

Factor Analysis to Explore the Indicators of Quality Assurance Mechanism on Higher Educational Institutions in Pakistan

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Abstract: The study aims to gauge the effectiveness of Quality Assurance Mechanism (QAM) and its impact on quality of education in Higher Education Institutions in Pakistan. In this study, a comprehensive survey was conducted, through a well-structured questionnaire, to collect essential data from the respondents. A total of 300 teachers of 5 private and 5 public sector universities were participated in the study. The Cronbach's alpha reliability value is found to be almost 0.80 for all construct of the instrument in this study. An independent t- test was carried out to reveal the significant difference among private and public sector universities in terms of quality of education. The p-value (significance value) of this test in each construct indicates that there is significant difference among private and public sector universities regarding quality assurance practices. Furthermore, the multivariate statistical tool "Exploratory Factor Analysis (EFA)" was used to explore the underlying pattern of the public and private sector universities data. Finally, four factors emerged in the data whose eigen value are greater than one. Factors emerges in public sector universities data represents teacher's satisfaction and combination of budget allocation and funding while factors that emerges on private sector universities are the combination of globalization, ranking and adequate funding.

Keywords: Quality Assurance (Q.A), Higher Education Commission (H.E.C), Independent t-test, Exploratory Factor Analysis (EFA), Factors, Reliability, Globalization (Glob), Ranking.

1. INTRODUCTION

In any civilized country higher education is considered to be backbone of the society. The quality of human resources in the country is depending on the quality of higher education. In recent days higher education is considered to be a complex system which facilitates teaching, international cooperation and research extension and understanding [1].

Higher education is considered as one of the main tools for development and prosperity. It provides the human resource and intellectual capital that satisfies basic, social, economic psychological and cultural needs. Higher Education Institutions produce, train and nurture brains; develop attitudes, skills and dispositions; and open a new world of opportunities for the country and its people. In the context of Pakistan, it has ideological meanings attached to its purposes as well. As an ideological country and to build a competitive nation, Pakistan requires scientifically trained persons for the socio-economic development of the country.

1.1. Quality Assurance in Higher Education

The main purpose of quality assurance in higher education is to implement quality assurance policies

and practices for higher education [2]. The quality assurance in Higher Educational Institutions means quality of students, teachers and support services and ultimately the quality of the country is the important aspect of higher education. This research focused on Higher Education Institution of Pakistan to investigate how and what practices they employ to assure quality in their institutions as perceived by their human resource.

Quality assurance frame work as per Higher Education Commission standards includes curriculum design, quality of faculty, and quality of research; available technological infrastructure administrative policies and accreditation regime are the key factors that influence the quality in higher education. Indicators of Quality Assurance can be divided into three phase which are educational inputs, educational output, and educational process respectively. The key components of educational inputs that are provided by the students at each stage are manpower, physical measures and financial measures. Financial measures relate to student expenditure. Infrastructure condition, class rooms, laboratories and use of international equipment are the components of physical measures. Number of personnel of different types related to numbers of students at each level is expressed as manpower or human resources. Educational qualification, experience, academic competencies and attitude are also considered.

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1.2. Quality Assurance Mechanism through Higher Education Commission Pakistan

The assessment of quality of education in tertiary education is a new trend in Pakistan. The quality education issue needs to be addressed at large scale. Higher Education Commission (HEC) of Pakistan has established in 2002. The aim of HEC is to improve the quality of higher education and to pursue the agenda of knowledge based economy.

Higher Education Commission (HEC) facilitates and encourages the process of the quality assurance in public and private sector universities for the implantation of quality enhancement programs. HEC has issued standard operating procedures (SOPs) to the universities, for the implantation of quality enhancement in system which includes, program, objective, mission, outcomes, curriculum design and organization, computer facilities and laboratories, institutional facilities and institution support. All universities are subjected to annual financial audit, tradition of academic audit, peer review to maintain the quality assurance in the universities. Now is a realization that in different quality of student, teachers and flawed institutional frame work are main contributing factors in lowering the quality of higher education.

1.3. Relevance of the Study

Like in the countries with the world most developing higher education. It is the need for reformation and transformation of higher education in Pakistan during last two decades. Higher Education Commission in Pakistan has occurred several changes in the higher education structure. Quality of education is emphasis more rather than quantity and emphasis is laid on the implementation of idea of pay for performance and quality. In the focus of this study we have laid one of the main stakeholders, partner of higher education, namely the teacher. From the teachers we examine the questions concerning the quality of higher education.

1.4. Objective of the Study

The main objectives of the study were as follows:

1. Explore the factors that facilitate quality assurance practices in public and private sector universities.
2. Examining the quality assurance practices in public and private universities.

3. Compare the quality assurance practices of education in public and private sector.

1.5. Research Hypothesis

We expressed our research hypothesis on the areas to our primary examinations based on the research objectives.

H1: The factor that emerges from the data represents quality indicators i.e teacher's satisfaction level, ranking of universities, globalization, and adequate funding.

After discussing a background of the study, the paper underline past research conducted in the domain of higher education. To meet the objective of this study, the literature review, research methodology has been discussed in the following sections.

2. LITERATURE REVIEW

According to UNESCO guide lines for progress in higher education the main challenges are globalization, regionalization, democratization and polarization and fragmentation accompanied by quantitative expansion [3].

[4] Further argued that in developing and under-developed countries higher education plays a vital and significant role for their socio-economic development. In the beginning Pakistan had a very weak foundation of higher education. At the time of partition, Pakistan inherited only two universities out of twenty one universities present in the sub-continent. One of which was the University of Punjab established in Lahore 1882 and the second one was in Dhaka, [5].

[6] Found that the following four important issues regarding the characteristics of higher education in Pakistan, quality, access, relevance and governance. Increasing access to higher education without enhancing its quality and relevance to the needs of country cannot be expected to achieve the goal of knowledge. It is a common belief that the majority of Pakistani universities do not fulfill the criteria of international standards.

[7] argued that quality assurance is perceived to be a systematic process and it plans to determine the required standards of education, infrastructure and scholarship in higher education institutions. Quality in tertiary education is affected by a wide range of factors. These include their vision and goals, capacity and proficiency of teaching staff, well equipped laboratories

and libraries, leadership importance and governance. In fact, most of all, the quality of faculty members in tertiary education determines the quality of institutions.

[8] Discussed that HEC focused on issues of quality through its multidimensional approaches that emphasizes improvement of infrastructure, faculty, academic environment, research, curricula, assessment, governance and accreditation of academic programs and institutions.

[9] Conclude that quality can be defined as the means by which standards of educational provision of institutions are guaranteed by institutions with confidence and certainty.

Factor analysis is known as a prominent method for analyzing the multivariate variable relations in survey data [10]. The outliers form the data has a significant influence on estimates because this method is directly based on covariance or correlation matrix [11] revealed that the outcome of the factor analysis have related to the choice of scale,

3. METHODOLOGY

3.1. Research Strategy

A quantitative strategy has been adopted for this study with special emphasis on interpretation of quantitative output. The data were recorded using Microsoft Excel 2007 and processed (statistical analyzed) using SPSS 18.

3.2. Sample

Researcher selected different sample from different discipline. A probability sampling technique, Stratified random sampling technique was used for quantitative aspect of the study in the data collection. Sample in this study included 300 teachers from Higher Education Institutions, 150 belonging to public sector universities and the remaining 150 to private sector universities of district Karachi, Sindh, Pakistan. The final sample consists of 300 teachers were accessed. 186 (62%) of were male while 114 (38%) were female teachers. A significant number of the respondents were MPhil and PhD in their relevant fields. Participants of faculty members were having 10 to 17 years of teaching experience.

3.3. Research Instrument

The impact of internal and external quality assurance mechanism on Higher Education Institutions

was measured using well defined questionnaires. On the basis of pilot testing of questionnaire, 24 items for teacher were finalized. These questionnaires were used for data collection from the respondents. All questions were developed on a 5-point Likert scale (strongly agree to strongly disagree) and these were coded from 5 to 1. To measure the impact of Quality assurance mechanism in Higher Education Institutions the items of the questionnaire has been divided into four constructs. Table 1 gives the summary of each item along with their associated Chi – square and median value [12]. Have also carried out the statistical analysis on the multiple choice examination questions.

The chi- square test statistics value and median values indicates that teachers were opinion that public universities were better in terms of teacher induction, research facilities and culture of merit. While private universities were better regarding infrastructure, research facilities, budget allocation, faculty development, transport facilities and market oriented education.

Table 2 represents number of items in each construct. A single holistic score of all items in each construct is calculated by taking the sum of responses of each construct. The mean, median and standard deviation of each construct is given in Table 2.

The mean and median values indicate teacher satisfaction level is high in public sector universities compare to private sector universities. While the mean and median value of all other constructs shows that teacher were opinion that private teacher universities were better in terms of ranking, globalization and allocation of budgets. The standard deviation values also revealed the same fact that responses of teachers in private universities were homogenous in these constructs.

4. DATA ANALYSIS AND RESULTS

4.1. The Reliability of the Instrument

The reliability of the instrument was tested prior to conducting the main analysis. The validity of the instrument is measured by Cronbach alpha. The reliability value of the construct 1 which consists 6 items and represents the teacher satisfaction level to the facilities provided in the Higher Education Institutions is found to be 0.82 shows the high internal consistency among the items. Similarly construct 2 Consist of 6 items. It measured the factors that

Table 1: Items of each Construct with Statistical Results

S. No	Statement	University Sector	Chi –Square	P-Value	Median
1	Teachers are in HEI's selected on merit	Public	9.07	0.000	4
		Private			2
2	Work is distributed according to their merit.	Public	12.35	0.000	4
		Private			2
3	Their intellectual contributions are appreciated by organizations.	Public	1.34	0.195	2
		Private			5
4	Teacher enjoys adequate research facilities.	Public	8.34	0.034	3
		Private			4
5	Teachers are satisfied with their job.	Public	20.32	0.000	5
		Private			2
6	All teaching & learning facilities provided to teachers.	Public	12.02	0.15	3
		Private			3
7	Research output are significantly impact on ranking of universities	Public	14.53	0.580	4
		Private			4
8	HEI has key performance indicators to measure their performance.	Public	4.56	0.56	3
		Private			3
9	Ranking is self-improvement tool for universities.	Public	24.76	0.000	2
		Private			5
10	Ratio of PhD faculty to total faculty is sufficient	Public	2.76	0.314	4
		Private			4
11	Teachers are given manageable population of students in classrooms.	Public	30.67	0.000	1
		Private			4
12	Ranking system of universities accelerated the academic departments of universities	Public	8.98	0.156	3
		Private			3
13	Faculty members have proper access to digital library, computer lab and internet websites	Public	36.8	0.000	2
		Private			4
14	Teachers provides incentives and opportunities for publication & research writing	Public	6.261	0.161	4
		Private			3
15	Budget allocation is sufficient and transparent for the academic activities.	Public	24.65	0.000	2
		Private			4
16	Transport facilities are available for the students and staffs.	Public	39.56	0.000	2
		Private			5
17	Class room and laboratories are sufficient and well equipped with latest technology	Public	58.0	0.000	3
		Private			4
18	University invests much on faculty development.	Public	21.5	0.000	3
		Private			4
19	The program offerings meet the specific needs of global market	Public	9.8	0.131	4
		Private			4
20	HEI's are promoting national spirit.	Public	12.41	0.735	4
		Private			4

(Table 1). Continued.

S. No	Statement	University Sector	Chi –Square	P-Value	Median
21	HEI's are promoting Global citizenship.	Public	27.06	0.037	2
		Private			4
22	HEI's are relevant to the cultural needs of society.	Public	18.87	0.032	4
		Private			5
23	Develop and inculcate proper values for the survival of the individual and society.	Public	14.68	0.000	3
		Private			5
24	Develop the intellectual capacity of individuals to understand and appreciate their local and external environments.	Public	24.92	0.000	3
		Private			4

Table 2: Number of Items under each Constructs

Construct	Items	Public Universities				Private Universities			
		N	Mean	Median	St.dev	N	Mean	Median	St.dev
Teacher satisfaction	6	150	27.06	27.00	0.853	150	14.95	15.00	2.126
Ranking	6	150	18.11	18.00	2.764	150	27.13	27.00	0.762
Globalization	6	150	18.05	18.00	2.755	150	23.97	24.00	1.367
Adequate funding	6	150	17.93	18.00	3.034	150	27.05	27.00	0.780

enhance the ranking of a university among other universities its reliability value is 0.83 (see Table 3). Another quality indicator of Higher Education Institutions is globalization; its reliability value is found to be 0.80. Construct 4 explain inadequate funding with 6 items and having reliability value 0.84.

The reliability values of all four constructs given in Table 3 shows that the items were highly consistent in terms of respondent responses within each construct.

Their narrative responses were then used for quantitative deductions. Having detailed demographic information related to independent variables and dependent variables. We then obtained (Quality Assurance Mechanism as rating Scale) the views of teachers.

4.2. Independent t-Test

This section shows the statistical analysis regarding the hypothesis. The data on each sets of questionnaire

are constructed on Likert scales ranging from strongly agree to strongly disagree. The data were ordinal in nature with no specific assumption. However, it was made continuous by summing all the scores (responses) of individual respondent to each construct. A test of normality was carried out in both data sets to meet the basic assumption of independent t-test that data must follows normal distribution. The test statistics and significance values of Kolmogorov–Smirnov and Shapiro-wilk test of normality for all the four constructs are given in Table 4. The values indicate that scores of all four constructs follows normal distribution.

As the data follows normal distribution and the participants in both sets of data were entirely different to each other therefore an independent t test was used to compare the differences in quality assurance practices of private and public sector universities. Independent sample t test was used to calculate difference between the perceptions of public and private sector teachers in each construct. The test

Table 3: Cronbach's Alpha for all Constructs

S. No	Construct	Items	Cronbach's alpha
1	Teacher's satisfaction	6	0.82
2	Ranking	6	0.83
3	Globalization	6	0.80
4	Budget Allocation	6	0.84

Table 4: Test of Normality Results of the Respondent Responses

Constructs	Kolmogorov–Smirnov			Shapiro-Wilk		
	Statistic	Degree of Freedom	Sig. Value	Statistic	Degree of Freedom	Sig. Value
Satisfaction	0.270	300	0.000	0.813	300	0.000
Ranking	0.253	300	0.000	0.861	300	0.000
Globalization	0.153	300	0.000	0.941	300	0.000
Budget Allocation	0.249	300	0.000	0.863	300	0.000

compares the two groups' means score to report similarity and difference. Table 5 represents the test statistics value and its corresponding significance value of independent t-test of each construct. The responses of respondents in private and public sector university construct were compared to analyze the differences in responses.

Column 1 of Table 5 represents construct of the responses, second column of Table 5 shows Levene's test for equality of variance of both group. This test measures the variances of both groups. The p-value of all the construct is 0.000 indicates that variances of both public and private sets of data under each construct are assumed to be equal. In the next column label with t-test for equality of means the test statistics value and significance value (0.000) of each construct shows that there is a statistically significant difference of teachers opinion among public and private universities regarding teacher satisfaction, ranking, globalization and allocation of budget. The result indicates that quality practices in private sector universities are significantly different from public sector universities. This can be taken to mean that perceptions of teachers of private and public sector universities regarding quality of higher education in their institutions are different to each other.

4.3. Factor Analysis

Independent t test was used to analyze any significant difference in quality assurance practices

among public and private sector universities. However, we are also interested to reveal the hidden pattern of the data. We are also interested to identify the factors that represent those quality indicators in both public and private sector universities. In this regard and an exploratory factor analysis was carried out [13, 14] have also used the factor analysis to reveal the hidden pattern of the data. We carried out the factor analysis to identify the pattern in our data whether the factors that emerge consist of items of different quality indicators appear more in private sector or public sector.

In our study, using the instrument, Q1, Q2, Q3, Q4, Q5 and Q6 represents teacher's satisfaction, Q7, Q8, Q9, Q10, Q11 and Q12 represents ranking of Higher Education Institutions, Q13, 14, Q15 Q16, Q17 and Q18 represents globalization and Q19, Q20, Q21, Q22, Q23 and Q24 are the items that represent allocation of budget.

The Kaiser Meyer Olkin (KMO) in public sector university data is 0.442 which is low but not below the standard requirement. However in private sector data, the KMO value is 0.507 which is fairly good compared to the public sector. Therefore we ignored these smaller values and carried out factor analysis on both sets of data.

The data in both sectors shows more certain and consistent behavior and the reliability is fairly good (see Table 6). In the public sector university the reliability

Table 5: Independent Sample Test of Teacher's Responses in each Construct

Construct	Levene's Test for Equality of Variances		t – test for equality of means			
	F	Sig. Value	T	Degree of Freedom	Sig. (2-tailed)	Mean Difference
Satisfaction	93.687	0.000	64.757	298	0.000	12.113
Ranking	127.451	0.000	-38.530	298	.000	-9.020
Globalization	66.090	0.000	-23.590	298	.000	-5.920
Budget Allocation	140.985	0.000	-35.632	298	.000	-9.113

Table 6: Reliability of all Factors in the Public and Private Sector Universities

Public Sector Universities			Private sector universities	
Factors	Cronbach α	No of Item	Cronbach α	No of Item
Factor 1	0.702	5	0.831	3
Factor 2	0.698	9	0.721	7
Factor 3	0.712	8	0.764	8
Factor 4	0.457	2	0.685	6

scale ranges from 0.236 to 0.712. In the private sector values range from 0.192 to 0.831 which show high consistency in the data.

In the public sector, four factors emerged with Eigen values greater than so we considered these first four components as important factors for all the sets of data because they explain most variation in all sets of data.

For explanation and discussion we considered the result of both sets of data. For interpretation and naming of factors that emerged from the data, We calculated the threshold or cut off value of all four factors and considered only those items in the factors whose loading is greater than their cut off value and ignored all of those whose loading is less than their cut off value regardless of their negative and positive sign.

Overall, there is a difference in Factor loading at private sector universities with a more definable pattern in the private sector universities.

The change in public and private sets of data may be taken as consistent with expectations as the

mechanism of quality is different in both sectors. The difference in the public and private sector universities can be judged to reflect this difference in the context of quality indicators. The difference in change between the two groups is significant and cannot be ignored.

It is important to note that differences are important in all constructs described above. The questions are set in the context of teacher's satisfaction; ranking, globalization, and allocation of budget relate to the quality assurance practices in the universities. This is discussed in the overall analysis.

In public sector data factor 1 include items of teacher satisfaction with budget allocation. This indicates that in public sector universities teachers are satisfied with facilities in their institutions while dissatisfied with allocation of budget.

Factor 2 represents a combination of positive loading of items that indicates funding in institutions and negative loading with the items that that indicates teacher's satisfaction with quality practices and merit in the institutions. Overall factors emerged in the public

Table 7: Factors of Teacher's Questionnaires of Public Sector Universities

Factors	Linear Combination	Cut off value	% of Variation	Reliability (Cronbach α)
Factor 1	$0.76(Q5+Q6) + 0.6Q4+0.4Q2 - 0.65Q24$	0.4	21.72	0.778
Factor 2	$0.8Q22+0.7(Q8+Q9)+0.6Q3+0.4(Q1+Q5-Q11)+0.3(Q4-Q13)$	0.4	15.89	0.720
Factor 3	$0.9Q19+0.6(Q5+Q10+Q18)+0.5Q3+0.4(Q1+Q7+Q14)$	0.5	9.719	0.721
Factor 4	$0.8Q15+0.7Q17+0.5Q18-0.4(Q10+Q1+Q4)$	0.4	7.99	0.337

Table 8: Factors of Teacher's Questionnaires of Private Sector Universities

Factors	Linear Combination	Cut off value	% of Variation	Reliability (Cronbach α)
Factor 1	$0.9Q7+0.8Q11+0.7Q14$	0.7	17.590	0.806
Factor 2	$0.8Q22+0.7Q19+0.5Q24+0.4(Q17+Q7+Q9+Q10)$	0.4	13.57	0.733
Factor 3	$0.8Q8+0.7Q19+0.6Q7+0.5Q6-0.4(Q21+Q24)$	0.4	12.02	0.577
Factor 4	$0.8Q14+0.7Q9+0.6Q4-0.4Q20$	0.4	7.05	0.610

sector indicates teachers are satisfied with quality practices in their institutions.

In the private sector universities the factors that emerge from the data shows opposite picture compare to the public sector universities data. Factor 1 emerges with positive loading of item 7 and 11 of construct 2 that indicates that ranking among universities enhance quality in universities and item 14 of construct 3 that measures the association between globalization and quality of education. Overall factor 1 completely represents the items of all constructs that support the quality assurance practices in the Higher Education Institutions. Factor 2 appears with positive high loading of items that explains effect of globalization on the quality of Higher Education Institutions and moderate loading with the combination of items of ranking. Overall all the factors in the private sector universities explore that globalization, ranking and allocation of budgets are the main factors that appeared in private sector data.

5. CONCLUSION

The Chi- square test of independence and median values of each items revealed that teacher were opinion that satisfaction level of teacher were high in public sector institutions compare to private sector universities. While teachers believe that private sector institutions were better in terms of infrastructure, research facilities, ranking practices and allocation of budget.

The results of mean, standard deviation and independent t-test of each construct i.e teacher satisfaction, ranking, globalization and allocation of budget also revealed the same fact that there was statistically significant difference among public and private universities teacher's perceptions.

However, the results of factor analysis indicate that factors with items of high positive loading that represent quality indicators emerges more consistently in private sector institutions. On the other hand factors with items with negative high loading appeared more in public sector universities. This can be interpreted that teachers of private sector universities were more satisfied with quality assurance practices in their institutions.

In the view of research findings it may be concluded that quality in higher education is directly related to the teacher satisfaction to the facilities provided by them,

ranking of universities, globalization and allocation of budget.

Overall this study explored and identified trends and best practices in Quality Assurance Mechanism in Higher Education Institutions. The study highlights, that Quality Assurance Mechanism should employ all new tools and practices to accelerate development in Higher Education Institutions. Future studies about impact of quality assurance mechanism on HEC, globalization, internal and external quality assurance can study conceptual or methodological weaknesses of Quality Assurance Mechanism process in universities. The study suggests that Quality Assurance Mechanism highly impacts on improving the quality of education imparted in the higher education.

6. RECOMMENDATIONS

This study provides an overview of the quality assurance practices in public and private sector universities in Pakistan. It is suggested that a comparative analysis can be done among public sector higher institutions to analyze how much difference exist in term of implementation of Quality Assurance Mechanism. The authors further suggest that this instrument can also be used for conducting a research on the similar sample and then performing other statistical technique like Discriminant Analysis and Confirmatory Factor Analysis to limiting the study into four factors.

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Received on 21-10-2015

Accepted on 28-01-2016

Published on 09-03-2016

<http://dx.doi.org/10.6000/1927-5129.2016.12.22>

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