

# Gap Versus Performance Based Measure of Pharmaceutical Education Service Quality: An Empirical Comparison

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## ABSTRACT

**Aim/Background:** Whether service quality is measured by the gap between expectation and performance or by performance only. In quest of attaining answer of that query, the present research has taken an attempt to compare the efficacy of two varied orientations of service quality estimation empirically in pharmaceutical education service. **Materials and Methods:** We have surveyed randomly students of pharmaceutical graduation course of the six institutes. We have developed (Employing Exploratory Factor Analysis) and compared the models based on gap and performance scores with the help of indices relevant for Confirmatory Factor Analysis (CFA) and validated by carrying out Ordinary Least Squares (OLS) considering overall satisfaction as dependent and all explored items for measuring service quality as independent variables. **Results:** We are concluding this research work with certain dialectic outcomes. The outcomes clearly state that most of the criteria of model fitting, gap and performance score-based models have manifested resemblance. However, the performance score generates a better prediction of the overall satisfaction of the respondents. On the other way round, in the context of students of ranked institutes or students having experience, gap scores predict better the student's satisfaction. **Implications:** Present research is an effort to unfold the answer to the long-standing debate on SERVQUAL vs. SERVPERF. Any administrator who wants service excellence may be guided by context-specific application of quality measurement. The service researchers would be familiar with new ways of research analysis in the context of model effectiveness. **Values:** The work is new and pioneers to employ in academic service especially in pharmaceutical education.

**Key words:** Pharmaceutical Education, Service Quality Measurement, India, SERVQUAL, SERVPERF, Higher Education Service Quality.

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## INTRODUCTION

How to measure the quality of service? This question has emerged debates among management researchers since the development of the 'Service Quality Gap' model.<sup>1</sup> The measurement of quality of service is always a subject for concern because service is far more complex than that of a product. Only in the case of very few services, quality is anticipated before its consumption.<sup>2</sup> However, in the case of the majority of services, service quality is measured during or after the consumption.<sup>3</sup> The service is difficult and multifarious since it is intangible, perishable, heterogeneous (Dependent on

persons involved and the environment) and inseparable (Service producer and service consumer are embedded).<sup>4</sup> Despite difficulties researchers have proposed the methodology of service quality measurement. Gronroos<sup>5</sup> and Lewis and Booms<sup>6</sup> are considered as a pioneer since they have extended the concepts of product quality offered by Crosby<sup>7</sup> and others mentioning the quality is conformity to customer requirements (expectations). According to Gronroos<sup>5</sup> and Lewis and Booms,<sup>6</sup> service quality can be measured how delivered service is matched closely with the expecta-



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tion of the customer. This definition of service quality is elaborated and reemployed further by Parasuraman *et al.*<sup>4,8-10</sup> Actually, they have included a service process and outcome in measuring the quality of the service and offered a process based service quality gap model.<sup>9</sup> Later on, they have also supplemented their initial work by offering five facets of service quality and that is well known as SERVQUAL.<sup>4,8-10</sup> However, in all cases, their methods of measurement of service quality followed estimating the gap between expected and actual service delivered.

Acceptance of SERVQUAL is widespread since lion shares of service quality researches have been carried out in the similar line across the nations. On the other way around, critical evaluation of the SERVQUAL model is also observed and it leads by Cronin and Taylor,<sup>11</sup> Carman<sup>12</sup> and others.<sup>13-15</sup> Critiques namely Cronin and Taylor<sup>11</sup> and Carman<sup>12</sup> opined that there is very less empirical and conceptual support in favor of considering service quality as a gap between expectation and perception (Actual). Hence, Cronin and Taylor<sup>11</sup> carried out a comparison of SERVQUAL and their proposed SERVPERF (Performance only measure for service quality) in terms of empirical survey results. Cronin and Taylor<sup>11</sup> have been influenced by opinions of Bolton and Drew,<sup>16</sup> Churchill and Suprenant<sup>17</sup> and others<sup>18</sup> who preferred comparing actual performance with customer expectations to measure service quality. Carman<sup>12</sup> who also influenced Cronin and Taylor,<sup>11</sup> analyzed that a customer after experiencing a service could have a difference in scoring compare with the situations where he has not been exposed of the same and thus he argued expectation measurement has practically less effect on measuring service quality. Further, he argued that expectation differs in different service context and influences perceptions (Actual). Following Carman,<sup>12</sup> Cronin and Taylor<sup>11</sup> extended the critical appraisal of SERVQUAL model by proposing an alternative version namely SERVPERF and that was based on the assumption that service quality is determined only through perceived service performance, which is synonymous of perceptions (Actual) dimension of SERVQUAL.

There are a good number of researches since then who supports either SERVQUAL or SERVPERF again either conceptually or empirically, have been presented in tabular form (Table 1).

This table covers samples of the Sea of researches have been executed since the inception of service quality measurement research. Our objective is to demonstrate four vital observations as presented below:

- Despite many criticism researchers' dependence on SERVQUAL is beyond any question. Similarly, SERVPERF is equally accepted.
- Most importantly there is no such concrete evidence is available by which one can claim in general SERVPERF is better than SERVQUAL or vice versa.
- Neither service specific nor country wise (Economy and culture-specific) any general claim of superiority of SERVPERF over SERVQUAL or vice versa has been made.

Hence, the debate of efficiency of one over other still remain valid and may unfold the scope of examining the superiority of SERVPERF over SERVQUAL or vice versa in the field of yet to explored service like technical higher education particularly pharmaceutical education service. Further, service quality research is required in the developing nations where the quality of service is an emerging issue for the sustenance of technical and professional education since privately funded institutions involved in technical and professional education have experienced mushroom growth without proper screening of quality and industry are suffering for employable graduates.<sup>31</sup> Pharmaceutical education is of no exception. We have been observing rapid growth of the institutes related to pharmaceutical education since the nineties of last century and this is mostly due to the huge enhancement of privately funded institutes.<sup>32</sup> However, in the recent past Pharmaceutical education administration has been witnessing noticeable changes. Statistics of last six years that can be observed from an authenticated source namely AICTE dashboard<sup>33</sup> has manifested clearly that enrolment of students in terms of approved capacities for B Pharm program in private entrepreneur led institutes are dwindling between 2012-13 and 2014-15. Later, because of the downsizing of approved intake (Capacity) by their administration, enrolment in terms of capacity is apparently increas-

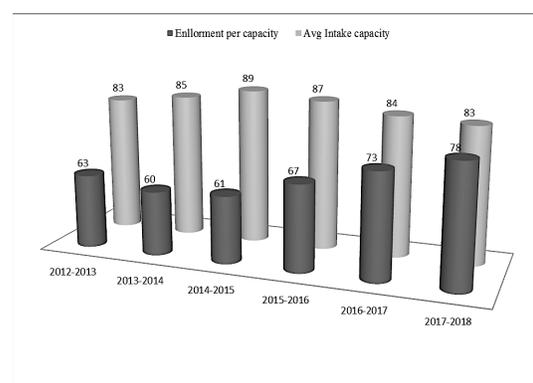


Figure 1: Pharmaceutical Education Scenario in India.

**Table 1: Industry-Wise Research Support for SERVQUAL and SERVPERF.**

SN	Authors	Year	Country	Insudtry	Type of Study	Concluding Remarks
1	Pakdil and Aydin <sup>19</sup>	2007	Turkish	Airline services	Empirical analysis	Supported perceptions-minus-expectations measurement of service quality (SERVQUAL)
2	Gounaris <sup>3</sup>	2005	Greece	B2B services	Empirical analysis	Supported perceptions-minus-expectations measurement of service quality (SERVQUAL)
3	Badri <i>et al.</i> <sup>20</sup>	2005	UAE	Telecommunications	Empirical analysis	Supported perceptions-minus-expectations measurement of service quality (SERVQUAL)
4	Kilbourne <i>et al.</i> <sup>21</sup>	2004	USA	Healthcare	Empirical analysis	Supported perceptions-minus-expectations measurement of service quality (SERVQUAL)
5	Lam <sup>15</sup>	2002	China	Banking	Empirical analysis	Supported perceptions-minus-expectations measurement of service quality (SERVQUAL)
6	Jiang <i>et al.</i> <sup>2</sup>	2000	USA	Information systems	Empirical analysis	Supported perceptions-minus-expectations measurement of service quality (SERVQUAL)
7	Cook and Thompson <sup>22</sup>	2000	USA	Library services	Empirical analysis	Supported perceptions-minus-expectations measurement of service quality (SERVQUAL)
8	Quester and Romaniuk <sup>23</sup>	1997	Australia	Advertising industry	Comparative empirical analysis between SERVQUAL and SERVPERF	Supported the perceptions-minus-expectations measurement of service quality
9	Kettinger and Lee <sup>24</sup>	1997		Information system	Comparative empirical analysis between SERVQUAL and SERVPERF	supported the performance-based measurement of service quality (SERVPERF)
10	Cronin and Taylor <sup>25</sup>	1994	USA	Bank	Comparative empirical analysis between SERVQUAL and SERVPERF	Supported the performance-based measurement of service quality (SERVPERF)
11	Brady <i>et al.</i> <sup>13</sup>	2002	USA	Banking	Extension of Cronin and Taylor (1992) by doing a Comparative empirical analysis between SERVQUAL and SERVPERF	Supported performance-based measurement of service quality (SERVPERF)
12	Mehta <i>et al.</i> <sup>26</sup>	2000	Singapore	Retail chain	Comparative Empirical analysis between SERVPERF and another scale	Supported performance-based measurement of service quality (SERVPERF) in service-oriented retail settings
13	Smith <sup>27</sup>	1999	UK	family-planning clinic	Comparison between SERVQUAL and SERVPERF is possible	The purpose was different but Indirectly Supported performance-based measurement of service quality (SERVPERF)
14	Angur <i>et al.</i> <sup>28</sup>	1999	India	Banking	Comparative empirical analysis between SERVQUAL and SERVPERF	Slightly Supported performance-based measurement of service quality (SERVPERF) over SERVQUAL
15	Lam <sup>29</sup>	1997	Hong Kong	Hospital	Theoretical and Empirical Analysis	Supported performance-Based measurement of service quality (SERVPERF)
16	Taylor <i>et al.</i> <sup>30</sup>	1994	USA	Health clubs, Golf clubs, Movie theatres, Dog tracks	Empirical analysis of the SERVQUAL scale	Supported if the perceptions-minus-expectations measurement of service quality SERVQUAL when the individual items comprising five dimensions are summed and averaged otherwise not supported
17	Carrillat <i>et al.</i> <sup>1</sup>	2007	NA	NA	Meta-analytical comparison between SERVQUAL and SERVPERF	Both scales are sufficient and equally satisfy the concept of service quality. Both the scales are equally popular (number of citation) among the researchers

ing in the said period (Figure 1). Lowering of capacity is clearly understandable by falling of average intake capacity of the pharmaceutical institutes between 2015-16 and 2017-18. Hence, it might appear to be a supply shock when expected demand for Pharmaceutical workforce is increasing.<sup>34,35</sup>

Naturally, it is a pertinent question that why career aspirants are not considering B Pharm as an option when opportunities are well appreciated.<sup>36</sup> Singh<sup>37</sup> has referred to the absence of quality training and research as a possible cause behind. Gupta and Mandal<sup>38</sup> and Mandal and Gupta<sup>39</sup> have also opined identically. In the global context, Hold fold and Reinders<sup>40</sup> have stated the need for students' judgment for offering quality service. All those opinions converge into a fact that there is a necessity of maintenance of service quality in the eyes of one of the important stakeholders namely students. Further, to offer the quality of service in pharmaceutical education we need to measure the same. Consequently, it is also relevant to understand for measuring service quality which principle whether gap based measurement<sup>41,42</sup> or performance only measurement<sup>43,44</sup> would be employed. Since both the principles of service quality measurement (Gap and performance based) have already been employed in existing research works vis-à-vis pharmaceutical education without comparing their efficiencies, hence, in the present research, we did the same. In addition, for the purpose of comparison, we have employed the methodologies employed by other leading research works vis-à-vis service quality measurement. Further, for the purpose of required elaboration of specific research query (Hypothesis), we have felt the necessity of reviewing the present state of research works in the field of technical higher education. Thus, in the next section, we have presented a discussion on the relevant research works of the same.

### Review of Literature

Many authors<sup>41-44</sup> have distinguished service offered by an educational institute with other services like banking, retail chain, hospital and healthcare, telecom and airline services. Education as service is more complex as intangibility, perishability, heterogeneity and inseparability all four service challenges are very much present in case of education as offered service. Moreover, in case of education, service encounters between student (and guardian) as service receiver and teachers (and administrative staffs) as service providers are infinite in numbers during the course tenure and thus, it is largely different from all other services mentioned. Said services like banking, retail chain, hospital and healthcare, telecom and airline services are having much less number of interaction

between service providers and customers and consequential to this, chance of reshaping of expectation by lowering this is less.<sup>1</sup> Since expectations are changed due to numerous interactions between service provider and customer, the plausibility of determining service quality by performance only may be high. We have reviewed literature in relation to higher education, which has been published in recent past (Last 20 years) and found some correlation between use of two different principles of service quality measurement and nature of higher education (Technical including management or General Education including physical education). Research works that have been focused on engineering and management educations<sup>41,45-47</sup> have employed a mostly gap-based measure of service quality. Alternatively, research articles<sup>43,48-53</sup> that have been carried out in the field of general education (Including physical education) have used performance only measure predominantly with some exceptions.<sup>42,54</sup> On the other way around research works it can also be analyzed that there is no relation between countries where a survey of research taken place and use of said two principles of service quality measurement. From the systematic review, it is also found that most of the research works have developed a new construct for service quality measurement but none of them has emphasized on the comparative scientific analysis of the efficiencies of two measures of service quality measurement.

However, after scanning the research works we can scrutinize some pertinent micro observations as follows:

There are three different approaches of measurement of service quality in higher education and these are i) Gap based (Perception minus expectation and perception minus importance) and iii) perception only measurement of service quality.

Other than Abdullah<sup>52,53</sup> no authors related to higher education service have compared between (or among) two (or more than two) constructs.

Abdullah<sup>52,53</sup> in both of his works compared between neither SERVPERF and SERVQUAL nor principle (Method) of measurements such as perceptions-minus-expectations and performance-based measurement of service quality. In fact, Abdullah<sup>52,53</sup> in both of his works compared among SERVPERF, HEDPERF and HEDPERF-SERVPERF.

None of the researchers has worked on comparative efficiency of the principle of operation of two basic approaches to measuring service quality namely gap and performance based.

Furthermore, we have reviewed five research works (Covering all most majority works available) exclu-

sively to pharmaceutical education and where we have observed that only in three works authors have constructed a model for quality measurement. Even this small number of research works are heterogeneous in principle of measurement, one<sup>39</sup> followed perception minus expectation while Holdford *et al.*<sup>40,55</sup> in two successive research works have taken a resort to performance only measure of the same. See Table 2 for a summary of the literature in relation to pharmaceutical education service quality.

Finally, after reviewing the literature, we understood that a less number of research works in relation to higher education that compared between the principles of measurement of service quality namely i) gap involving expectation and perception of service quality and ii) performance (perception based) only. But, it is very important to know which measuring principle is better. Therefore, we have decided to fulfill the gap in the existing literature with an emphasis in the context of pharmaceutical education service quality measurement since no research works have been carried out in said domain and we have already mentioned in the background section of the present work that the challenges in maintaining service quality of pharmaceutical degree education in the context of India.

Hence, in the present study, we worked with the following research query:

**RQ:** Which is the better principle of measuring service quality vis-à-vis pharmaceutical education? The principle of performance-based or performance minus expected (i.e. gap) based measurement of service quality.

Consequently, for the purpose of attaining this research query, it is necessary to know how to define better

because definition must correlate with measurement. Existing literature suggested two different approaches. One researcher<sup>52,53</sup> has opined for good fit structural model as the better measure of service quality. Abdullah<sup>52,53</sup> in both of his researches compared two different items for the measurement of service quality and therefore missed to compare the principles (Performance only and Performance minus Expectation) alone. For the purpose of overcoming this shortcoming in the present research, we have decided to work with one set of items that would be analyzed with two different principles for model building and further compared with appropriate fit indices employed for structural equation modeling. On the other way round, following Hodford and Reinders<sup>40</sup> it can be opined that for pharmaceutical education because of its character is a non-discrete event and thus it is necessary to consider 'Overall Satisfaction' (OS) as an alternate measure of Overall Service Quality (OSQ). In relation to that, they have proposed to carry out ordinary least square regression considering OS as dependent and all dimensions of 'Education Service quality' as independent variables. The objective of carrying out OLS is to check goodness of model fit as cited by Hodford and Reinders<sup>40</sup> whereas Abdullah<sup>52,53</sup> has proposed also to measure 'effect size' and relative importance by considering overall service quality as dependent variables and service quality dimensions of various models (SERVPERF and HEDPERV) as independent variables. Hence following all previous researchers, particularly Hodford and Reinders<sup>40</sup> and Abdullah,<sup>52,53</sup> we can refine our research queries into six subqueries as follows:

**Table 2: Details of Construction for the Measurement of Pharmacy Education Service Quality.**

SN	Authors	year	Country	Area of Higher Education	A New Construct has been developed? [YES (name of the Construct) /Not Constructed]	Principle of Measurement
1	Mandal and Gupta <sup>39</sup>	2018	India	Pharmacy education	Yes (PESQ)	Applied the principle of perceptions-minus-expectations measurement of service quality (SERVQUAL)
2	Singh, S <sup>37</sup>	2014	India	Pharmacy education	Not Constructed	Conceptualized the Quality by Design in Education (QbDE) in pharmacy education
3	Gu <i>et al.</i> <sup>56</sup>	2014	China	Pharmacy education	Not Constructed	Proposed TQM, as a novel teaching concept for pharmacy education
4	Holdford <i>et al.</i> <sup>40,55</sup>	2001 and 2003	USA	Pharmacy education	Yes (ESQ-Educational Service Quality)	Applied the principle of performance-based measurement of service quality (SERVPERF)

**RQ<sub>A</sub>:** Which model fits better in terms of various fit indices? Perception minus expected (Gap) based model or perception (Performance only) based model.

**RQ<sub>B</sub>:** Whether Perception minus expected (Gap) based model is expectation biased or neutral to both (Perception and expectation).

**RQ<sub>C</sub>:** Which model produce better effect size when Overall Satisfaction (OS) is dependent (Criterion variable) and either perception (Performance only measure) or perception minus expectation (Gap measure) variables are independent variables?

**RQ<sub>D</sub>:** Which model produces a more noteworthy contribution (Number of statistically significant regression coefficients) of service quality variables when Overall Satisfaction (OS) is dependent (Criterion variable) and either perception (Performance only measure) or perception minus expectation (Gap measure) variables are independent variables?

**RQ<sub>E</sub>:** Which model produce better results in terms of effect size and number of statistically significant regression coefficients when moderating variables namely Selection of sample unit has been done from institutes having variety in performance as per NIRF framework and Overall Satisfaction (OS) is dependent (Criterion variable) and either perception (Performance only measure) or perception minus expectation (Gap measure) variables are independent variables?

**RQ<sub>F</sub>:** Which model produces better results in terms of effect size and number of statistically significant regression coefficients when moderating variables namely selection of sample unit has been done from students having variety in year of experience with their own institution and Overall Satisfaction (OS) is dependent (Criterion variable) and either perception (Performance only measure) or perception minus expectation (Gap measure) variables are independent variables?

Hence, in the next section, we have discussed the research process undertaken to get an answer to the above-stated research queries.

### Research Process

At the outset, we have decided that we would like to resolve the said queries with the help of a sample survey on the students of pharmaceutical graduation course. It is also needless to mention why we have decided to work on that specific course of study. Gupta and Mandal<sup>38</sup> have emphasized the mushroom growth of pharmacy education after 1980. Mandal and Gupta<sup>39</sup> have shown that the vicious cycle of unemployment and lack of industry readiness of the pharmacy graduates.

Further, we have seen there are a few research works have taken place on the measurement of service quality

in pharmaceutical sectors. All the above three understandings converge towards the necessity of efficient service quality measurement by resolving the debate stated in Section 1 and hence motivated us to quest efficient measurement of same in pharmaceutical education. In addition, it was important to identify any service quality measurement construct from the pool of pharmaceutical research works that suffice our purpose. In the previous section, we have already critically analyzed that when to select which is better principle (Not the construct) of measuring service quality it is judicious to take a common construct employing which we need to compare both the principles (Performance only or gap measure). There are two major constructs namely Holdford and Patkar<sup>55</sup> and Holdford and Reinders,<sup>40</sup> both are based on performance only (SERVPERF) measure in the context of the USA and another one Mandal and Gupta<sup>39</sup> in the context of India, is based on gap (SERVQUAL) measure. Since we are working in the context of India, we have selected the later one. This construct is comprised of 26 items under six factors. We have considered items only and have ignored the dimension as Van Herk *et al.*<sup>57</sup> and Sultan *et al.*<sup>58</sup> observed different service quality measures when applied to different countries having separate economic conditions and culture produce modifications of dimensions mostly without having any change in the items.

Logically next in the research process, we have to set the 'Population of the research' and which we have planned to operationalize within West Bengal as it is within our geographic scope and the state is having a good share of pharmaceutical business alongside representative character of the Indian population. In West Bengal, there are 11 numbers of private pharmaceutical institutes covering 4000 to 5000 number of students.<sup>33</sup> All of these 11 institutes are located in the south of West Bengal, so it is expected that they are having homogeneity of students. Thus, we have chosen randomly six institutes, which are located in four areas within South Bengal. All total 11 institutes are having 4212 number of enrolment for all four years. For the six institutes, this number comes down to 2083.<sup>33</sup> We have understood following the work of Mandal and Gupta<sup>39</sup> students of 1<sup>st</sup> and 2<sup>nd</sup> year having a different level of aspiration, so they need to be in different strata. Thus, we have chosen randomly from the enrollment list of second and fourth year that constitutes 983 numbers of students from said six institutes. According to sample size measurement<sup>59</sup> (Describe minimum sample size for given confidence interval and margin of error) with 95 percent Confidence Interval (CI) and 10 percent Margin of Error (MOE) if population size is 4212 minimum size

of sample should be 94 and if increase the CI up to 99 percent level it increases as 160. However, for six institutes we have surveyed we can have a size of population 2083 and for this like, the previous figures are 92 and 154. If we are taking all students, of 2<sup>nd</sup> year and 4<sup>th</sup> year, the size of the population would be 983 and with 95 percent CI and 10 percent MOE the minimum size of the sample is 88 and if increase the CI up to 99 percent level it increases as 143. We have randomly chosen 140 number of students from all six institutes equal number from both the years (2<sup>nd</sup> and 4<sup>th</sup> year), but initially, we get 124 number of replies which by repeated persuasion increases up to 130. Our size of the sample is slightly short than the desired size of the sample which can be considered one of limitation of this work.

As already we have mentioned, we have decided to work with 26 items provided by Mandal and Gupta;<sup>39</sup> we have prepared our questionnaire with those 26 items and organized questionnaire with two major parts. First major part asked the expectation of the students and we have presented another major part after some days, where we have enquired students about their perception on their present institute vis-a-vis said 26 items. We have offered a gap of some days between the executions of two parts of the questionnaire just to avoid pre-measurement error in the design.<sup>60</sup>

All the six research queries were examined by different statistical methods, For RQ<sub>A</sub>, the CFA with EFA is carried out and both the models have been compared in terms of various model fit indices.

For RQ<sub>B</sub>, we have correlated gap score with expectation score as well as with perception score separately to understand whether said gap score is biased to any of them.

For RQ<sub>C and D</sub>, we have compared two models with the help of OLS regression, in both the model dependent variable has been Overall Satisfaction (OS) and for first model independent variables have been performance only (Perception) measure and for second model perception minus expectation (Gap) measure.

For RQ<sub>E and F</sub>, similar to the previous query, statistical analysis has been carried out, but the responses have been categorized (Based on either ranking or year of experiences of the student respondents) for the comprehensive analysis of the findings.

### Scheme, Results and Analysis

We have initiated describing and analyzing results with the order of queries. In our research query 'A', we emphasized on the building of two confirmatory models based on relevant service quality items by employing correlation of the gap score (Performance minus

expectation) and another by performance score. Before making the model confirm, it is necessary to develop the model through exploration and for this purpose 'Exploratory Factor Analysis' (EFA) with the help of method namely 'Maximum Likelihood' have been executed. Since the prerequisites for EFA are the 'Bartlett test of Sphericity'(BTS) that measures whether the correlation matrix is statistically varied from identity matrix or not and the Kaiser-Meyer-Olkin (KMO) test which measures the adequacy of the sample for executing EFA, have also been employed. A result of BTS is statistically significant that mean correlation matrix is significantly away from identity matrix (No correlations exist between any pair of variables) and thus we understood that within variables some degrees of correlations are present. The result of KMO is also satisfactory and thus we have carried out maximum likelihood-based factor analysis and found three-factor solutions with 60 percent of variance explained. It is also to note that we have ended with 10 items since in the process of purification we have not considered items having less than 0.50 correlations with any of the factor and items cross-loaded between two factors.<sup>61</sup> Based on the items under specified factor we have identified service quality when measured regarding the gap between expectations subtracted from perception, is viewed with three facets namely Career driven policy, academic focus and updated views of the Management. All of them have high internal consistency since Cronbach alpha and Composite Reliability values are more than 0.75 in every occasion (Table 3).<sup>62</sup>

Next, the same procedures have been followed with the 'Perception Score' and found significant probability value for BTS test result alongside acceptable KMO value. In this case, again we have completed with three factors with almost similar items under the specified factor have been observed. Overall, 56 percent variations are explained with the satisfactory internal consistency of Cronbach's alpha (Range from 0.633 to 0.794), composite reliability (range from 0.735 to 0.803 and see the Table 4 for details).

Further we have examined the model by Confirmatory Factor Analysis (CFA) with an objective to understand which one of the above-stated duo is a best-fitted model in terms of various indicators namely i) Absolute fit measures ii) Incremental fit measures and iii) Parsimonious fit measures.<sup>61</sup> In Table 5, it is observed that model based on gap score and model based on perception score both have either crossed or within the recommended value as suggested except the RMSEA value. Overall gap score-based model is better a little in terms of RMR value.

**Table 3: Details of the Items with the Three Factors of the Gap (P-E) Model.**

Kaiser-Meyer-Olkin (KMO) indexes		Bartlett's Test of Sphericity		
		$\chi^2$	df	p-value
0.721		580.706	45	0.000
Factor Name		Career Driven Policy	Academic focus	Updated views of the Management
V1	College/ Institute administration should help students for incubation and entrepreneurial development.	0.941		
V2	I should get support from the institute and faculties to do innovative and research work.	0.713		
V3	Expert counseling should be arranged for student career development.	0.666		
V4	College/Institute should be visible by advertisement and media activity.	0.655		
V5	Career development seminars and workshops should be organized.	0.565		
V6	College/Institute should provide all the information on its website.	0.536		
V7	Semester courses should be completed on time		0.994	
V8	I would like to get adequate* study materials		0.693	
V9	Classrooms should have (white/ Black/ Smart/ white and black/ white and smart) board with LCD projector.			0.899
V10	Industry experts should be invited to take classes.			0.667
Total variance explains (60.91%)		29.49 %	16.77 %	14.65 %
Composite Reliability		0.842	0.834	0.767
Cronbach's Alpha		0.844	0.833	0.790

Source: Authors calculation

In the case of query B, our intention was to examine whether the gap score is related more with expectation score or not (or with perception score). This query gave birth to the following set of generic hypothesis:

**H<sub>A</sub><sup>exp</sup>:** There is a significant correlation between expectation score and gap score for service quality item i.

**H<sub>A</sub><sup>perception</sup>:** There is a significant correlation between perception score and gap score for service quality.

Where i is equal to any one of the specified ten service quality items

We have taken the opinion of 130 respondents, on day one, for each of the 26 items respondents have assigned the expectation score and after some days, they have stated perception score. Further, we have calculated gap score (Perception-expectation). Now, we are having for each item three scores (Expectation, perception and gap score). Therefore, correlation analysis has been carried out between expectation and gap score vis-à-vis perception and gap score. Based on this, we have received results of 10 correlation values between gap score and expectation score. On the other side, ten correlation values between gap score and perception score and com-

pare the number/s of significant correlation between stated situations.

In fact, we have found a significant correlation between expectation and gap score for all items, but it is only three for the case between perception and gap score (Table 6). This result clearly portrays the biases of gap score with expectation score.

Therefore, we conclude for research query B that for the purpose of measurement of the pharmaceutical education service quality gap score is relatively (Moderately) better measure compared with perception score.

In the case of research query C to F, we have carried out Ordinary Least Square (OLS) regression where all the items for measuring service quality have been considered as independent variables and overall satisfaction has been employed as dependent variable since satisfaction is considered a better measure of manifestation of overall service quality by majority of the literature<sup>26-29</sup> including the literature belonging to pharmaceutical<sup>40,55</sup> and other education service quality measurement.<sup>48,52</sup> We have executed OLS regression twice once with gap (Between expectation and performance) score and

**Table 4: Details of the Items with the Three Factors of the Perception-Only Model.**

	Kaiser-Meyer-Olkin (KMO) index	Bartlett's Test of Sphericity		
		$\chi^2$	df	p-value
	<b>0.560</b>	<b>507.028</b>	<b>45</b>	<b>0.000</b>
	Factor Name	Career Driven Policy	Academic focus	Updated views of the Management
V1	My College/ Institute administration helps us with incubation and entrepreneurial development.	0.873		
V2	My Institute provides all the information on its website.	0.808		
V3	My College/Institute is visible to society through advertisement and media activity.	0.644		
V4	I am getting proper support from the institute and faculties to do innovative and research works.	0.484		
V5	Here Semester courses are completed on time		0.988	
V6	Students are getting required study materials.		0.580	
V7	In this College/Institute Career development, seminar and workshop are organized.		0.482	
V8	Here Industry experts are invited to take classes.			0.997
V9	Our Classrooms have (white/ Black/ Smart/ white and black/ white and smart) board along with LCD projector.			0.541
V10	Expert counseling is arranged for us for our career development.			0.486
	Total variance explains (56.74%)	22.05%	17.37%	17.30%
	Composite Reliability	0.803	0.743	0.735
	Cronbach's Alpha	0.794	0.673	0.633

Source: Authors calculation

**Table 5: CFA Model Fit Indexes with the Recommended Values and Experimental Model Values.**

Types of Fit	Model Fit Indexes	Recommended Values	Model based on GAP Score	Model based on PERCEPTION Score
Absolute Fit Measures	Chi-Square/df	Less than 3.000 for the nested models <sup>63</sup>	2.479	2.604
	GFI (Goodness of Fit)	Greater than 0.8 <sup>64</sup>	0.909	0.910
	AGFI (Adjusted GFI)	Greater than 0.8 <sup>65</sup>	0.833	0.810
	RMSEA	Less than 0.10 <sup>63</sup>	0.110	0.114
	RMR (Root Mean Square Residual)	Small RMR <sup>63</sup>	0.011	0.132
Incremental Fit Measures	TLI (Tucker-Lewis Index)	Greater than 0.80 <sup>64</sup>	0.880	0.850
	NFI (Normal Fit Index)	Greater than 0.80 <sup>64</sup>	0.876	0.871
Parsimonious Fit Measures	CFI (Comparative Fit Index)	Greater than 0.90 <sup>63</sup>	0.920	0.913
	IFI (Incremental fit index)	Greater than 0.80 <sup>64</sup>	0.922	0.916

Source- Authors' calculation

another with performance score. Later, for the purpose of queries E and F, we have divided the sample unit into two sections i) students from the first fifty ranked institute under NIRF (National Institutional Ranking Framework by MHRD)<sup>66</sup> and rest ii) students belong to beginning classes (1<sup>st</sup>/2<sup>nd</sup> year) and belong to experi-

enced classes (3<sup>rd</sup>/4<sup>th</sup> year) and carried out OLS regression twice for each of the cases.

For the purpose of analyzing we have compared the OLS regression results between carried out with gap score and same with performance score. Overall it is seen that  $R^2$ , adjusted  $R^2$  and 'effect size' is higher (Table 7) for the performance-based measure in comparison

**Table 6: Correlation between Gap Score and Expectation/Perception Score.**

Items	Correlation between Gap and Expectation score	Correlation between Gap and Perception score
V1	Significant ( $p < 0.05$ ) <sup>*</sup>	Significant ( $p < 0.05$ ) <sup>*</sup>
V2	Significant ( $p < 0.05$ ) <sup>*</sup>	Insignificant ( $p > 0.05$ ) <sup>#</sup>
V3	Significant ( $p < 0.05$ ) <sup>*</sup>	Insignificant ( $p > 0.05$ ) <sup>#</sup>
V4	Significant ( $p < 0.05$ ) <sup>*</sup>	Insignificant ( $p > 0.05$ ) <sup>#</sup>
V5	Significant ( $p < 0.05$ ) <sup>*</sup>	Insignificant ( $p > 0.05$ ) <sup>#</sup>
V6	Significant ( $p < 0.05$ ) <sup>*</sup>	Significant ( $p < 0.05$ ) <sup>*</sup>
V7	Significant ( $p < 0.05$ ) <sup>*</sup>	Significant ( $p < 0.05$ ) <sup>*</sup>
V8	Significant ( $p < 0.05$ ) <sup>*</sup>	Insignificant ( $p > 0.05$ ) <sup>#</sup>
V9	Significant ( $p < 0.05$ ) <sup>*</sup>	Insignificant ( $p > 0.05$ ) <sup>#</sup>
V10	Significant ( $p < 0.05$ ) <sup>*</sup>	Insignificant ( $p > 0.05$ ) <sup>#</sup>

Note: Significant<sup>\*</sup> means a  $p$ -value less than 0.05 and Insignificant<sup>#</sup> means a  $p$ -value more than 0.05 in the correlation analysis process.

**Table 7: Result of Regression Analysis with Significant Variables of the Different Approaches.**

Dependent Variable- Overall satisfaction of students from the pharmaceutical graduate degree course				
		Independent variables for Regression analysis	Gap based model	Performance only model
Query C	All Responded based Model	$R^2$	0.475	0.507
		Adjusted $R^2$	0.431	0.465
Effect Size of Model*		0.904	1.028	
Variables have a significant coefficient with Overall satisfaction		1 out of 10	5 out of 10	
Query D	Model based on Responses from NIRF ranked Institute	$R^2$	0.519	0.433
		Adjusted $R^2$	0.434	0.330
		Effect Size of Model*	1.070	0.763
		Variables have a significant correlation with Overall satisfaction	2 out of 10	2 out of 10
Query E	Model based on Responses from rest of the Institute	$R^2$	0.547	0.648
		Adjusted $R^2$	0.446	0.613
		Effect Size of Model*	1.200	1.830
		Variables have a significant correlation with Overall satisfaction	1 out of 10	6 out of 10
Query F	Model based on Responses from 1 <sup>st</sup> /2 <sup>nd</sup> year students	$R^2$	0.402	0.543
		Adjusted $R^2$	0.295	0.462
		Effect Size of Model*	0.672	1.188
		Variables have a significant correlation with Overall satisfaction	1 out of 10	4 out of 10
	Model based on Responses from 3 <sup>rd</sup> /4 <sup>th</sup> year students	$R^2$	0.749	0.480
		Adjusted $R^2$	0.694	0.367
		Effect Size of Model*	2.980	0.923
		Variables have a significant correlation with Overall satisfaction	2 out of 10	2 out of 10

\*Effect size measured with Cohen-d Measurement [ $R^2 / (1 - R^2)$ ], Cohen suggested that  $d=0.2$  be considered a 'small' effect size, 0.5 represents a 'medium' effect size and 0.8 a 'large' effect size.

with same gap score (Query C). Moreover, for performance-based model five variables have been found whose regression coefficients are significantly away

from zero (Table 7) and it is only one (Table 7) for the gap-based model (Query D).

**Table 8: Finding of this Study and Some Previous studies with Similar Results.**

Series of Queries	Outcomes of the study	Previous studies with similar findings
Query A	The efficacy of gap score based model is slightly better than performance based model to measure the pharmaceutical education institutes service quality.	Mandal and Gupta; <sup>39</sup> Angell <i>et al.</i> <sup>42</sup> Mahapatra and Khan; <sup>41</sup>
Query B	The gap score is biased with expectation score; the gap score is relatively better measure compared to perception score.	Carrillat <i>et al.</i> <sup>1</sup> Ladhari; <sup>68</sup> Llusar and Zornoza <sup>69</sup>
Query C	The effect size is higher for perception only based model in comparison to the gap score model.	Abdullah <sup>52,53</sup>
Query D	Perception based model has a greater number of significant regression coefficient than gap score model.	Abdullah <sup>52,53</sup>
Query E	Gap based model is better to measure for top-ranked institutes rather perception based model is more appropriate for non-ranked institutes of pharmaceutical education.	Not done previously
Query F	If the service quality of pharmaceutical institutes is measured for experienced students then gap-score model is better, else perception-based model should be used.	Not done previously

Interesting observations have been originated when we divided the whole sample unit into two groups and carried out the OLS regression. First, we have segregated the whole respondents into two clusters that are responses from the students of NIRF ranked (First 100 rank holding institutes in pharmacy) institutes and rest of the students and executed OLS regression. These results have shown for measuring parameters like  $R^2$ , adjusted  $R^2$  and effect size as proposed by Cohen<sup>67</sup> gap-based score fits less erroneously with criterion variable (Overall satisfaction) and vice versa in case of students of other than the NIRF ranked institutes (Query E). Almost similar results are found for another parameter namely the number of the significant coefficient of the variables (Query E). In case of analyzing Query F we have segmented all the respondents in terms of their year of experiences with the course and have observed in case of beginners (Students of classes 1<sup>st</sup> and 2<sup>nd</sup> year) performance-based scores of ten service quality items (Independent variables) fits comparatively better with overall satisfaction (Dependent variable) considered as criterion variable (Table 7). In the case of experienced students, responses are just the opposite of the beginners (Table 7).

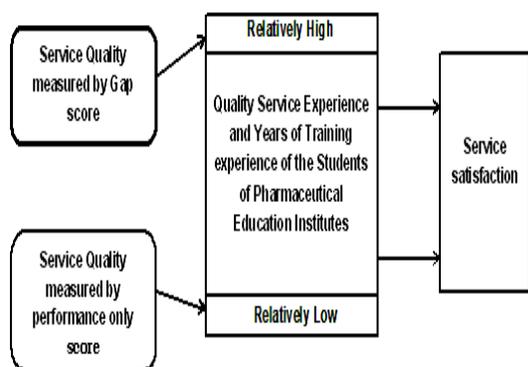
Overall resolving queries E and F we have observed apparently contrary statistical outcome though in deeper level it unfolds some thoughtful insight. Furthermore, this study has been found following similarity based on previous research outcomes (Table 8). In the next section of the concluding note, we have explained all of these in details.

## CONCLUSION

Our findings unfolded some interesting observation. Service experience of the students belongs to high (within 100) NIRF ranked pharmaceutical institutes must differ from the students of the pharmaceutical institutes having no ranking and that is why service satisfaction of the students of high ranked institutes is dependent significantly on their gap score (Perception of the service after experiencing minus expectation of the service before the same). Just reverse has been seen for the students of non-rank institutes since they have either no expectation or they synchronize their expectation with actual (what they received) and therefore their service satisfaction is related mostly with the perception of the service after experiencing.

Similarly, students who have already experienced three and more year, eventually they became conscious about the difference between what they actually received and what they can be supposed to be received and thus it dictates their service satisfaction. Again, it is not the case of less experienced newly joined students. For them what they received, they believe in that and it directs their service satisfaction.

Hence, we have developed the following model of the relationship between service quality measurement and service satisfaction (as an outcome of service experience) where whether service quality measurement using gap score and service quality measurement employing performance score are moderated by 'quality service experience' and 'year of training experience' of the students. In the case of relatively high both of these factors, gap score is significantly related with service sat-



**Figure 2: Pharmaceutical Education Service Satisfaction Model.**

isfaction otherwise for relatively low of said two factors performance only score guides the service satisfaction (Figure 2).

### Implication of the Research

The present research has taken an attempt to compare the efficacy of two varied orientations of service quality estimation empirically. It is an effort to unfold the answer of the long-standing debate SERVQUAL vs SERVPERF. Moreover, this research is a forerunner for resolving the said debate for pharmaceutical education. Academic administrators will be immensely benefitted as this work will provide insight into execution varied ways of measuring the quality of service with the different context of the institution. Service quality researchers may extend the present research problem (which service quality measurement techniques work better in their context?) in the circumstance of heterogeneous higher education institutes. Researchers would also be familiar with new ways of research analysis in the context of model effectiveness. Finally, our research offers academicians a thoughtful resolution in relation to the direction of service quality measurement debate.

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### CONFLICT OF INTEREST

The authors declare no conflict of interest.

### ABBREVIATIONS

**EFA:** Exploratory Factor Analysis; **CFA:** Confirmatory Factor Analysis; **OLS:** Ordinary Least Squares; **RQ:** Research Query; **NIRF:** National Institutional Ranking Framework.

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### SUMMARY

- The study has taken an attempt to compare the efficacy between 'Gap' and 'Performance' orientations of service quality assessment empirically with special emphasis on pharmaceutical education service.
- The 'Goodness of fit' for models developed by both the orientation has been compared with the help of CFA indices.
- The results also validated by carrying out model fitting through OLS regression technique considering overall satisfaction as dependent and all explored items for measuring service quality as independent variables for each of the model and compared in terms of  $R^2$  and significance of regression coefficients.
- The outcomes of analysis state that most of the criteria of model fitting, gap and performance score-based models have manifested equal outcome. However, the performance score generates a better prediction of overall satisfaction of the respondents from Pharmaceutical education institutes.
- The gap score model predicts better overall satisfaction in the context of students of NIRF ranked pharmacy institutes or students having higher experience in course study.

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