TEST Engineering & Management

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Student Perception towards Educational Institution

Dr. NVJ Rao[1], Dr. Manabhanjan Sahu[2], Debasis Mohapatro[3], Dr. Jitendra Kumar Sahu[4].

[1]*Registrar, GIET University, Gunupur, Odisha, India.*
[2]*Assistant Professor, School of Management Studies, GIET University, Gunupur, Odisha, India*
[3]*Assistant Professor, School of Management Studies, GIET University, Gunupur, Odisha, India*
[4] *Professor &HoD, Sanjay Memorial Institute of Technology, Berhampur, Odisha, India.*

Article Info
Volume 82
Page Number: 8402 – 8422
Publication Issue:
January-February 2020

Article History
Article Received*: 18 May 2019*
Revised*: 14 July 2019*
Accepted*: 22 December 2019*
Publication*: 07 February 2020*

Abstract:
The researchers in this work used a tool to analyze the students' perception (financial &non financial) while selecting a specific educational institution for the purpose of a higher professional education. In specific the researchers have used Principal Component Analysis (PCA) to explore the Principal components out of a set of variables used in the analysis. This is to define the specific variables and their order of preferences in a selection process. To analyze the same we collected empirical data from 140 students from 12 different colleges from three districts, namely Rayagada, Gajapati and Ganjam form the state of Odisha, India. Out of these, only 120 are the valid responses which finally we analyzed. A pre and post test is conducted to define the final questionnaire. The collection of data from the sampel is purely on random basis. The survey was conducted in the month of September, 2019. The proposed model is used to find the principal components and the valid variables which impacts the decision making process of a student. The major finding are that , out of nine variables only six variables are found relevant while selecting an educational institution, these are in order of their importance are; placement, reference, quality teaching, brand image of institution, some other personal factors and finally a University. While the unimportant variables are; fee structure, free seat and distance from home.

Keywords:*Principal Component Analysis (PCA), random sampling, perception, empirical data.*

I. INTRODUCTION

Now days, education become one the basic needs of the present society. The education everybody looks for is a professional type, which could secure their life in terms of getting employments. Even though the final destination is a job, but preferences are always not given to that institution offers a placement, rather some other factors also impacts while selecting a professional educational institution. There are lists of preferences while selecting an instruction by a student, here it becomes important to understand the mind set of those. Hence educations once termed as a practice is become a business and the rate at which the new institutions are coming up every day with billions of investment, it become very important to understand the mindset of the students. What exactly a student's look for, a student's perception for an institution need to be understood first. At this context the researchers through this article tried to understand the same, and propose an insight on the student's psychology while selecting a professional educational institution for their higher education.

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

II. REVIEW OF LITERATURE:

These are few of the literatures; those have worked on the student's perceptions for an professional educational institution.

Senthilkumar et al. (2009) did a research on the determinants of service quality in the higher education institutions in India, in specific to the educational institutions in specific for the state of Tamil Nadu. He concluded that the major determinants are the placement, teaching quality, quality of the faculty members, physical resources and a wide range of disciplines. These in other term speak about the employability of the graduate and post graduate students in a higher education institution.

Arambewela et al. (2009) by their research on an empirical model of international student satisfaction, proposed through a theoretical model that, the perceived level of satisfaction of the students is depend upon the nature of services. This manly depends upon the educational and non educational services.

Marks et al. (2005) through the research on predictors for effective online learning by use of the Structural Equation Modeling, did an investigation on interactions among three components on education i.e. instructor, student and content. They concluded that instructor is the major component for any effective learning process.

Arulraj et al. (2007) on a study of placement (employability) as a criteria to determine the service quality of an educational institution through a SQM-HEI model revealed that there are three major components which determine the service quality of an educational institution, these are; teaching style, study environment and discipline. They developed a 30 variable instrument, which are empirically tested with the uses of AMOS 7 for structural equation model & Bayesian estimation and testing.

Pituch et al. (2006)on a study of the perception of students for an e learning system. They proposed the alternative models of learning, proposes a model consists of external variables, perceived usefulness, perceived ease of use, intention behaviour and use of system. They named it as the technology acceptance model.

Amaury Nora (1987) in its research on the determinants for retention of college students by use of structural equation modeling proposes that,

2.1. Gap in the present research:

Most of the research articles used the Factor analysis as a tool for its statistical analysis. Even there are application of AMOS as a tool for analysis and interpretation. We found no researchers using PCA as a tool to analyze the variables.

2.2. Objective of the study:

Hence, to fill the gap in the past studies, we are using the Principal Component Analysis (PCA) to find out the principal components and important variables which a student gives maximum priorities.

The objective is also to make a hierarchical order or the series of variables in accordance to the preferences.

III. RESEARCH METHODOLOGY

The methodology basis in this research paper is the survey of the student's opinion (perception) while selecting an educational institution for their higher studies. Out of 9 major questions, the researcher tries to find out the principal components (major variables) which influence their selection criteria. Hence we used the statistical model of principal component analysis (PCA) to analyze the survey.

3.1. Survey process

The survey process follows a systematic sequence of following steps.

3.2. Literature review:

Following different literature reviews and also by considering different traditional possible dimensions of student's perceptions for selecting an educational institution for higher professional education.

TEST Engineering & Management

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

The survey form designed consists of the following;

3.3. Design of Questionnaire:

The questionnaire designed in the survey form is having two sections, first section contains five questions speaks about the general information (Background) of the student and second section contains nine questions are related to the information about the perception of students while selecting an educational institution for pursuing a professional education. The scaling used in the questionnaire is designed as per the five point Likert scale.

Under the Five point Likert scale, the points represents as follows;

Point 1 for very unimportant
Point 2 for unimportant
Point 3 for cannot say
Point 4 for important
Point 5 for very important

3.4. Pre-test & Post-test

The questionnaire was first pretested on 20 numbers of students from five different colleges belonging to the district of Rayagada to check whether the language & text used in it is under stood clearly or not and also other structural issues in it. The questionnaire was then further adjusted as per the desired levels of the changes it required and finally the revised format was tested one more time on same number of students from same colleges, hence a post test is also done on the questionnaire before we move to the final collection and analysis of the data . Basically it is used to check the communality issues in the research. It ensures that the final research is having all the expressions are true on its consistency and nature.

3.5. Questionnaire format items:

The questionnaire contains the following five general information items and nine perception related items in Table 1.

Table: 1. Questionnaire format

BACKGROUNDL INFORMATION:	**SOURCE**
Name	Author
Age	Author
Place	Author
Qualification	Author
Family income	Author
PERCEPTION RELATED INFORMATION	**SOURCE**
University	Author and past literature studies
Distance	Author and past literature studies
Placement	Author and past literature studies
Reference	Author and past literature studies
Teaching faculties	Author and past literature studies
Free seat	Author and past literature studies
brand image (Reputation)	Author and past literature studies
Course Fees	Author and past literature studies
Others	Author and past literature studies

Source: Author

3.6. Data collection

The survey area is the three districts of the state Odisha i.e. Ganjam ,Gajapati and Rayagada. Students are the targeted sample, mostly the students from the higher secondary education schools and colleges those who are expected to opt for a further higher education, in specific the professional education. A face to face personal interview is done with the use a structured close end questions. The sample size was 140 numbers of students belongs to 12 different higher secondary and graduation schools and colleges. The selections of the schools are

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

purely random in nature, as well the selection of students. There are 120 valid responses out of these 140 responses by excluding some of the outliers. Hence the valid response rate is about 86% of the responses, which is good enough to validate and generalize the research outcome.

3.7. Research framework

Once the data is collected the real analysis begins with a sequence of steps, and in our research it follows basic five steps.

1. Standardization of data
2. Computing the covariance matrix
3. Calculate the Eigen vectors and values
4. Computing principal components
5. Reducing the dimensions of data set

3.7.1. Step: 1.

Under the process of standardization of data, it deals with scaling of the data in such a way that there is a common / similar range under which all the variables and its range will fall. It is calculated by subtracting the variable value from the mean, and the whole is divided by its standard deviation. It is observed on the basis of the Z value that, the data maintains a standard scale between + 2 SD to - 2 SD.

3.7.2. Step: 2.

It is necessary to identify the highly correlated variables as they may destruct the overall data structure and information (biasness & reluctant), hence it is necessary to find the correlation and dependencies among the variables. By the help of the covariance matrix we could find out the such variables and treat those accordingly.

As per the mathematical calculation it uses P X P and Q X Q matrix, where P explains the dimensions of the data and Q represents the quantile. Under P X P Matrix, each of the entries represents the corresponding variable's covariance i.e. the co-dependence between the variables. If the covariance is negative it signifies that there s a negative or indirectly proportionate relation between the variables, while a positive value signifies the opposite. Besides the values of covariance represents the strength of relation between the variables.

3.7.3. Step: 3.

Normally the data is scattered randomly with different degree of variances and along different dimensions, hence it is required to concentrate the scattered the data around some distinct dimensions. This concentrating the data in to different dimensions is done with the help of Eigen vectors, which represents the dimension along which the data need to be concentrated. In the context of Principal Component Analysis, an Eigen value represents the scalars of the respective Eigen vectors, which is normally taken as one. Hence these eigen vectors and values represents the number of principal components in a data set.

Note: the objective of the PCA is to find out the principal components (new set of limited variables from the existing all variables) which are significantly different from each other by compressing and processing the most important and distinct information when the data is scattered randomly.

3.7.4. Step: 4.

Having the computed values of Eigen vectors and values, the next step is to order them in a descending manner to enable the most significant variables to be the principal components among the set of variables. Highest the Eigen values is the highest most significant, and lowest the value is the lowest significant. It is to noted that, the variables having the Eigen value more than one is considered as the number of different dimensions, and also is the number of principal components. hence the principal component having less significant are removed so as to reduce the dimension of the data set. This computing the principal components meant for construct a matrix called as Future matrix, which contains all the significant variables containing maximum of the information.

TEST Engineering & Management

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

3.7.5. Step: 5.

This is the final step of performing PCA, which deals with the reorganize the variables along with the principal components so as to minimize the number of variables and maximize the chances of its representation of information. To re organize the variables PCA follows a simple multiplication of the transpose of initial data with the obtained transpose of calculated Feature vector.

IV. ANALYSIS AND INTERPRETATIONS:

4.1. Descriptive Data Analysis:

The data (table 2) shows that, the students emphasizes all the attributes as more than the average rating (3) on a liker type scaling. Also among the nine attributes, teaching quality (quality of the teachers) is ranked the highest with an average rating of 3.96, and free seat is ranked the lowest with an average rating of 3.44.

Table: 2. Rating and Ranking:

Attributes	University	Fees	Near to home	Job placement	Reference	Teaching quality	Free seat	Brand name	Others
Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9
Average Rating	3.75	3.78	3.49	3.57	3.50	3.96	3.44	3.80	3.53
Average Ranking	4	3	8	5	7	1	9	2	6

Source: Author

The major three attributes besides *teaching quality* are; institution *Brand image/reputation* and *courseFee structure*. With these major three considerations, the students select an institution offering a higher professional course.

On the contrary, the least three attributes besides free seat are; Distance of institution from the home and Reference. A third attributes; Job Placement (campus interview) lies at the middle of the rank with an average rating score of 3.57.

The other two attributes above and below this middle attribute are; student prefer an University over a college and some other factor respectively while selecting an educational institution for their higher education.

Table: 3. Descriptive Analyses:

Attributes/variables		university	Fees	distance	reference	faculties	free	reputation	others	placement
		F1	F2	F3	F4	F5	F6	F7	F8	F9
N	Valid	120	120	120	120	120	120	120	120	120
	Missing	0	0	0	0	0	0	0	0	0
Mean		3.75	3.78	3.49	3.50	3.96	3.44	3.80	3.53	3.57
rating		4	3	8	7	1	9	2	6	5
Std. Error of Mean		.116	.109	.123	.108	.125	.100	.129	.126	.114
Median		4.00	4.00	4.00	4.00	4.50	4.00	4.00	4.00	4.00
Mode		5	4	5	4	5	4	5	5	5
Std. Deviation		1.265	1.197	1.347	1.181	1.374	1.091	1.418	1.378	1.248
Variance		1.601	1.432	1.815	1.395	1.889	1.190	2.010	1.899	1.559
Skewness		-.908	-1.068	-.559	-.529	-1.208	-.796	-.808	-.563	-.339
Std. Error of Skewness		.221	.221	.221	.221	.221	.221	.221	.221	.221

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

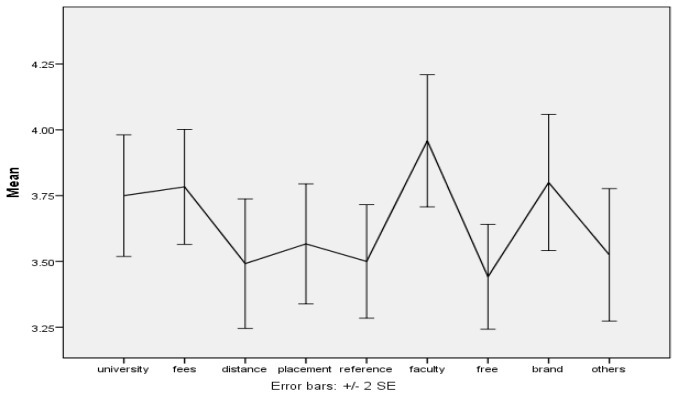
Kurtosis	-.115	.503	-.730	-.518	.146	.171	-.752	-.934	-1.050
Std. Error of Kurtosis	.438	.438	.438	.438	.438	.438	.438	.438	.438
Range	4	4	4	4	4	4	4	4	4
Sum	450	454	419	420	475	413	456	423	428

Source: Author

The data in above table (3) represents, median of 4 for all the attributes except quality of faculties having the median of 4.5. In response to the mode (the maximum of cases) where the students very highly agreed that, these attributes are highly significant for selecting an educational institution are; University, Distance, quality faculties, brand value, placement and some others. While they expressed that, fees, reference and free seat plays a significant role in their decision. The Z value of the kursosis and skewness represents there are few attributes which shows a level of Kurtosis &skewness, but its range lies between + 1.96 to -1.96. this represents that the data is normally distributed. The further demonstrate that the variances from the means of the attributes are not same.

Below chart (1) is a graphical presentation of the means of the attributes, where we could find that, the attributes like; quality of the faculties, brand value, fees and Univesiity showing a very higher range of mean in comarison to others. The attribute like; distance, placement, free seat and other factors shows a lower mean. The diagram aslo represents the standard erros of these means.

Chart: 1. Mean and Standard error:



Source: Author

4.2. Distribution of Data set:

The distribution of the data set shall be further analyzed by use of a P-P plot, which will enable us to understand and compare cumulative distribution function of the empirical data against a standard (theoretical) distribution function. A P-P Plot data set model is presented in the blow table (4)

Table: 4. P-P Plot for the data set

Model Description		
Model Name		Student preference
Series or Sequence	1	university
	2	fees
	3	distance
	4	placement
	5	reference
	6	faculty
	7	free
	8	brand
	9	others
Transformation		Natural logarithm
Non-Seasonal Differencing		1
Seasonal Differencing		0
Length of Seasonal Period		No periodicity
Standardization		Applied
Distribution	Type	Normal
	Location	estimated
	Scale	estimated
Fractional Rank Estimation Method		Tukey's
Rank Assigned to Ties		Mean rank of tied values
Applying the model specifications from Student preference		

Source: Author

The final P-P Plot model description allows us the following information; there are 9 series of events, transformation through a natural logarithm, standardization is applied, distribution is normal, scaling is appropriate, liker 5 point scale with ordinal data, application of Tukey's Fractional rank estimation method and finally the rank is assigned on the basis of mean rank of the tied values.

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Table: 6. **Case Processing Summary**

		university	fees	distance	placement	reference	faculty	free	brand	others
Series or Sequence Length		120	120	120	120	120	120	120	120	120
Number of Missing Values in the Plot	Negative or Zero Before Log Transform	0	0	0	0	0	0	0	0	0
	User-Missing	0	0	0	0	0	0	0	0	0
	System-Missing	0	0	0	0	0	0	0	0	0
The cases are unweighted.										

There are no missing values in the data collected and analyzed.

Source: Author

Table: 7. **Estimated Distribution Parameters**

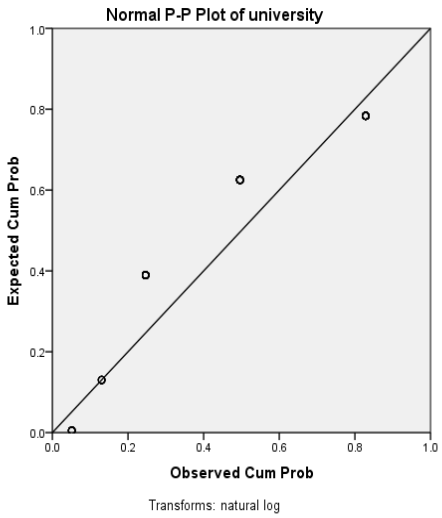
		university	fees	distance	placement	reference	faculty	free	brand	others
Normal Distribution	Location	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
	Scale	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
The cases are unweighted.										

Source: Author

The P-P Plot of individual items in its graphical presentation, further provide a clear view of the cumulative distribution function of variables. The same is presented in 9 different graphs (chart 2-9) below.

Chart: 2. P-P Plot (University)

Chart: 3. P-P Plot (course fee)



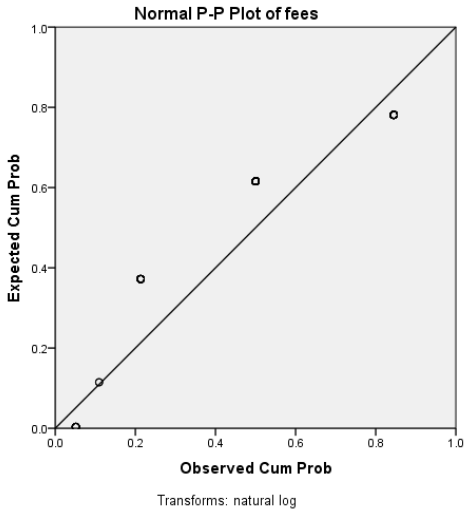
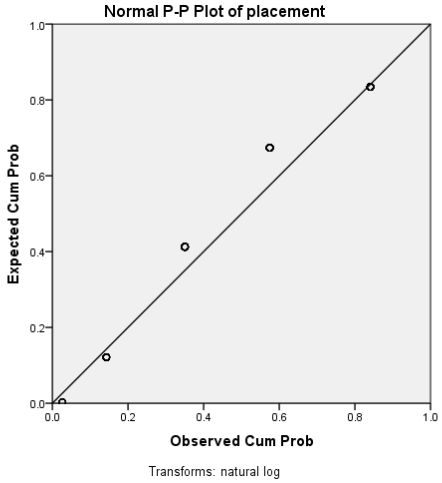


Chart: 4. P-P Plot (placement)

Chart: 5. P-P Plot (distance)

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422



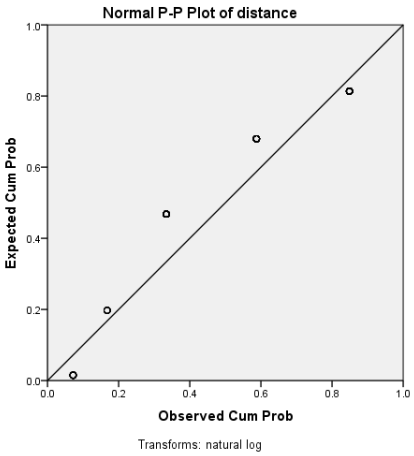
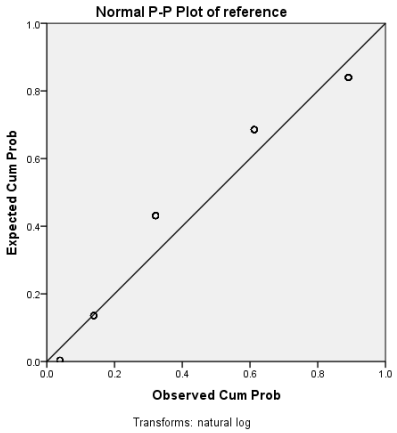


Chart: 6. P-P Plot (reference)

Chart: 7. P-P Plot (free seat)



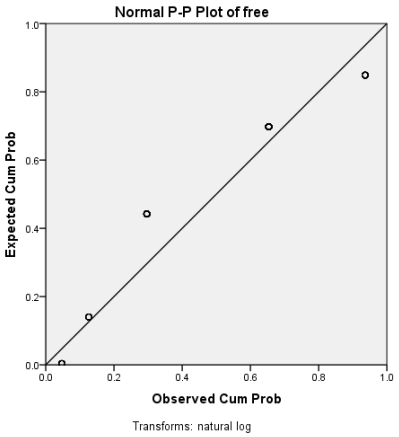
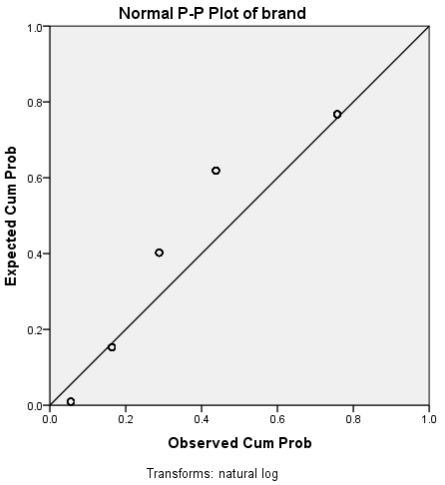
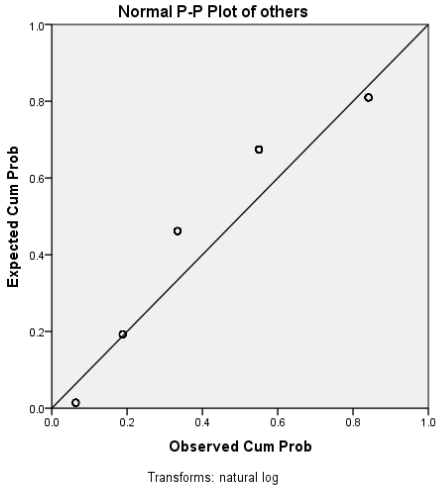


Chart: 8. P-P Plot (brand image)

Chart: 9. P-P Plot (other cause)

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422





All sources: Author from SPSS

4.3. Correlation Matrix:

Correlation matrix (table.5) represents the correlation between different attributes of selection of an educational institution, bigger the correlation value, the better correlation is. All the attributes are correlated to rest other attributes to an extend depending on the responses presented by the respondents. The significance level of the attributes also presented in the matrix speaks about the level of significance to which this correlation is valid. The responses having the value greater than + or – 3 shall be considered in this case.

The significance level is on one tailed test of significance. The attributes showing less than 0.005 is considered as a significance value. i.e. there is a significant relation between the attributes at 95% level of significance.

Table: 5. Correlation Matrix

Correlation Matrix[a]										
		university	fees	distance	placement	reference	faculty	free	brand	others
Correlation	university	1.000	.352	.324	.660	.647	.724	.282	.581	.471
	fees	.352	1.000	.280	.235	.416	.485	-.003	.306	.452
	distance	.324	.280	1.000	.253	.441	.234	.125	.184	.082
	placement	.660	.235	.253	1.000	.576	.655	.345	.558	.407
	reference	.647	.416	.441	.576	1.000	.691	.447	.552	.467
	faculty	.724	.485	.234	.655	.691	1.000	.293	.694	.486
	free	.282	-.003	.125	.345	.447	.293	1.000	.221	.281
	brand	.581	.306	.184	.558	.552	.694	.221	1.000	.540
	others	.471	.452	.082	.407	.467	.486	.281	.540	1.000
Sig. (1-tailed)	university		.000	.000	.000	.000	.000	.001	.000	.000
	fees	.000		.001	.005	.000	.000	.486	.000	.000
	distance	.000	.001		.003	.000	.005	.086	.022	.188
	placement	.000	.005	.003		.000	.000	.000	.000	.000
	reference	.000	.000	.000	.000		.000	.000	.000	.000
	faculty	.000	.000	.005	.000	.000		.001	.000	.000
	free	.001	.486	.086	.000	.000	.001		.008	.001
	brand	.000	.000	.022	.000	.000	.000	.008		.000
	others	.000	.000	.188	.000	.000	.000	.001	.000	
a. Determinant = .012										

Source: Author

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

The above table finally has shown a determinant value of 0.012 and as per the theory any determinant value greater than 0.0001 shall be considered as there a gross correlation between the variable in a data det.

4.4. Test of Sampling adequacy:

The KMO and Bartlett's test (table.6) further confirms that there is a sampling adequacy and sphericity of the data, by its value of 0.830 and 0.00005 respectively.

Table: 6. **KMO and Bartlett's Test**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.830
Bartlett's Test of Sphericity	Approx. Chi-Square	507.552
	df	36
	Sig.	.000

Source: Author

Note: KMO value above .9 is marvelous, .8 to .9 is meritorious, .7 to .8 is middling, .6 to .7 is mediocre, .5 to .6 is miserable, and less than .5 is unacceptable. It is the entire correlation of the samples. Further for any value smaller than 0.001 on Bartlett's test is the confirmation of significant relationship among the values of the attributes.

Hence the sample shows meritorious values which assure that the data is sufficient enough for further analysis and treatments.

4.4. Test of Communalities:

To understand the how much the attributes are correlated on the basis of the questionnaire designed and clarity in understanding while answering, the test of communalities is applied.

The above table on communalities represents there the data is significant as the communalities is more than the minimum expected. On this parameter; distance shows the maximum, while other factors show the least.

Table: 7. Communalities

Communalities		
	Initial	Extraction
university	1.000	.696
fees	1.000	.742
distance	1.000	.902
placement	1.000	.651
reference	1.000	.766
faculty	1.000	.782
free	1.000	.719
brand	1.000	.669
others	1.000	.629
Extraction Method: Principal Component Analysis.		

Source: Author

Note: Communality very low for an item, it usually represents the variables are completely unrelated. The items are poorly designed i.e. poorly drafted or not understood. It represents the biasness if low communality. Initial value is 1 while the Extraction values good close to 1

V. EXTRACTION METHODS:

5.1. Total variance explained

Purpose of PCA is to explain as much as the variance in the model, its contribution to the total variance in the model is expressed in form of Eigen value. We used Eigen value as 1; hence any component having the Eigen value more than 1 represents the Principal components.

Component one, two and three combined represents 72.847 % of variables of which component one stands for almost 50 % of variables (49.857), component two represents 11.118% and component three represents 11.118 of variances

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Table: 8. Total Variance Explained

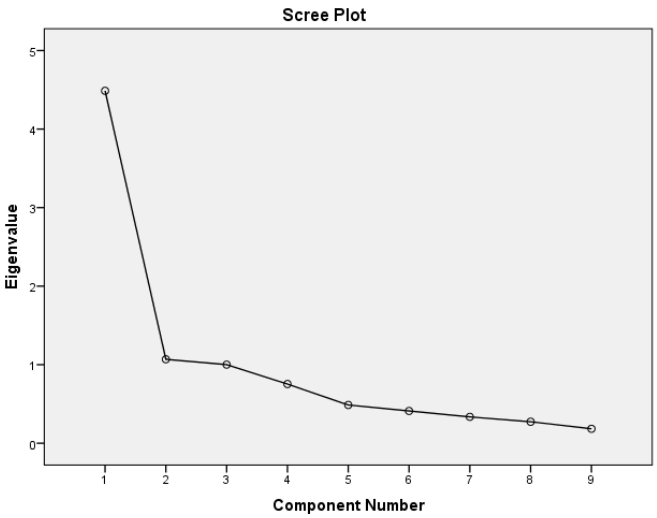
Total Variance Explained							
Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.487	49.857	49.857	4.487	49.857	49.857	4.309
2	1.069	11.873	61.730	1.069	11.873	61.730	1.160
3	1.001	11.118	72.847	1.001	11.118	72.847	1.914
4	.753	8.372	81.219				
5	.487	5.410	86.629				
6	.411	4.563	91.191				
7	.335	3.727	94.919				
8	.273	3.038	97.956				
9	.184	2.044	100.000				
Extraction Method: Principal Component Analysis.							
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.							

Source: Author

By the above calculation, there are three components are being extracted from the list of components.

The same also further confirmed by use of a scree plot. On this scree plot there is a point of deflection, which divides all the components in to two parts. The components above the delfection are considered are the principal components and the components below the scree plot are non principal components.

Chart: 10. Scree plot of principal components



Source: Author

The deflection point in the scree plot represents the number of components to retain, hence there are utmost three components to be retained.

5.2. Computing principal components:

5.2.1. Component matrix

By the help of component matrix, the Principal component analysis has extracted three components, 1, 2 and 3.by the un-rotated values of the factor loading. The components having higher values are found suitable to be included under the components. Under component one the factors having higher and near equal values are grouped on one, these are from factor 1, 2, 3, 4, 5 and 6. While component 2 has two factors i.e. factor 5 and 6, but these are negatively correlated. Component 3 has two, these are factor 6 and 9, and of these factors 9 is having higher positive value, while factor 6 is having an insignificant lower and negative value. It shows that all the variables under different components shows a significant value to be considered for analysis.

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Table: 9. Component matrix

Component Matrix[a]			
	Component		
	1	2	3
faculty	.874		
reference	.843		
university	.834		
placement	.774		
brand	.773		
others	.674		-.411
free	.443	-.696	
fees	.547	.662	
distance	.415		.804
Extraction Method: Principal Component Analysis.			
a. 3 components extracted.			

Source: Author

Note: Factor analysis has identified three components

5.2.1.1. Factor loading of items

The extraction under the principal component analysis, the pattern matrix is derived by rotated oblimin with Kaiser Method of normalization, it gave 9 iterations. Rotation is oblimin believing that the factors are not independent; rather they all are correlated to each other. With this matrix it is found that, variables from 1 to 6 are having a almost near value to be grouped under the component 1. While component 2 is having variable number 7 & 8 and component 3 is having variable 6 & 9 but are in not similar values.

5.2.1.2. Pattern Matrix (3 components)

Pattern matrix describes the pattern of the items, which are extracted by a Principal component analysis and by following an oblimin rotation with Kaiser Normalization. The pattern matrix is presented in the below table (10)

Table: 10. Pattern matrix

Pattern Matrix[a]			
	Component		
	1	2	3
faculty	.855		
Brand	.843		
others	.834		
university	.736		
placement	.692		
reference	.628		.394
Free		-.758	
Fees	.534	.619	
distance			.973

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.
a. Rotation converged in 9 iterations.

Source: Author

5.2.1.3. Component correlation (3 components):

The next step is to do an analysis of component correlation analysis, under this it is found that there is very low degree of correlation between the component 1 & 2. There is small correlation between the component 1 and 3. The rotation for normalization is once again by the Oblimin with Kaiser Method for the extraction under principal component analysis.

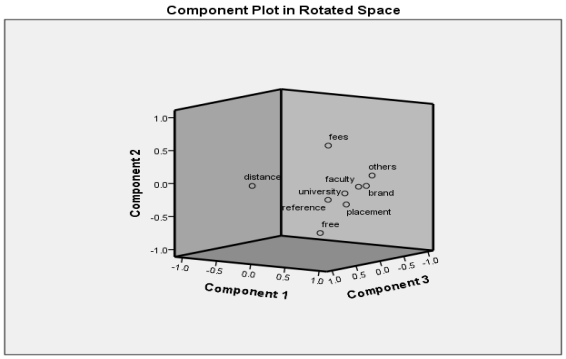
Table: 11. Component correlation Matrix

Component Correlation Matrix			
Component	1	2	3
1	1.000	-.085	.317
2	-.085	1.000	-.068
3	.317	-.068	1.000
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.			

Source: Author

The same is presented in form of a 3 D model, which also further confirm that 6 variables are good enough to be considered under one component i.e. component 1.

Chart: 11. 3D plot of component correlation matrix



Source: Author

5.2.2. Component Matrix (2 components)

With reference to the above analysis, the researchers have decided to ignore three component analyses to practices, and a two component analysis is introduced.

The component matrix has shown a significant value for further pattern matrix analysis.

Table: 12. Component Matrix (2 component)

Component Matrix[a]		
	Component	
	1	2
faculty	.874	
reference	.843	
university	.834	
placement	.774	
brand	.773	
others	.674	
distance	.415	
free	.443	-.696
fees	.547	.662
Extraction Method: Principal Component Analysis.		
a. 2 components extracted.		

Source: Author

5.2.2.1. Pattern Matrix (2 components):

The pattern matrix values are also significant; hence it is further exposed to the structure matrix.

Table: 13. Pattern matrix

Pattern Matrix[a]		
	Component	
	1	2
faculty	.872	
reference	.846	
university	.835	

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

placement	.788	
brand	.774	
others	.669	
distance	.397	
free	.485	-.697
fees	.506	.663
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.		
a. Rotation converged in 6 iterations.		

Source: Author

5.2.2.3. Structure Matrix (2 Components):

Under the structure matrix all the variables are significant. It is further exposed to correlation matrix between component 1 & 2.

Table: 14. Structure matrix

Structure Matrix		
	Component	
	1	2
faculty	.874	
reference	.843	
university	.834	
placement	.774	
brand	.773	
others	.674	
distance	.415	.315
fees	.546	.694
free	.443	-.667
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.		

Source: Author

5.2.2.4. Component Correlation Matrix (2 Components):

Under the component correlation matrix method, it is found that there is 61% correlation between component 1 & 2.

Table: 15. Component correlation Matrix

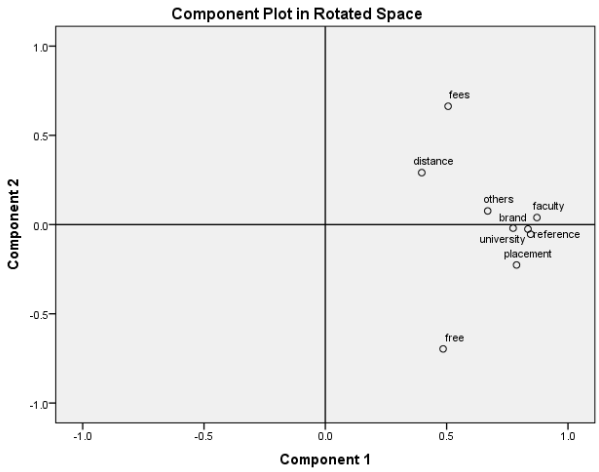
Component Correlation Matrix		
Component	1	2
1	1.000	.061
2	.061	1.000
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.		

Source: Author

5.2.2.5. Component plot-Rotated (2 Components)

The component plot is designed to express the same in a pictorial presentation. It is found that component one is having 6 variables concentrated in one space and rest three (fees, distance and free) are scattered and could be considered under component 2.

Chart: 12. Scattered plot of component correlation matrix



Source: Author

5.3. Results

We finally we got list of variables under the principal component one and two are as follows;

Principal component 1 includes 6 variables i.e.

1. University
2. Placement
3. Reference

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

4. Faculty
5. Brand image
6. Others

While, the Principal component 2, includes 3 variables i.e.

1. Distance
2. Course fees
3. Free seat

VI. RELIABILITY TEST:

The next step is to do a reliability study of these two components.

6.1. Reliability statistics for component one (1)

6.1.1. Summary of Principal component one.

A reliability study starts from a case processing summary, which is as follows (Table 1);

There are 120 valid responses, no missing values, and a list wise deletion of variables procedure is applied.

Table: 16. **Case Processing Summary of component one**

Case Processing Summary			
		N	%
Cases	Valid	120	100.0
	Excluded [a]	0	.0
	Total	120	100.0
a. Listwise deletion based on all variables in the procedure.			

Source: Author

6.1.2. Reliability statistics of Principal component one:

The reliability statistics is expressed in form a Cronbach's alpha, the same is used to measure the internal consistency (coefficient of reliability) of the data i.e. the how closely the items are correlated as a set of item and also as a group.

It is to note that, ahigher value of alpha represents a higher degree of internal consistency i.e. they are related to each other very closely.

The value of cronbach's Alpha derived (Table 17) is .891 which is significant enough to conclude that there is a very high degree or internal consistency between the items and within the groups.

Table: 17. **Reliability Statistics of component one.**

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.891	.893	6

Source: Author

6.1.3. Inter-item correlation of Principal component one:

The inter item correlation is found to be significant, being the values are positive and on higher values.

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Table: 18. **Inter-Item Correlation Matrix of component one.**

Inter-Item Correlation Matrix						
	placement	reference	faculty	brand	others	university
placement	1.000	.576	.655	.558	.407	.660
reference	.576	1.000	.691	.552	.467	.647
faculty	.655	.691	1.000	.694	.486	.724
brand	.558	.552	.694	1.000	.540	.581
others	.407	.467	.486	.540	1.000	.471
university	.660	.647	.724	.581	.471	1.000

Source: Author

The inter item correlations reveals the following information;

With Item Placement, item faculty quality is best correlated

With item reference, item faculty quality again best correlated

With item faculty, Item University is best correlated.

With item brand image, item faculty is best correlated

With item other cause, Item University is best correlated

With item university, item faculty is best correlated.

Table: 19. **Inter-Item Covariance Matrix of component one.**

Inter-Item Covariance Matrix						
	placement	reference	faculty	brand	others	university
placement	1.559	.849	1.125	.988	.700	1.042
reference	.849	1.395	1.122	.924	.761	.966
faculty	1.125	1.122	1.889	1.353	.921	1.258
brand	.988	.924	1.353	2.010	1.055	1.042
others	.700	.761	.921	1.055	1.899	.821
university	1.042	.966	1.258	1.042	.821	1.601

Source: Author

6.1.4. Summary statistics of principal component one (1)

Summary of the statistics is presented below (table 20) reveals the following information;

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Mean value is 3.683 which is much convincing; inre item covariance is about 99.5 %. Correlation is about 58.1%.

Table: 20. **Summary Item Statistics of component one.**

Summary Item Statistics							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.683	3.500	3.958	.458	1.131	.033	6
Item Variances	1.725	1.395	2.010	.615	1.441	.058	6
Inter-Item Covariances	.995	.700	1.353	.653	1.933	.031	6
Inter-Item Correlations	.581	.407	.724	.317	1.778	.009	6

Source: Author

On the individual item analysis, all the 6 variables found having Cronbach's alpha much higher i.e. coefficient is more than .855 and as high as .895.

6.1.5. **Item-Total Statistics of component one.**

Table: 21. **Item-Total Statistics of component one.**

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
placement	18.5333	29.243	.697	.520	.874
reference	18.6000	29.570	.720	.543	.871
faculty	18.1417	26.761	.813	.691	.855
brand	18.3000	27.472	.722	.549	.870
others	18.5750	29.793	.566	.345	.895
university	18.3500	28.347	.762	.614	.864

Source: Author

6.1.6. Intra-class Correlation:

The intra-class correlation (table 22) with single measure is 0.577 and with average measure is 0.891.

Note: the intra class correlation coefficient at its lower side must be above .7, more the coefficient is more the correlation.

Hence we could find that there is a higher degree of intra class correlation between the items. As it is higher than .7 and it is almost .9 hence there is a very high degree of correlation. Also on its lower bound it is .858 which is large enough to conclude the same, and its upper bound it is .919. These all signifies that there is a very high degree of correlation within the class.

The significant F value is 0.0001 which is less than .001, which represents that there is a significant relation between the items.

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Table: 22. **Intra-class Correlation Coefficient of component one**

Intraclass Correlation Coefficient							
	IntraclassCorrelation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.577[a]	.501	.653	9.179	119	595	.000
Average Measures	.891[c]	.858	.919	9.179	119	595	.000
Two-way mixed effects model where people effects are random and measures effects are fixed.							
a. The estimator is the same, whether the interaction effect is present or not.							
b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.							
c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.							

Source: Author

6.2. Reliability statistics for component two (2)

6.2.1. Case Processing Summary

Case summary is similar to the component 1

Table: 23. **Case Processing Summary of component two.**

Case Processing Summary			
		N	%
Cases	Valid	120	100.0
	Excluded[a]	0	.0
	Total	120	100.0
a. Listwise deletion based on all variables in the procedure.			

Source: Author

6.2.2. Reliability statistics:

Reliability statistics for internal consistency through Cronbach's alpha gave the coefficient value of .333 which is much lesser than .07, hence these is an issue of internal consistency in the data set. We should not proceed for any further analysis. Still we believe to re test on other dimensions.

Table:24. **Reliability Statistics of component two**

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.333	.317	3

Source: Author

6.2.3. Inter-item correlation:

The inter item correlation is also very poor i.e. less than .280 and even negative. Further rejects any type of inter item correlation.

Table: 25. **Inter-Item Correlation Matrix of component two**

Inter-Item Correlation Matrix			
	fees	distance	free
fees	1.000	.280	-.003
distance	.280	1.000	.125
free	-.003	.125	1.000

Source: Author

6.2.4. Inter-item covariance:

Same issue with the inter item covariance. It's not significant

Table: 26. **Inter-Item Covariance Matrix**

Inter-Item Covariance Matrix			
	fees	distance	free
fees	1.432	.452	-.004
distance	.452	1.815	.184
free	-.004	.184	1.190

Source: Author

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

6.2.5. Summary item statistics

The summary stamen says, there is no issue with the item means, but the correlation and covariance is not significant.

Table: 27. **Summary Item Statistics**

Summary Item Statistics							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.572	3.442	3.783	.342	1.099	.034	3
Item Variances	1.479	1.190	1.815	.625	1.525	.099	3
Inter-Item Covariances	.211	-.004	.452	.456	-104.097	.042	3
Inter-Item Correlations	.134	-.003	.280	.284	-84.283	.016	3

Source: Author

6.2.6. Item Total statistics:

The individual item also shows a negative or very low coefficient of Cronbach'salpha, that means the internal consistency of the individual item is also not significant. This violates the reliability model further.

Table: 28. **Item-Total Statistics**

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
fees	6.9333	3.374	.204	.080	.219
distance	7.2250	2.613	.292	.095	-.007[a]
free	7.2750	4.151	.081	.017	.436
a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.					

Source: Author

6.2.7. Intra-class Correlation:

To check the intra class correlation, we found the correlation coefficient is .333 which much lower than the desired value of 0.7. and on 95% confidence level it shows only .095 on its lower side and .561 on its higher side. Hence we could definitely say that there is no intra class correlation. To justify the same again, the F test value also reject the same with the significant value of .005, which is much lower than the critical value of .001

Table: 29. **Intra-class Correlation Coefficient**

Intra-class Correlation Coefficient							
	Intra-class Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.142[a]	.034	.262	1.498	119	238	.005

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

Average Measures	.333[c]	.095	.516	1.498	119	238	.005

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

VII. FINDINGS & SUGGESTIONS:

7.1. Research Findings:

The model validates that, out of nine items (variables) selected for this study only 6 are the valid cases which impacts positively while a student select a specific institution for its higher professional educations. These variables in order of their preferences are as follows;

Placement, Reference, Quality faculty, Brand image, some other factors and finally the University.

It is also can be concluded that the items are also correlated to each other in many ways, i.e. intra item and inter item. There are few best fit of first order could be determined. These are as follows;

With Item Placement, item faculty quality is best correlated

With item reference, item faculty quality again best correlated

With item faculty, Item University is best correlated.

With item brand image, item faculty is best correlated

With item other cause, Item University is best correlated

With Item University, item faculty is best correlated.

It further found that the variables like, Distance, Fees and free seats have never attract a student for pursuing its post further professional education.

7.2. Suggestions:

The research suggests the following points;

A professional educational institution shall give more importance on the activities related employability activities, these shall include all employability capacity enhancing skills i.e. all skill related to industry and market demands.

It further suggest that the students, the parents of the students and their friends and relatives shall be satisfied with the services offered by the institution, so that they will refer the information seeking students to get admission.

Quality of the faculties also acts as a best part of the human resource, who play a major role in attact the students to get admitted. The quality in terms of both intellectual as well as human skills are the basis of measurement.

Brand image is such an intangible thing which comes automatically by consistent performance of the institution in all dimensions of performance. Hence there is no short cut to get the brand image overnight.

There are some other factors which are hidden, sometimes they follow an ideal person who is studying or going to joi. It is also group of friend they take decision as a whole group, they move in a mass.

People also prefer a university due to its flexibility on curriculums and other facilities which a university only can offer to its students. Hence being a University, an institution gets the advantage by its own benefits.

VIII. CONCLUSION AND SCOPE FOR FURTHER RESEARCH:

Conclusion;

The model of principal component analysis is used in this research article to evaluate the principal components which affect the decision making process of a student while he/ she is going to pursue a professional higher education. There are 9 items initially selected and among the items, we could construct only two principal components. The Principal component 1 contains 6 items and

January - February 2020
ISSN: 0193-4120 Page No. 8402 – 8422

component 2 contains 3 items. The items under component 1 justified the selection perceptions and component 2 fails to do so.

Scope for further research:

This study is open for further more inter related studies by its analysis and application. Few of these are follows;

The study on basis of gender preferences is still open for this research article

Instead PCA, a Factor analysis model could be applied to measure the items.

Instead of SPSS, some other statistical tool could be used to test the same. E.g. R Analytics, AMOS etc

REFERENCES

1. Senthilkumar, N., &Arulraj, A. (2011). SQM-HEI–determination of service quality measurement of higher education in India. Journal of Modelling in Management, 6(1), 60-78.
2. Arambewela, R., & Hall, J. (2009). An empirical model of international student satisfaction. Asia Pacific journal of marketing and logistics, 21(4), 555-569.
3. Marks, Ronald B., Stanley D. Sibley, and John BenardArbaugh. "A structural equation model of predictors for effective online learning." Journal of management education 29.4 (2005): 531-563.
4. Marks, Ronald B., Stanley D. Sibley, and John BenardArbaugh. "A structural equation model of predictors for effective online learning." Journal of management education 29.4 (2005): 531-563.
5. Senthilkumar, Nakkeeran, and A. Arulraj. "Role of placement in determination of service quality measurement of higher education in India." International Journal of Management Research and Technology 3.1 (2009): 293-307.
6. Pituch, K. A., & Lee, Y. K. (2006). The influence of system characteristics on e-learning use. Computers & Education, 47(2), 222-244.
7. Nora, A. (1987). Determinants of retention among Chicano college students: A structural model. Research in higher education, 26(1), 31-59.
8. Sahu, J. K., &Sahu, M. (2016). Service Quality of Public Sector Banks in India A Gap Between Perception and Expectation. International Journal of Engineering and Management Research (IJEMR), 6(2), 573-578.