater external weight that amount prove to be significant.[10]

The results obtained and shown in Figure 2 lead us to not reject the central hypothesis of the study, it means, it is evident that the direct and indirect relationships between the latent variables that exist in the different areas of TEC are similar, for example, the direct effect of the technology have facilities and first-class team (CF) positive and significant influence on the work carried out by the teaching staff (PD) with 76.2 percent. Thus, the domain and the ability to transmit knowledge in a timely manner with the academic program by applying a good support material are key elements to increase the satisfaction level of students (ME) to 50.7 percent; the latter variable, in turn, directly affects the development and the formation of the student (DI) by 41.6 percent. Therefore, it appears that there is a correlation between the four groups (CF, PD, ME and DI), and good or bad can alter to another, for example, the perception we have of CF could affect PD indirectly, ME and consequently the DI, which would result in dissatisfaction or negative perception of the student about the Technological Institute.

Figure 2. Results of the structural model.



Source: Prepared based on data obtained in the AFCP with SmartPLS 2.0 software

[10] For a more detailed treatment of missing values and reliability of the indicators in the structural model see study Henseler (2009) analysis.

In general, it can be argued that the variables-from high to low grade- with more impact on the perception of educational quality in the TEC is Media Education (49.9 percent), Integral Development (35.8 percent), Physical Component (35.5 percent) and Teaching Staff (24.1 percent). Undoubtedly, these four dimensions show a positive perception (satisfaction) of the university at the time of receiving a quality education in these houses of study. Therefore, it can be concluded that the perception of the students is highly explained by these four factors, as the R^2 obtained is 0.839.

VII. CONCLUSIONS

Using a survey of 594 students at the TEC, this essay analyzes the perception regarding the quality of higher education in this prestigious home studio using a structural equation model. Most of the surveyed students seem to have a positive perception about the dimensions valued on the perceived quality regarding the services the educational institute provides them.

The analysis performed by the MES provides relevant information about the students' perception regarding the quality of service that their home studio gives them. This method has allowed us to verify the way in which students construct their perceptions of quality. It is found that there are several factors of high importance for the perception about the quality of education students receive, among which stands out the preparation that has the teaching staff to transmit knowledge with adequate means of teaching and dynamic proactive as well as provide comprehensive and humane training students. These dimensions play a major role in the perception of students.

While this technique may lack of predictive power, it is a valid procedure to select, from the perspective of the perceptions of students, those variables that have certain significant relationships with the perception about the quality of a service, in our case, education. It is noteworthy that, although an attempt to develop a rigorous work regarding the implementation of the MES has been tried, we are aware of the constraints and opportunities for improvement; for example, using a probability sampling. From this work future research lines are separated such as analyze the trend of public or private education separately in other states or regions, therefore, make a comparison of the same variables in public versus private universities could improve knowledge, perception and dilemmas that are in the education market.

VIII. ANNEXED

P1-Facilities. Are the physical facilities in my house of study (classrooms, library, cafeteria, bathrooms) are in good condition?

P2-Equipment. Is the equipment (furniture, decoration, computer and audiovisual equipment) from my home studio looks modern?

P3-Materials. How would you rate the materials related to education in their home studio (manuals, support materials,

photocopying) as its ease of understanding?

P4-Airconditioning. What are the conditions under which the air conditioner operates in my home studio?

P5-Lighting. How would you rate the degree of illumination on the premises of your home studio?

P6-Library. How would you rate the library catalog that has the library of his home studio?

P7-Guarantee. The extent to which in my house of study care about keeping the information without errors (lists of enrolled students, faculty listings, notices of meetings, grades).

P8-Promises. The degree to which met in my house of study when they promise to do something at a certain time (deliver materials, grade papers, dealing with a subject of study).

P9-Program. The degree to which teachers from my house of study always try to finish the program.

P10-Errors. The extent to which teachers make few mistakes in explaining the subjects.

P11-Knowledge. The teachers have sufficient knowledge to answer the concerns of students.

P12-Explained. How would you rate the clarity with which the teacher explained?

P13-Content. Current degree to which the content taught in courses is updated.

P14-Theory and Practice. The degree to which the classes combine theoretical and practical aspects.

P15-Media. The degree to which teachers combine traditional teaching with modern methods (such as: internet and computer practices).

P16-Provision. The degree to which the teacher always is willing to help students.

P17-Training. The degree to which this house of study received both academic training, as human development.

P18-Extracurricular. The degree to which my home studio organizes extracurricular activities (conferences, company visits, museums).

P19-Needs. To what extent staff understands my home studio specific needs and particular concerns?

P20-Development of interest. The degree to which teachers encourage interest in the subjects that teaches to students.

P21-Teaching. How would you rate the interest shown by teachers to teach?

P22-Guidance. The extent to which the house of study's teachers orient properly students on our professional future.

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