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## The Endogenous Indicators for Performance of Teacher Education Institutions: An Exploratory Factor Analysis

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### Abstract:

*The aim of the present study was to explore endogenous indicators for performance of teacher education institutions. These endogenous indicators were developed through perception of the responders (students, staff and administrators) towards quality aspects of the teacher education institutions therefore 330 sample consisting of 200 students, 100 staff and 30 administrators were selected through stratified sample method from AMU, central university, D.E.I (deemed university) and eight teacher education institutions from Dr. B. R. Ambedkar university, Agra. The investigator constructed a rating type scale to explore endogenous indicator. Item – total item correlation and internal consistency (Cronbach's alpha reliability) was calculated and this protocol was followed for item analysis and refinement of the Endogenous Indicator*

*Development Scale (EIDS). Those items placed in the final form of the scale having more than 0.3 value of item-total item correlation. Finally a set of 35 items placed in the final form of the scale. The index of Cronbach's alpha reliability and test retest reliability were found satisfactory. The content and face validity were established for this scale (EIDS). The statistical techniques "factor analysis" performed using SPSS 16.0 version. The six indicators were found and known as governance, student support and progression, team effort and healthy coordination, knowledge assimilation, faculty quality and development and infrastructure with innovative resources and these indicators accounted nearly 75 percent of variance among observed quality aspects of the teacher education institutions.*

**Key words:** Endogenous Indicators, Exploratory factor analysis, Performance

## **Introduction:**

The demand for qualified and quality teachers has been continuously increasing over the world. There has been an unprecedented expansion of school education especially in the developing countries. In the past few years researchers have worked on factors that are instrumental in improving the efficiency of teacher education Institutions. Forecasting performance of the teacher education is a problem of obvious importance in education. Educationist, researchers and guidance workers always look for some endogenous indicators for predicting performance of Teachers Education Institute.

**Singh (1995)** emphasized that the educationists in the country were greatly concerned and anguished with the continued deterioration in the quality of teacher education.

**Garg (2000)** studied growth and development of teacher education in the post independence period and he found that the teacher education after independence had expanded at a very faster rate but not focused on the quality aspect of teacher education programme.

**Narayan Rao and Brahadeeswaran (2004)** found that personnel management, financial management, classroom teaching, library facilities, interaction with external agencies, information network, decentralized responsibilities, programme for professional development and matching between Job and person were important indicators for quality and standard of higher education.

**Singh and Singh (2007)** stated that quality control was a major problem in teacher education and neither the State Governments nor the Universities tried to enforce the minimum standards required for teacher preparation. As a result it was found that there were a large number of institutions which did not have the minimum necessary buildings, furniture, library, teaching staff with appropriate qualifications etc.

It is found from the literature that after providing the NCTE a statutory status, there has been a mushroom growth of privately managed self-financed secondary teacher education institutions in India. {Singh (2005) and Sidhu (2004)}. Most of the privately managed colleges in India did not follow the norms the standards prescribed by NCTE. {NCTE (1998)}. Quality had been deteriorating with the increase in quantity of institutions {Singh (2004)}. Most of the privately managed self-financed colleges were established with the motive of profit making. {Singh (2004) and Joshi (2005)}.

In relation to quality performance of the teacher education institutions, the review of literature revealed that quality should be identified as a key indicator for the performance of any educational institution. Many researchers have postulated that variables such as periodic review of curriculum, continuing education, consultancy, staff development, research development, co-curricular activities, academic environment, student teacher interaction, decentralized administration, organizing seminar, conferences and workshops for teachers and staff influence the quality of education. The investigator focused on Endogenous factors

which truly reflect internal aspect of the institutions and these factors may be enhanced within the institutions. A perusal of the related literature further reveals that only countable numbers of studies have been conducted in India related to the quality indicators for performance of Teacher education Institutions. In the present study it was planned to explore the endogenous indicators for performance of teacher education institute through factor analysis.

### **Objective of The Study:**

This study is conducted with basic objective as: To explore the endogenous indicators affecting the quality of teacher education institutions through factor analysis.

### **Research Methodology:**

The aim of the present study to explore endogenous indicators for performance of teacher education institutions, therefore, the methodology was designed in the following manner-

**Research method:** The investigation followed descriptive survey method to explore endogenous quality indicators through the sample of students, staff and administrators.

**Sample design:** Investigator decided to select the Students who have appeared or qualified minimum master degree in education and above, Staff who had NET or Ph.D with minimum 2 year experience in teaching and Administrators who had qualified NET or Ph.D with minimum 2 year experience in administrative area. Hence 330 (200 students, 100 staff and 30 administrators) sample units were selected from Aligarh Muslim University, Aligarh, Dayalbagh Educational Institute, Agra and eight teacher education institutions affiliated to Dr B. R. A. University, Agra through stratified random method whereas institutions which selected

through purposive method of sampling because of exiting criteria of sample units.

**Instrument and its development:** The investigator constructed a rating type scale to develop endogenous indicator for performance of teacher education institutions. In the preliminary phase of the scale investigator observed and piling a large numbers of items which expressed and ensured comprehensive coverage of the most relevant domains of the quality of the teacher education institutions and placed in first draft. These items were collected by making extensive study of different literature sources such as the books, journals, dissertation abstracts, reference books, surveys of educational research, research studies of different researchers and institutions, newspapers, magazines, publications of National Council of Teacher Education, MHRD, Govt. of India and related websites. There were 30 items enlisted in the first draft. The bunch of these items was given to 15 experts for getting their opinion and they were asked to sort out all the items into two categories such as (1) Related to the quality aspect of teacher education (✓) and (2) Unrelated to quality aspect of teacher education (×) and also requested them to suggest such items (except the listed items) that directly or indirectly influence the quality or performance of teacher education institutions. After that only those items were retained which have 75 percentage approvals of experts. Some more items suggested by experts were placed in this draft of the tool. Finally 40 items were retained in the second draft of this scale, A list of 40 items were administered on the 50 responders (10 administrators, 20 staff and 20 students) for refinement of the scale. Item – total item correlation and internal consistency (Cronbach's alpha reliability) protocol were followed for item analysis and refinement of the scale. Those items placed in the final form of the scale having more than 0.3 value of item-total item correlation. Finally a set of 35 items placed in the final form of the scale. The internal consistency and test retest

reliability were estimated for the final form of the scale and index of Cronbach's alpha reliability and test retest reliability were found satisfactory. The content and face validity were established for this scale (EIDS).

### **Statistical Techniques:**

The data was analyzed through descriptive and inferential statistics using SPSS 16.0 version. The questions and responses were coded and entered in the computer using Microsoft Excel Software. Required analysis was done with the help of Statistical Package for Social Sciences 16.0 Version. The researcher has adopted various measures of statistics in order to arrange and thrash out the essence from the collected data and to make the data meaningful the following statistical techniques were used:

1. Mean
2. Standard Deviation
3. Factor analysis
  - i. Correlation matrix (Pearson moment)
  - ii. KMO & Bartlett's Test for sample adequacy
  - iii. Index of communalities
  - iv. Eigen values
  - v. Scree plot
  - vi. Factor loading
  - vii. Rotated component matrix

### **Discussion**

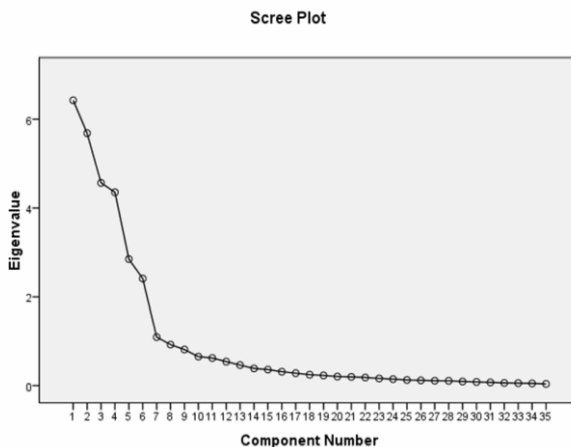
In the pre-requisite phase, the Kaiser-Meyer-Olkin (KMO) for the sampling adequacy and the Bartlett's test of sphericity for the appropriateness of data were performed by investigator (**Table 1**) in which it is ensured that the correlation matrix is identical or not (characteristics of correlation matrix) because factor analysis would be meaningless with an identity matrix .KMO

value can be considered as adequate that should be greater than 0.6 (Kaiser and Rice, 1974). KMO value was found high (0.777) which indicates that the data set is highly desirable for factor analysis. The high KMO value indicates adequate and high correlation existed among the variables and appropriate for extraction of factors. A significance value of chi-square (Bartlett's test) at  $p=0.01$  indicates that the data do not produce an identity matrix and have significant deviation from identity matrix. This result implies that the data is thus approximately multivariate normal and acceptable for factor analysis

**Communalities for quality items:** Communality in Factor Analysis is same thing like  $R^2$  (R square) in the regression analysis and it shows the extent to which the derived factors explain the particular item. The factor should explain at least half of each original item's variance, so the communality value for each item should be 0.50 or higher (Malhotra, 2006). If communality value for a particular item is low ( $<0.5$ ), then that item cannot be considered for factor analysis and If communality value for a particular variable is high ( $>0.5$ ) then that item can be considered for factor analysis. Communality index values (**Table-2**) for each quality items was found relatively large (greater than 0.5), so we can say that all the items have large proportion of its variance which can be accounted by the common factors, hence all items are acceptable for further analysis. The investigator found in pre-requisite phase of factor analysis that the obtained data is appropriate and adequate and also the items have large proportion of its variance accounted by the factors which indicates the suitability pre-requisites for factor analysis.

**Principal Components Analysis (PCA) for Factor Extract:** In this step, investigator determined the number of factors which extracted with the quality items, PCA is a method used to transform a large set of items into a small set of factors.

Eigen values are used to consolidate the variance. In factor analysis, Eigen values are used to condense the variance accounted by the factor. The factor with the largest index of Eigen value has the most variance and considered for further analysis, and the factors with small or negative Eigen value ( $<1$ ) that are usually omitted from solutions" (Tabachnick and Fidell, 1996.). Only those components placed which have Eigen value equal or greater than 1. It was found that there are six factors which have Eigen value more than 1 and also accounted 75.128 percent of the variance among the quality items (**Table - 3**) which is exceed than the 60 percent threshold commonly used in social sciences to establish satisfaction with the solution (Hair et al., 1995) and also it is seen that first factor accounted 17.925 % of total variance among the quality items and second, third, fourth, fifth and sixth factor accounted 15.636%, 12.390%, 11.131%, 9.913% and 8.133% respectively. These six factors accounted and explained the large amount of quality aspects or performance of teacher education institutions. "Scree plot" for 35 quality items with their factor loading value is obtained and shown as under-



It is clearly seen from scree plot 1.01 which indicates there are six factors which can be seen through elbows of the plot and



result of scree plot can be validated with above PCA output analysis.

**Rotated Component Matrix for Factors:** In this step, Varimax with Kaiser Normalization method for rotated component matrix (**Table-4**) is used in the present study. The inclusion of items in the factor was determined by their factor loadings. Factor loadings are the correlation of the items with the factor. It indicates the strength of the relationship between the item and factors. 35 items considered in the primary data were reduced to 6 factors model and each factor was given a name which associated with the corresponding items. The factor with their representative items are given in the following **Table -5:**

**Table 5: Percentage of variance accounted by determined endogenous indicators and their quality items with factor loading.**

Factors	Percentage of variance	Items with factor loading	Endogenous indicators
A	17.925	Mixed policy of centralized and decentralized management (.924), Recruitment and salary as per norms (.900), Accountability of staff (.814), Curriculum updated frequently (.828), Students involvement in the administration (.826), Transparent admission policy and fee structure (.812) Periodic investigation and supervision by administrative authority (.780), Academic calendar (.792), Comprehensive and continuous assessment (.738)	<b>Governance</b>
B	15.636	Placement cell (.927), Student motivation for self learning (.901) Guidance and counseling facility (.939), Physical activity programme (.909), Attendance involvement in scholastic achievement (.902), High-tech teaching and learning environment (.841), Clear vision and mission in the mind of students (.705)	<b>Student Support and Progression</b>
C	12.390	Balanced work load among staff (.915), Staff student ratio (.909), Healthy staff student interaction (.924), Subject-wise teaching staff (.930), Internal coordination and management (.906)	<b>Team effort and Healthy Coordination</b>
D	11.131	Guest lecture by educational expert. (.858), Organizing seminar, conferences and workshops. (.823), Remedial coaching. (.617), Focus on teaching practice (.837), Enriching social, cultural	<b>Knowledge Assimilation</b>

		and leisure activities (.732), Enforcement on research development. (.810)	
E	9.913	Highly motivated faculty with high job satisfaction (.924), Reward and recognition for outstanding progress (.889), Staff setting goal for teaching Development (.899), Well qualified and experienced teaching faculty (.907)	<b>Faculty quality and Development</b>
F	8.133	Library with innovative resources (.855), Financial assets as per norms (.896), Electronic multimedia and laboratories (.843), Students support facilities e.g canteen, toilet, water etc. (.727)	<b>Infrastructure With Innovative Resources</b>

It is revealed from the table-5 that there are six indicators which labeled with their common features. These indicators are known as governance, student support and progression, team effort and healthy coordination, knowledge assimilation, faculty quality and development and infrastructure with innovative resources and these indicators accounted nearly 75 percent of variance among observed quality aspects of the teacher education institutions. The index of factor loading is shown with quality items that indicate the level of importance of items in the endogenous indicators.

### **Conclusion of the Study:**

It is concluded that the determined six endogenous indicators accounted 75.128 percentage of total variance among the observed quality aspects of teacher education institutions and high value of communality for each item is indicated that observed quality items play important role for overall development of teacher education institutions. The endogenous indicators such as knowledge assimilation, governance and student support and progression accounted more percentage of variance among the observed quality items. It means these aspects of teacher education are most important determinant for performance of teacher education institutions.

## Annexure

**Table 1: Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.777*
Bartlett's Test of Sphericity (measure for identify the correlation matrix)	<b>Chi-Square</b>	1205. 4
	<b>Degree of freedom</b>	595
	<b>Level of significant</b>	.01

\* High and Adequate (>0.6)

**Table 2 : Communalities for Each Quality Items**

Items	Initial	Extraction	Items	Initial	Extraction
<b>GLEX</b>	1.000	<b>.823</b>	<b>BWL</b>	1.000	<b>.850</b>
<b>OSCW</b>	1.000	<b>.700</b>	<b>SSR</b>	1.000	<b>.841</b>
<b>RC</b>	1.000	<b>.652</b>	<b>HSSI</b>	1.000	<b>.858</b>
<b>FTP</b>	1.000	<b>.781</b>	<b>SWTE</b>	1.000	<b>.870</b>
<b>ESCLA</b>	1.000	<b>.584</b>	<b>ICAM</b>	1.000	<b>.824</b>
<b>CCA</b>	1.000	<b>.587</b>	<b>PC</b>	1.000	<b>.864</b>
<b>LIR</b>	1.000	<b>.780</b>	<b>SMSL</b>	1.000	<b>.820</b>
<b>FAPN</b>	1.000	<b>.819</b>	<b>GCF</b>	1.000	<b>.885</b>
<b>EMAL</b>	1.000	<b>.741</b>	<b>PAP</b>	1.000	<b>.846</b>
<b>SSF</b>	1.000	<b>.533</b>	<b>AISA</b>	1.000	<b>.819</b>
<b>CCDM</b>	1.000	<b>.862</b>	<b>HTLA</b>	1.000	<b>.738</b>
<b>RSPN</b>	1.000	<b>.813</b>	<b>CVMMS</b>	1.000	<b>.509</b>
<b>AS</b>	1.000	<b>.664</b>	<b>HMFHJ</b>	1.000	<b>.885</b>
<b>CUF</b>	1.000	<b>.704</b>	<b>RROP</b>	1.000	<b>.816</b>
<b>SIA</b>	1.000	<b>.701</b>	<b>SSGTD</b>	1.000	<b>.859</b>
<b>TAPFS</b>	1.000	<b>.665</b>	<b>WQETF</b>	1.000	<b>.847</b>
<b>PISAA</b>	1.000	<b>.621</b>	<b>ERD</b>	1.000	<b>.691</b>
<b>AC</b>	1.000	<b>.642</b>			

**Table 3 : Factor Structure with Eigen Values and percentage of Variance**

Components	Initial Eigen Value	Rotation Sums of Squared Loadings	
		% of variance	Cumulative percentage
<b>1</b>	6.426	17.925	17.925
<b>2</b>	5.686	15.636	33.562
<b>3</b>	4.566	12.390	45.951
<b>4</b>	4.356	11.131	57.083
<b>5</b>	2.850	9.913	66.995
<b>6</b>	2.411	8.133	75.128

**Table 4 : Rotated Component Matrix for Factors**

ITEMS	Component					
	1	2	3	4	5	6
CCDM	<b>.924</b>	.010	.016	.055	.072	-.021
RSPN	<b>.900</b>	-.017	-.052	.005	-.016	-.010
CUF	<b>.828</b>	-.089	.035	.045	.060	.061
SIA	<b>.826</b>	.040	-.054	-.031	-.093	-.070
AS	<b>.814</b>	-.008	-.005	.004	-.007	-.032
TAPFS	<b>.812</b>	.001	.026	-.071	-.003	-.020
AC	<b>.792</b>	-.093	.039	.053	.029	.013
PISAA	<b>.780</b>	.003	-.013	-.088	.056	-.045
CCA	<b>.738</b>	-.043	.051	-.155	.043	-.108
GCF	-.027	<b>.939</b>	.014	.031	-.020	-.014
PC	.020	<b>.927</b>	.032	.017	-.034	-.036
PAP	-.141	<b>.909</b>	.006	.014	-.014	-.004
AISA	-.014	<b>.902</b>	-.029	-.049	-.005	-.048
SMSL	.030	<b>.901</b>	.028	.017	-.082	.019
HTLA	-.101	<b>.841</b>	-.032	-.135	-.011	-.041
CVMS	.028	<b>.705</b>	-.070	-.071	-.014	-.018
SWTE	-.047	-.033	<b>.930</b>	.021	.022	.042
HSSI	.032	.028	<b>.924</b>	.006	-.038	.017
BWL	-.043	-.060	<b>.915</b>	-.027	-.053	.058
SSR	.087	.027	<b>.909</b>	-.013	-.073	.033
ICAM	.012	-.024	<b>.906</b>	.034	.041	.008
GLEK	-.213	-.090	.103	<b>.858</b>	.147	-.014
FTP	-.064	-.119	.118	<b>.837</b>	.197	.096
OSCW	-.022	.042	-.126	<b>.823</b>	-.019	-.059
ERD	.052	.015	.111	<b>.810</b>	.133	.035
ESCLA	-.047	-.034	-.178	<b>.732</b>	-.013	-.113
RC	.081	-.019	.027	<b>.617</b>	.243	-.068
HMFHJ	.072	-.012	-.037	.153	<b>.924</b>	-.032
WQETF	-.006	-.094	-.061	.096	<b>.907</b>	.055
SSGTD	.024	-.083	-.047	.203	<b>.899</b>	.015
RROP	.028	.030	.038	.149	<b>.889</b>	.011
FAPN	-.078	-.014	.044	-.019	.086	<b>.896</b>
LIR	-.139	-.030	.131	.107	.026	<b>.855</b>
EMAL	-.014	-.061	-.015	-.147	-.071	<b>.843</b>
SSF	.030	-.015	-.004	-.054	.004	<b>.727</b>

**Extraction Method : Principal Component Analysis.**  
**Rotation Method : Varimax with Kaiser Normalization.**  
**\* Highlighted value of factor loading for each item indicates representative component or factor.**

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