

Service Quality Gap Measurement in Pharmaceutical Educational Institutes: An Empirical Analysis for Model Development

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ABSTRACT

Perspective: One can observe the sea changes that have been taken place in the Indian pharmaceutical business environment. There are challenges for this section and which is possible to overcome by quality human resources. In fact, we have experienced mushroom growth of pharmaceutical education institutes (PEIs) without producing of the employable graduates. Probably this is due to poor service offerings from PEIs. **Objective:** Hence, the purpose of the present research to develop service quality determinants for pharmaceutical education institutes (PESQ) and analyse the nature of the gap/s if it generates at all. **Methods:** We have selected six education institutes and their students randomly and based on the responses we have refined the prior facets of service quality identified from the literature. We have employed Principal component analysis (PCA) and other techniques of refinement of the construct. After the development of the facets, aggregatively we have compared between actual and expected to identify gaps in service quality. **Conclusion:** Our Research develops some important outcomes. Six facets quality model for pharmaceutical education has been developed, four of which were common with previous works and found two unique dimensions suitable to Indian environment. In addition, it was identified that said two dimensions result in higher gap in service quality.

Key words: Pharmaceutical education, Higher education, Service quality management, Gap analysis, Factor analysis.

INTRODUCTION

One can observe the sea changes that have been taken place in the Indian pharmaceutical business environment, since the implementation of WTO guideline in relation to the system of patenting (*product vs process*). A paradigm shift has been observed in patent laws which replace process patent regime by product patent.¹ The researchers apprehended that those Indian pharmaceutical players, who have failed to innovate may not survive in the long run² In practice, the small-scale manufacturers had absorbed the sudden shock and thousands have survived by implementing contingent strategies.³ But for overcoming challenges over the period, they required quality human resources.^{3,4} Thus, it is imperative for the sustenance of a large number of domestic pharmaceu-

tical players to avail a system of continuous supply of industry ready human resources, who gradually earn experiences and pull the company in growth trajectory. This is possible when organized efforts to develop and impart a formal training for the budding pharmaceutical executive are possible to make. Nature of this formal training should be three prongs namely i) Regular industry required curriculum ii) Training by industry personnel on and off the industry ii) Effective pedagogy for enabling industry orientation. Hence, this necessities the requirement of the professional courses, like B.Pharm, M.Pharm, MBA (Pharmaceutical Management), M.Tech (Pharmaceutical Technology) etc, since these courses are supposed to match with the stated nature

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intrinsically.⁵ Hence, the logic behind the mushrooming of pharmaceutical higher education institutes in tandem with the industrial growth of the pharmaceutical sectors is understandable. But, at the same time in spite of this growth possibilities the most of the educational institute's expansion is virtually stagnant, which is an issue of concern. During 2005 to 2015, we have observed a growth of more than 6 percent in Indian Gross Domestic Product (GDP) other than the year 2008 and 2012 and throughout the same period the pharmaceutical sector has grown almost 13 percent compound rate annually (exactly the sector did the business of 6 billion in 2005-06 and 34.6 billion in 2015-16) which has shown that the pharmaceutical sector did well despite the threat perception due to change in patent laws.^{1,6} Now, if we change our focus on supply sources of human resources in aggregate, we would find that between 2012-2013 and 2016-2017 D.Pharm institutes in number (private and government), intake capacities (private and government) and passed out budding executive (private and government) have shown positive growth and which is quite obvious since, the opportunities of employment increases with the advent of industrial growth. A set of curiosity triggering information is observed in the same (above mentioned) period in mentioned first two parameters for B. Pharm and M.Pharm courses. These have been demonstrating stagnant trends.⁷ Furthermore, in the case of student pass out data for government institutes, both for B. Pharm and M. Pharm have been representing landslide downfall which may also be unfolding the trend of sluggish supply due to lack of employability of the potential executives. In this regard, we can refer the statement made by Anil Sahasrabudhe, Chairman, AICTE *"The quality level of education has not achieved the degree of growth that it should have seen. Industry bodies such as NASSCOM, CII, FICCI are lamenting about the employability of graduate."*⁸ In addition, issues are same for pharmaceutical sectors except for the case of D.Pharm pass out. Since we can consider pass out information as a proxy measure for demand (attraction) of the course, it can be commented that same for D. Pharm pass out is showing an increasing trend which states further that semi-skilled human resources are employable, which is just reverse for skilled human resources.

Thus, the problem is to understand the reason for the gap between actual and industry required skills. It is assumed (subjectively) that pharmaceutical educational institutes, especially which have been imparting training for graduate and master's levels have failed to satisfy the industry by supplying industry-ready budding executives. Hence, the industry personnel found a less employable supply of human resources further which

jeopardy overall economic growth of the industry and consequentially competitiveness of the same. On the flip side of the story, National Skill Development India (NSDI, 2015) forecasted for 3.5 million job requirements by 2022 for the pharmaceutical pass out which further enhances the difference between demand and supply.⁹ As we know according to the law of demand, the gap in demand and supply is adjusted by price escalation, for this case, it is synonymous to the increment of the cost of compensation. On the other way around, un-employability would repulse the meritorious students from pharmacy degree program and it results in further un-employability. Thus, we can observe a vicious cycle of the un-employability or non-industry-readiness of the potential pharmacy graduates and naturally, it is imperative to break the cycle for the betterment of the industry as a whole.

What should be done, therefore? This problem may be considered as a service failure of an academic institute (service provider) engaged in offering services to students (service taker/receivers). Generally, service fails due to gaps in quality of services. Hence, if service quality can be measured along with the gap in offering same, it may offer the solution to the problem stated above. Thus, various service quality models including path-breaking SERVQUAL offered by Parasuraman *et al.* (1985,1988)^{10,11} have been reviewed, but all these models were not extendable in terms of measuring quality determinants for academic/education as a service. Further, higher education service quality measurement models (Table 1) have also been examined and these have been found not so perfect for pharmacy education. Finally, few researches (mainly Holdford and Reinders; 2001 and Holdford and Patkar; 2003) have been studied in this regard. In these researches, pharmaceutical service quality has been measured in the perspective of USA. However, service quality is not culture-independent, which is understandable from the culture wise variation in service quality determinants.^{12,13} For example, difference in service quality determinants are visible between researches carried out by Gu *et al.* (2016)¹⁴ and Holdford and Reinders (2001)¹⁵ (also with Holdford and Patkar, 2003)¹⁶ and thus it is imperative to execute the research in the context of India. Though there are researches (Gupta and Mandal, 2016; Singh, 2016)^{17,18} which have been contextualized service quality in the Indian backdrop but not have reduced the necessity of doing a new research on the same since mentioned duo is nonempirical in nature. Thus for the first time in this present research empirically we have measured service quality determinant/s alongside gaps in the same for degree level pharmaceutical education in the context

of India. In addition, quite interestingly some important and new dimensions of pharmaceutical education service quality have been identified by our research and detail of this has been mentioned in Contribution section. In the next section, we would like to present all those related literatures in an order of logic.

Literature Survey

Measurement of the quality is predominant in the service literature. Quality measurement in the manufacturing sector is also important for the researches, but the same issues become complex in service sector due to same special four characteristics (Intangibility, Variability, Perishability, and Inseparability) of the service.^{10,11,19} The measurement problem of the quality is dependent on the definition of the same. Juran and Godfrey (1999) have mentioned '*fitness for use*' which is focused on user benefit and thus it refutes the Juran's (1989) concept of planning, control, and improvement of the quality in line with customer need.^{19,20} Another definition of quality has been cited by Crosby (1979) who explained zero defect in production performance as an indicator of quality and for him, quality was '*conformance to the requirement*' not at all '*elegance to the same*'. But again as Peters (1987) has analyzed despite the fact that Crosby's fundamental focus was on meeting the technical requirement, he indirectly had talked about the delivery of customer need. Matching with his criticism to Crosby (1979), Peters (1987) had presented a slightly varied version of quality, and that is '*Customer perceived excellence*'.^{19,20} Similarly, Feigenbaum (1991) in his concept of TQM (Total quality management) had set the target of meeting customer expectation. None of these proposals was incorporating specialties of service though all of them were common in the sense that they directly or indirectly showcased the customer-centric definition of quality and hence all these conceptualisation dictate the measurement of the quality in relation to the customer. As already stated that because of four special characteristics of any service is difficult to quantify and measure.^{19,21} Service quality literature can be segregated with four schools of thought first one is comprised of those researchers,¹⁹ who believe a service operation is a predominantly encounter /interaction between customer and service provider, especially with the front line service staffs and thus, the relationship building is the key for service satisfaction of the service receiver. The second school of thought is based on the opinion of the Gummeson (1995) and others²² that give an equal focus on service process. In fact proponent of this school's analyses four stages- Design, Production, Delivery and rational of the service quality. The third

one covers the research, writing of Zeithmal, Parasuraman and Berry (1985, 1988, 1991), Buttle (1993)^{23,24,25} and that has mainly measured the quality of service with certain objective methods and parameters. The fourth one in this regard is related to the customer satisfaction as an outcome of service quality. Some researchers believe that customer satisfaction is related to service quality, and they are high in number. Alternatively, Randall and Senior (1996) and previously to them Crompton and Mackay (1989) opposed the relationship between service quality and customer satisfaction.²¹

If we would able to identify the commonality of these four schools of thoughts in relation to service quality we may found three as follow:

Service quality may be measured based on customer subjective and objective feelings.

The role of excellence which is purely subjective to the customer and which in turn alongside other factors like service provider's communication and image from the customer expectation.

As a measurement of service quality is difficult for the customer also, they compare said excellence (expectation) with actual service they encounter (received) and found whether Actual received service is equal or more than expected or not.

Thus, service quality is good, if the stated one would take place; otherwise, service is regarded as bad. Similarly, customer satisfaction is positive when the difference between actual service received and the expected service is greater than, equal to null or otherwise satisfaction is negative. These commonalities have been employed to the majority of researchers, including the celebrated worked by Parasuraman *et al.* (1985, 1988).^{10,11} Thus, Parasuraman *et al.* (1985, 1988)^{10,11} methodology of measuring service quality is also used in extended service quality researches and sometimes these are fitted forcefully the general service dimensions in the case of other services like tourism, leisure, education. However, these services essentially have its own characteristic requirements and that should adhere at the time of its service quality measurement. Hence, prominent research works that have been reviewed are presented in the following Table 1. This Table presents the alternative determinants of the service quality on the higher education system.

After reviewing literatures in relation to determinants of higher education service quality, we are interested to narrow our focus on service quality facets of the pharmaceutical education. A few researches have been carried out in this domain out of which most relevant are Holdford and Reinders (2001) who have proposed

Table 1: Service Quality Model for Higher Education.

Service quality Model of Higher Education	Dimensions of SQ model	Geographical location of Sample Respondents	Author/Authors with year of publication
Importance-Perception Approach (IPA)	Seven determinants of education service quality- Program Issues, Physical aspect, Academic reputation, Career opportunities, location, Time, and Other.	New Zealand	Joseph and Joseph (1997) ²⁶
SQM-HEI	The placement is the main criterion for the selection of an HEI by students and their guardian in India. Teaching methodology, the physical study resources, and disciplinary Action improve the chances of employability of a student.	India	Senthilkumar and Arulraj (2001) ²⁷
HEdPERF	Five factors of education service quality- Non-Academic Aspect, Academic Aspect, Reputation, Access, and Program Issues	Malaysia	Abdullah (2005,2006) ^{28,29}
EduQUAL	A systematic, integrated model for the technical education system. The five factors are Learning outcomes, Responsiveness, Physical facilities, Personality development, Academics.	India	Mahapatra and Khan (2007) ³⁰
PESPERF	Three dimensions of service quality in the School of Physical Education and Sports Sciences (PESS) - academic aspects, empathy, and access.	Turkey	Suleyman and Kara (2009) ³¹
EDUSERV	Measures educators' expectations and perceptions of service quality. Five dimensions Empathy, School facilities, Reliability, Responsiveness, Assurance-discipline	Mauritius	Munhurrin <i>et al.</i> (2010) ³²
Measurement of engineering program quality	Three dimensions- the Industrial focus, Industrial readiness, and the quality of program aspect.	India	Mandal and Banerjee (2012) ^{33,34}
HESQUAL	Five primary dimensions - administrative quality, physical environment quality, core educational quality, support facility quality and transformative quality.	Mauritius	Teeroovengadam <i>et al.</i> (2016) ³⁵
UnivQual	Three main dimensions for university education quality - (i) 'Curriculum', which refers to the quality of the learning methods and the coordination efforts throughout the whole study period; (ii) 'skills development', referring to the skills that students might acquire and (iii) 'services and facilities' of the university.	Spain	Marimon <i>et al.</i> (2017) ³⁶
HiEduQual	Six determinants of service quality in HE - teacher quality, administrative services, knowledge services, activities, continuous improvement, and leadership quality.	Pakistan	Latif <i>et al.</i> (2017) ³⁷

three facets of functional quality. Mentioned facets are learning resources, faculty, and administration.¹⁵ This research has been extended further by Holdford and Patkar (2003) with five dimensions and with more numbers of samples though within a single location. The dimensions that they have proposed are Resources, the Interpersonal behaviour of the faculty, Faculty expertise, Faculty communication, and Administration.¹⁶ In the recent past, in the context of India, Gupta and Mandal (2016) have conceptualized with the help of the literature review and identified five dimensions and

these are Infrastructure, Academic and Social Reputation, Career Development, Academic Program and Administrative system. This research left immense scope for future improvement.¹⁷ Recently, Gu *et al.* (2016) have mentioned professional ethics, course quality and practice teaching as three facets of quality of the pharmaceutical education.¹⁴ In the context of India, Singh (2016) has identified key parameters like effectively designed policies, curriculum, and program for building students' quality.¹⁸

After reviewing the various kinds of the service quality literatures with special emphasis on work carried out to identify determinants of service quality for the pharmaceutical education. We summarize three key observations, which are as follows:

In the perspective of the Indian environment, the service quality determinants of pharmaceutical education were studied, but not empirically and hence, we have identified our scope to carry out the same in India with empirical justification. In a global perspective, also, a few researchers have been identified service quality facets and it is not wise to extend them blindly for measuring service quality gaps of the Indian pharmaceutical education. Thus, it is imperative to call for an empirical research to understand the facets of the service quality of the pharmaceutical education and to measure the service quality gap of the same.

This present research may be improved methodologically and thus may be multi-location, multi-institution based because the previous researches other than Gupta and Mandal (2016)¹⁷ have been carried out with a single Institution. The selection of sample should be random in nature otherwise; this research should suffer from sampling error and non-representative of the target population.

Finally, to maintain conformity with the majority of previous researches on higher education and the pharmaceutical education service quality, students as customer of the service and one of the stakeholders who, directly benefited by education service quality, have been considered as the target respondent for the present study.

Thus, in the next section, we have developed a research query in tune with reviewed literatures and a summary of the observation.

Research Query (RQ) Development

In the previous section, we have identified the gaps in existing literature. The researches which have been carried out in an outside Indian environment¹⁴⁻¹⁶ are empirical in nature, but at the same time unwise to extend without modification into the Indian situation since service quality expectation is not neutral to culture.^{12,13,38} The research that has been executed in India by Gupta and Mandal (2016)¹⁷ is a kind of conceptual analysis for the measurement of service quality determinants and judgmental findings of Gupta and Mandal (2016)¹⁷ opined that five number of factors can measure the service quality. Thus, it is suffering from a limitation of not having an empirical examination and reliability testing of the factors (dimensions) though they have collected those items mostly from reliable scales for judgmental development of each of

the factor. Hence, in this present research, we have decided to develop pharmaceutical service quality determinants by empirical testing with those 45 items identified by Gupta and Mandal (2016).¹⁷ Since they have not used any empirical analysis technique for understanding the service quality determinants, we have decided to mitigate this gap by carrying out it. Hence, we have developed our first research query (RQ 1) as follows:

RQ 1: What are the determinants of pharmaceutical education service quality?

Further, we have to focus on our other primary objective that is a measurement of a gap if any, in the pharmaceutical education service quality by using that identified determinants. Thus, we have developed a second research query as follows:

RQ 2: Is there any pharmaceutical education service quality gap in relation to its determinant?

MATERIALS AND METHODS

For Research Query one (RQ1)

We have considered directly 45 statements available in the research of Gupta and Mandal (2016)¹⁸ have not executed any technique such as PCA and reliability analysis of dimensions (Cronbach-alpha or Composite reliability) other than literature reviews and expert opinions. However, we have taken the opinion of the respondents where they have considered these 45 statements ideally for the service quality measurement of a pharmaceutical institute. Based on the opinion we have discarded those variables for which respondents differ a lot.^{39,40}

In the second stage of refinement, we have examined with 'Communalities' a measure that determines explained variance by the variable and those variables are having weak communalities are eliminated from the analysis.⁴¹

In the third stage, we have disregarded those variables, which are having a low value of 'measure of sample adequacy' and/or low value of loading with the factor (less than 0.40).⁴⁰ We have also refined the model by eliminating those variables that are having high cross-loading (usually less than equal to 0.10).^{42,43} Alongside, this model refinement, we have planned to execute principal component analysis (PCA) with Kaiser Normalization and Varimax rotation. Details of the same are presented in the subsequent section (Table 3).

For Research Query two (RQ2)

We also have planned to use the outcome of RQ1 for analysis the solution of RQ2. We have considered

responses item-wise from each respondent for both ideal (expected) and actual. In the solution of the first query, we have developed a multifaceted service quality model for pharmaceutical education. Now, using these outcomes, we can understand that under a facet which of the items are loaded. Therefore, the average of the responses of all the items under a facet separately for expected and actual are calculated and which are termed as '*facet mean (expectation)*' and '*facet mean (actual)*' for each of the facets. The difference of means (between expected mean and actual mean) for each of the facet is considered as a '*service quality gap*'. A gap exists if expected mean is more than the actual mean otherwise no gap presents in the said facet of service quality. Actually, the gap in numerical values may show some difference, but it is not accepted as a gap according to the law of statistics since the difference in numerical values can be generated due to sample difference. Therefore, we have to examine the probability of that gap in case of the population. Hence, for all identified gaps, whether it is statistically significant or not, we have to test the hypothesis as mentioned below.

Hypothesis

There is the statistically significant difference between the expected and actual means in relation to the i^{th} Facets of service quality determinants.

Where, i^{th} Facets indicate any service quality determinants for which expected mean is more than actual.

Research Procedure

Questionnaire development

We have developed a questionnaire with three sections. Section-A covers demographic information. Section-B comprises all 45 items with five reverse statements with respect to an ideal pharmaceutical education institute as if it is the expectation of the students from the Institute in regards to service quality. Section-C continues with same 45 items, but with students view in respect to what they actually receive as a service.

Sampling Frame

Though our primary objective is to develop the service quality model for pharmaceutical education, but it is not possible to execute the survey with the whole of India, therefore, we have to confine within the geographic scope of the state of West-Bengal. We can justify the selection of West-Bengal by its representative culture and high population share along with good pharmaceutical industry share.^{4,9} In West-Bengal, there are 13 institutes including two government institutes that offer B. Pharm course with more than 1200 enrollment

capacity.⁷ We have restricted our survey population within private institute only since in India more than 90 percent of B Pharm enrolment is in private institutes and thus overall quality of pharmaceutical education service heavily depends on the performance of the same.⁷ We have employed multistage simple random sampling process. In stage one, we have selected more than 50 percent of the Private Institutes (6 out of 11 private institutes) by simple random sampling. In stage two, we have decided to survey the two groups (strata) of the students, one year from beginner stratum (1st and 2nd year) and another year from experienced stratum (3rd and 4th year). This is because that these two groups possibly have different expectations. Thus, we have randomly chosen two (2nd year /3rd semester) and four (4th year/7th semester) two numbers. Next, we have generated a common list from enrolled students list of randomly chosen strata and it is 983 in totality. Further simple random sampling procedure has been applied to choose 140 sample respondents (see the Table 2). When population size is 983 with 95 percent confidence interval and with an allowance of 10 percent margin of error minimum size of the sample is 88 and if we increase the confidence interval to 99 percent with the same degree of accuracy the minimum size of the sample is near about 140 (actually it is 142).^{44,45} It is not out of place to mention that if we lower the margin of error with the same level of confidence interval we may require more number of sample respondents. Therefore the size of the sample is one of the limitations of this work (see detail in section Limitations and Future Scopes of research) In fact, we got full responses (three sections of the questionnaire have been administered with three days gap) from 124 students as 16 respondents did not submit the last section of the questionnaire. (Figure 1)

Survey Procedure

We have conducted a survey with structured questionnaire during a working break between two classes. We have offered assistance for explaining statements if any respondent requires the same. We have surveyed in two steps. In the first step, we have offered section

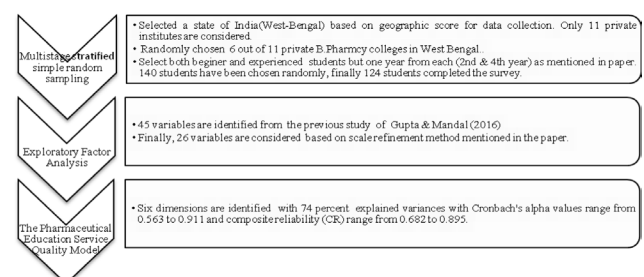


Figure 1: Research Process.

Table 2: Information regarding Population and Demographic characteristics of sample.

Sr. no.	Population size*		Sample size	Sample gender distribution	
	1 st stratum	2 nd stratum		Male (Percentage)	Female (Percentage)
Institute 1	99	56	140	73	27
Institute 2	117	58		60	40
Institute 3	132	60		71	29
Institute 4	60	53		60	40
Institute 5	56	61		60	40
Institute 6	105	126		68	32
Total	983		140	67	33

* Data from AICTE dashboard⁷

A and B to the 140 students. After three days of the initial response, we again met with the same respondent with section C for completion of the survey. Purposefully, we have taken responses in relation to expectation and actual from a student in two different times so that responses remain independent of each other.

RESULT AND ANALYSIS FOR RQ1

Prerequisites for Principal Component Analysis (PCA) Two tests are required to test before PCA. The Bartlett test of Sphericity, which is an authentic indicator of the suitability of data for factor analysis, is significant ($\chi^2= 2556.74$, $df=325$, $p< 0.000$) and the Kaiser-Meyer-Olkin (KMO) indexes 0.870 that is greater than 0.6, the sample data is adequate for factor analysis.^{40,46} Both the results allow us to proceed with PCA.

Result of PCA

PCA explains the existence of six factors with 74 percent explained the variance. The internal consistency of the variables with each factor is examined with Cronbach's alpha reliability test and composite reliability (CR) test. Here, Cronbach's alpha values range from 0.563 to 0.911 and composite reliability (CR) range from 0.682 to 0.895.^{40,47}

Naming of the Dimensions

This is very much essential for PCA to name each of the dimensions according to the latent factor. First dimension comprises of V1 to V8 and these variables except V8 state various scopes for career development like the scope for incubation, innovation, and entrepreneurial development, industrial training and tour for exposure in an actual work environment, the scope of further development of career by attending education fair, career-oriented workshop and seminar, expert counselling. Variable 8 takes on exposure of the college

to large mass and brand building, which also indirectly helps the career goal of the students. Thus, the latent factor that is operating behind is 'Scope of career development' and we employ this for the naming of the first dimension. Similarly, V9 to V12, four items that are the timely completion of course, focus on practical and theory classes, where exposure of practical class is vital and adequacy of material for study, commonly expresses 'Academic program' as an important quality determinant thus, we have named the second dimension accordingly. For the third dimension V13 to V18 various facilities like library, laboratory and games infrastructures that are essential for the pharmacy graduation are mentioned and hence this dimension has been named as 'Facilities'. The fourth dimension speaks for 'Transparent Administration' since variables content cover admission, feedback, affiliation, accreditation, and information disclosure. The fifth dimension states alternative job opening in the field of sales and marketing as it focuses on marketing study and learning of sales presentation. Last but not the least need of the students is 'Value for money' of the course and for that, they further want more industrial exposure to strengthen their demand. (See the Table 3)

RESULT AND ANALYSIS FOR RQ2

Now, by using the paired sample t-test, we have examined the difference between mean values of students' expectation and actual received education service quality. Before executing the pair t test it was customary to check normality of the gap variables (the difference between expected and actual score given by each respondent). We have employed one sample Kolmogorov-Smirnov test and with 99 percent confidence interval it has been found five gap variables were normally distributed whereas one gap variable (academic program) was distributed other than normal.⁴⁸ All the paired sample t-test are sta-

Table 3: Six Dimensional Model of Pharmaceutical Education Service Quality [n=124].

Dimensions (In Bold Letter)	Factor Loading	Variance Explained	Cronbach's alpha*	Composite Reliability (CR)**
Scope for Career Development		22.55%	0.911	0.895
V1-College/ Institute administration should help students for incubation and entrepreneurial development.	0.795			
V2-Students should be taken for industrial tour.	0.779			
V3-College/Institute should arrange industrial training.	0.738			
V4-My college/institute should participate in education fair.	0.719			
V5-I should get support from institute and faculties to do innovative and research work.	0.704			
V6-Career development seminars and workshops should be organized.	0.688			
V7-Expert counseling should be arranged for student career development.	0.666			
V8-College/Institute should be visible by advertisement and media activity.	0.644			
Academic Program		19.64%	0.881	0.851
V9-Semester courses should be completed on time.	0.800			
V10-Appropriate focus should be given on practical and theoretical learning.	0.799			
V11-In laboratory; technical staffs should help me to do practical work.	0.757			
V12-I would like to get adequate study materials.	0.707			
Facilities		09.71%	0.841	0.792
V13-Sports facilities with equipment and tools should be available in campus.	0.750			
V14-Library time should be enough flexible for students.	0.686			
V15-Institute should provide well-equipped laboratories with adequate* chemicals.	0.652			
V16-Institute/college should have modern computer with latest software.	0.504			
V17-Relevant subjects E-books should be available in library by online mode.	0.460			
V18-Library should have adequate* books for relevant subjects.	0.438			
Transparent Administration		07.56%	0.826	0.733
V19-Admission process should be transparent and easy to understand for students.	0.606			
V20-College/Institute should have feedback system where we can give our submission.	0.604			
V21-College/institute should be affiliated and accredited from industry and external agencies.	0.577			
V22-College/Institute should provide all information in its website.	0.410			
Alternative opening in the job market		07.33%	0.563***	0.682***
V23-Curriculum should have more focus on marketing specialized subjects.	0.858			
V24-Classrooms should have board with LCD projector for learning, sales presentation.	0.566			
Value For Money		07.21%	0.664	0.698
V25-B.Pharmacy course fee should be value for money for me.	0.834			
V26-Industry experts should be invited to take classes.	0.622			
Overall		74.00%	0.944	

Note: scales range from 1 = Strongly Disagree to 5 = Strongly Agree. 19 variables were dropped from the original 45 variables

*Cronbach (1951) established a measure of scale reliability by computing the correlation coefficient for two halves of the data that is commonly known as Cronbach's alpha (α). This alpha is calculated by dividing the number of items (N) squared multiplied by the average covariance between items with the sum of all the item variances and item covariances.⁴⁶

**Composite reliability (CR) is calculated by dividing the multiple of the number of items (N) with the reliability of the unit test by the sum of one and a multiple of the reliability of unit test with (N-1).^{39,40}

***Cronbach α value generally accepted above and equal to 0.6,⁴⁷ only for this facet it is accepted below 0.6 as CR value is greater than 0.6.

Table 4: Stepwise Paired t-test values for Gap analysis [n=124].

Dimensions	Expectation		Actual		Gap		t-value	Wilcoxon test value	probability
	Mean	SD	Mean	SD	Mean	SD			
Scope for Career Development [#]	4.62	0.62	3.22	0.55	1.40	0.78	19.79		0.00 [*]
Academic Program ^{##}	4.74	0.56	4.15	0.74	0.59	0.91	NA	6.984	0.00 [*]
Facilities [#]	4.60	0.56	3.46	0.78	1.13	0.90	13.91		0.00 [*]
Transparent Administration [#]	4.73	0.53	3.75	0.69	0.98	0.84	12.89		0.00 [*]
Alternative opening in the job market [#]	4.57	0.65	2.78	0.99	1.79	1.16	17.13		0.00 [*]
Value for Money [#]	4.66	0.68	3.12	0.76	1.53	0.98	17.42		0.00 [*]

Note SD=Standard Deviation, Gap= (Expectation-Actual)

* the t-values are significant at the 99 % level of significance

[#] gap variable is normally distributed at 99% level of significance and ^{##} gap variable is other than normal

NA- Not applicable

tistically significant ($p < 0.000$) at the 99 percent level of confidence. The Table 4 clearly indicates the students' expectation (Ideal) from pharmacy institutes are very high that is mean values are greater than 4.5 for each facet, but at the same time values of actually received educational service from these institutes are low. Thus, these gaps are raised due to high expectation, but low perceived service quality. Moreover, this gap is highest for Alternative opening in the job market (1.79) followed by Value for Money (1.53), Scope for Career Development (1.40), Facilities (1.13), Transparent Administration (0.98) and Academic Program (0.60). As one gap variable was not normal we have also carried out non-parametric Wilcoxon signed rank test for that gap variable (academic program) and we have found statistically significant difference between expected and actual at 99 percent confidence levels ($p < 0.000$).

Contribution of Present Research

This research has delivered two important outcomes; determinants for measuring pharmaceutical education service quality (PESQ) and analyse the nature of service quality gaps in academic institutions. The Present model offers six facets of PESQ (Figure 2) that are not common with previous related known works. Comparing with two of the celebrated works of Holdfold and Reinder (2001) and Holdfold and Patker (2003),^{15,16} present research deviates atleast with three factors namely 'Scope for career development' (more particularly option for higher study), 'Alternative option for job market' (whether they can be chosen as marketing executive or not) and 'Value for Money'. These three facets represent the economic uncertainty of Indian youth and social approval for higher academic degree holders in Indian society. Holdfold and Reinder (2001) and Holdfold and Patker (2003)^{15,16} have focused on 'Facilities' and 'Administration', which are common with present work. But they have also identified 'Faculty'

(interpersonal behavior, communication, and expertise) as important dimensions, which have been observed in terms of 'Academic program' quality in our work. It is related because all those three faculty related variables finally related to the development of the academic program quality. Indian based researchers like Mandal and Banerjee (2012)⁴⁹ and Singh (2016)¹⁸ have identified 'curriculum and program quality' that is common with present PESQ model. 'Facilities' as a determinant mention in our work is also common with previous HEI service quality researches^{50,51} and dimensions identified by Joseph and Joseph (1997).²⁶ 'Transparent Administration' is considered as a facet of service quality in our work is also found common with Latif *et al.* (2017).^{31,52,53,54} 'Two dimensions like 'Alternative option for job market' and 'Value for Money' are identified as new one (Not mentioned by any of previous researchers) and both of them are matched with Indian economic environment that promotes the economic value and multiple job readiness of Indian people due to the competitiveness of the market.

Thus, in conclusion, it can be expressed that this present piece of work can be used as an eye-opener and can help pharmaceutical education authorities to do better.

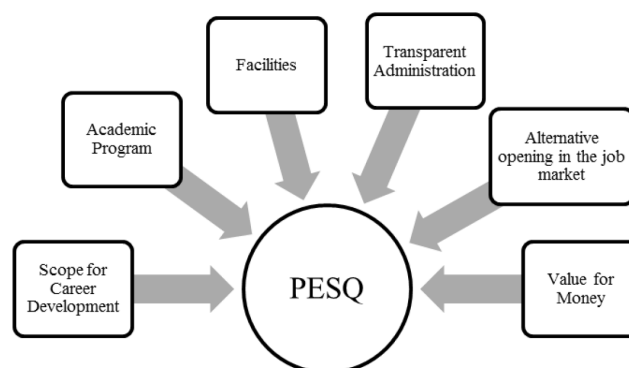


Figure 2: Pharmacy Education Service Quality (PESQ).

Limitations and Future Scopes of Research

The present work has a number of limitations, which can be mitigated by future research. Firstly, we have developed the pharmaceutical education service quality model based on the responses of the students only, which can be further extended by other stakeholders like faculty, industry executives, and management staffs. India is a big country and there are lots of variations across the regions, despite the fact that our location of response collection is representing characteristics of the Indian population, but it would always better to carry out the same with the institutes covering all the regions. One of the major limitations of this work is related to its sample size and that can be corrected by increasing the size with 5 percent allowable error. Further, this work can be extended with government-funded institutes to understand whether any differences between private and government institutes exist or not.

Last but not the least that after the availability of NIRF (National Institutional Ranking Framework) ranking of the pharmaceutical Institutes, if we able to develop the model over the different categories of colleges we can understand the cause of variance between good and poor institutes that may help the academics for the further development.

CONCLUSION

Pharmaceutical institute authorities can use these six dimensions of PESQ to understand the expectation of the students at the time of admission or initial days of the first year. Institute authority further helps the students to reshape their expectation with reality and if possible extend the service quality on the said dimensions to match with students' expectation. The students belong to final semester; they can help the institute authorities with their valuable suggestions regarding those dimensions of the pharmaceutical education service quality. The management of the institutes can check whether students opinion regarding service quality they received changed during entry and exit phase of their interview or not. Thus, this PESQ can be used as a control mechanism for the institute offering pharmaceutical education degree programme. If authority uses the correct measure to mitigate the deviation (gap) between expectation (Ideal) and actual, over the period they can offer better quality which would help them to place among the good institutes for pharmaceutical education.

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ABBREVIATIONS

PEIs: pharmaceutical Education Institutes; **PESQ:** Pharmaceutical Education Service Quality; **PCA:** Principal Component Analysis; **WTO:** World Trade Organization; **HEI:** Higher Education Institute; **NIRF:** National Institutional Ranking Framework.

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SUMMARY

- The objective of the present research was to develop pharmaceutical education service quality determinants and with the help of this, identifying the gaps if at all between expectation and actual service.
- Based on the literature survey on relevant issues pertaining to service quality, the authors have gathered 45 items. Later on, based on empirical survey result authors have refined and pruned the number of items into 26 with 6 dimensions.
- Within the state of West Bengal half of the total number of private institutes and further from those institutes 140 students have been chosen randomly for the survey. The survey has been carried out in two phases, first one for understanding expectation and second one for knowing the actual experience of the students.
- This work identified two new dimensions of pharmaceutical education service quality special for Indian condition and this work has also identified gaps in respect to all surveyed institutes which need to mitigate. Authors offer suggestion for operationalizing the same.

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