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Research Article

Does University Type Moderate the Relationship Between Service Quality and Student Satisfaction? Evidence from Multi-Group PLS-SEM

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ABSTRACT

Higher education increasingly operates as a service environment in which students evaluate academic provision, service delivery, and institutional perceptions. This study compares satisfaction level of students of public and private universities and examines the relationship between functional quality, institutional image, technical quality and student satisfaction. It further investigates whether university type influence these relationships. Data were collected from 595 postgraduate commerce and management students of selected universities in Punjab and Chandigarh, India, and analyzed using independent-samples t-test, PLS-SEM and multi group analysis. Functional quality was found to have the strongest relationship with student satisfaction ($\beta = 0.537$, $p < 0.001$), followed by institutional image ($\beta = 0.198$, $p < 0.001$) and technical quality ($\beta = 0.114$, $p < 0.01$), with the model explaining 56.8% of satisfaction variance. Private-university students reported a slightly higher satisfaction mean (32.50 vs. 31.50), but the difference was not significant ($p = 0.070$). However, university type significantly influenced the relationship between functional quality and satisfaction ($\Delta\beta = 0.172$, $p = 0.041$) and institutional image–satisfaction relationships ($\Delta\beta = -0.206$, $p = 0.014$), while the technical quality relationship remained comparable across groups.

Keywords: Higher education; service quality; functional quality; technical quality; institutional image; student satisfaction; university type; PLS-SEM; multi-group analysis.

1. INTRODUCTION

Higher education is increasingly regarded as a service environment in which students evaluate not only academic outcomes but also the processes and institutional conditions through which education is delivered. Accordingly, service quality has become an important basis for understanding students' overall educational experiences. Higher education service quality is multidimensional, and its dimensions may vary according to the characteristics of the institutional and cultural context (Abdullah, 2006; Grönroos, 1984). The relation amid 'service quality' and 'student satisfaction' has gained considerable attention in service research. Satisfaction represents students' general assessment of their educational experience, whereas service quality reflects their assessment of different aspects of service delivery and outcomes. Previous research has established a meaningful relationship between perceived service quality and satisfaction, supporting the view that students' quality evaluations contribute to their overall satisfaction (Cronin & Taylor, 1992; Spreng &Mackoy, 1996; Woodside et al., 1989). However, treating service quality as a single, uniform construct may overlook the different ways in which students evaluate the process, outcome, and broader institutional environment. Grönroos's (1984) service-quality model provides a useful basis for addressing this issue by distinguishing between technical quality, referring to what the student receives, and functional quality, regarding the way in which the service is provided, while also recognizing the role of institutional image in service evaluations. In the higher education context, functional quality can encompass accessibility, assurance, empathy, reliability, responsiveness, and tangibility, whereas technical quality primarily reflects the academic component of the educational service. This multidimensional perspective allows student satisfaction to be

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examined through both service-delivery experiences and educational outcomes. An important but relatively less examined issue is whether the relation between 'service-quality dimensions' and 'student satisfaction' remains consistent across different institutional contexts. Public and private universities operate within different organizational and institutional environments, which may shape students' expectations and evaluations of university services. The research evidence indicates differences in perceived service-quality dimensions between public and private universities, while the broader literature also emphasizes the context-specific nature of service-quality assessment (Cronin & Taylor, 1994; Dabholkar et al., 1996; Kang & James, 2004). Thus, comparing only average levels of service quality or satisfaction may not fully explain whether institutional context changes the strength of the quality-satisfaction relationship.

This issue is particularly relevant in the Indian higher education context, where public and private universities coexist and provide education under different institutional arrangements. Despite the importance of service quality for student satisfaction, comparatively limited attention has been given to examining whether the relationships between 'functional quality,' 'institutional image,' 'technical quality,' and 'student satisfaction' differ between public and private universities. Addressing this gap can provide a more context-sensitive understanding of how students translate different quality perceptions into overall satisfaction. Therefore, this study compares the level of student satisfaction between public and private universities, examines the relationship of functional quality, institutional image, and technical quality with student satisfaction, and investigates whether university type moderates the strength of these relationships. The study focuses on selected public and private universities in Punjab and Chandigarh, India, and contributes to higher education service-quality research by moving beyond pooled relationships to examine both differences in satisfaction levels and institutional context as a potential boundary condition.

2. LITERATURE REVIEW AND HYPOTHESIS FORMULATION

2.1 Higher Education Service Quality

'Service quality' is a comprehensive construct that reflects both the consequence of a service and the process through which it is delivered. Gronroos (1984) distinguished between technical quality (what is received), functional quality (how the service is delivered), and organizational image. Similarly, Parasuraman et al. (1988) identified reliability, responsiveness, assurance, empathy, and tangibility as key service-quality dimensions. Performance-based approaches further emphasized customers' evaluations of actual service performance (Cronin & Taylor, 1992, 1994). In higher education, service quality is particularly context-dependent because students evaluate academic, administrative, support, and institutional services simultaneously. This has led to the development of higher-education-specific measures such as HEdPERF (Abdullah, 2006), alongside other frameworks developed for university settings (Sultan & Wong, 2010; Senthilkumar & Arulraj, 2011). Studies have also demonstrated the relevance of technical, functional, and image dimensions in service-quality assessment (Kang & James, 2004). Accordingly, this study examines 'functional quality,' 'institutional image,' and 'technical quality' as distinct dimensions of higher-education service quality.

2.1.1 Functional Quality and Student Satisfaction

Functional quality concerns how services are delivered and encompasses attributes such as reliability, responsiveness, assurance, empathy, accessibility, and tangibility (Grönroos, 1984; Parasuraman et al., 1988; Abdullah, 2006). In universities, these attributes reflect students' experiences with academic and administrative personnel, institutional procedures, and supporting facilities. Prior research indicates that service-quality perceptions are closely associated with satisfaction (Woodside et al., 1989; Cronin & Taylor, 1992; Spreng &Mackoy, 1996). Higher-education studies similarly identify service-delivery attributes as important components of students' evaluations of university services (Abdullah, 2006). Therefore:

H1: Functional quality has a significant effect on student satisfaction

2.1.2 Institutional Image and Student Satisfaction

Institutional image signifies students' overall perception of the university and forms an important component of Grönroos' (1984) service-quality framework. In higher education, image may reflect perceptions of institutional

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reputation, credibility, academic standing, and the broader university environment. Previous research has incorporated image and reputation into higher-education service-quality models (Kwek et al., 2010; El-Hilali et al., 2015), while Kang and James (2004) demonstrated the relevance of image alongside functional and technical quality. A favorable institutional image can contribute to students' overall evaluation of their educational experience. Thus:

H2: Institutional image has a significant effect on student satisfaction

2.1.3 Technical Quality and Student Satisfaction

Technical quality refers to what students receive from the educational service (Grönroos, 1984). In higher education, this primarily relates to academic outcomes, including knowledge acquisition, curriculum quality, teaching outcomes, and skill development. Ewell (1994) emphasized educational outcomes as an important component of higher-education quality, while Senthil kumar and Arulraj (2011) identified academic and educational attributes as important dimensions of university service quality. Since students evaluate universities partly according to the educational outcomes they receive, technical quality is expected to influence satisfaction:

H3: Technical quality has a significant effect on student satisfaction

2.2 University Type as a Moderator

Public and private universities may differ in governance, resource structures, administrative practices, and service-delivery environments. Previous research has identified differences in service-quality perceptions across public and private educational institutions (Basheer, 2009; Calvo-Porral et al., 2013). Such contextual differences suggest that university type may influence not only the level of perceived service quality but also the strength of its relationship with student satisfaction. Accordingly, university type is examined as a moderating variable to determine whether the relations between service-quality dimensions and student satisfaction vary in both public and private universities.

H4: The effect of functional quality on student satisfaction differs significantly between public and private universities.

H5: The effect of institutional image on student satisfaction differs significantly between public and private universities.

H6: The effect of technical quality on student satisfaction differs significantly between public and private universities.

3. CONCEPTUAL MODEL

Drawing on the service-quality literature, the conceptual framework proposes that functional quality, institutional image, and technical quality influence student satisfaction. Functional quality represents how educational services are delivered, technical quality reflects what students receive from the educational process, and institutional image captures students' overall perception of the university (Grönroos, 1984; Kang & James, 2004).

The framework further proposes university type (public vs. private) as a moderating variable. This moderation examines whether the strength of the relationships between the three 'service-quality dimensions' and 'student satisfaction' differs across public and private universities (Figure 1).

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Figure 1. Conceptual Framework

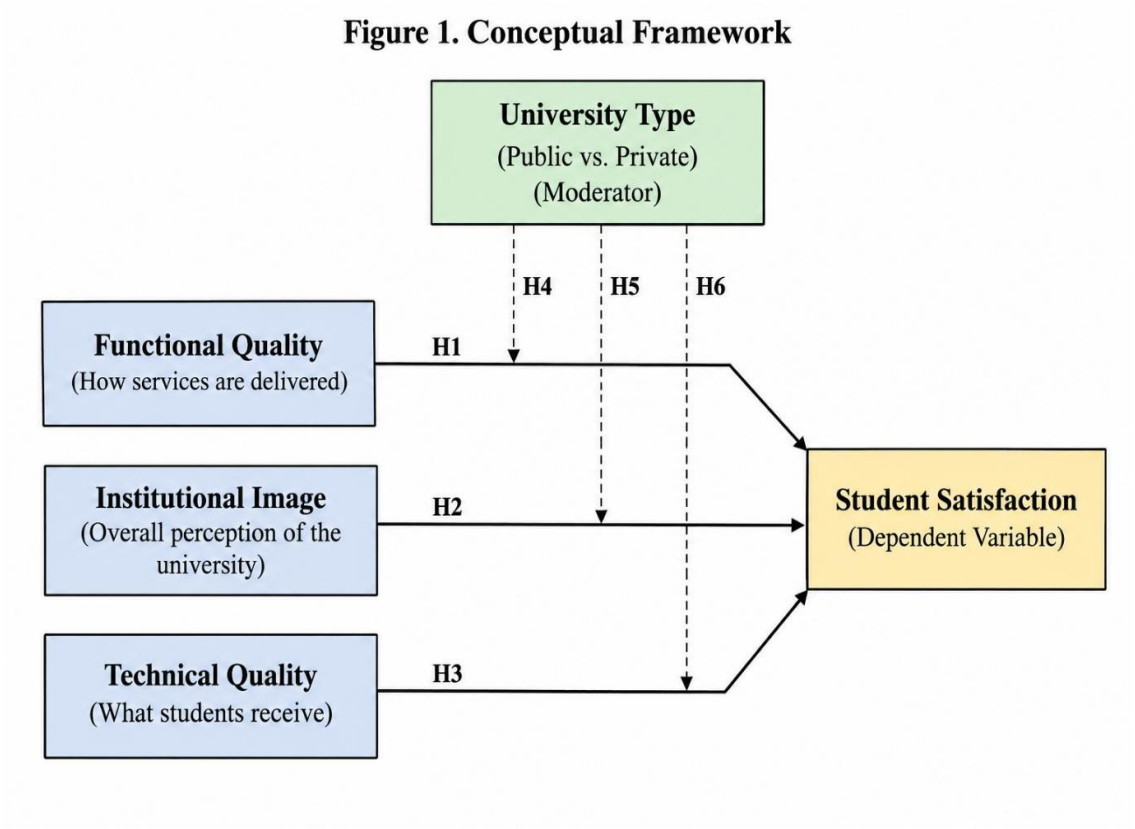


Figure 1 presents the proposed relationships tested in the study

4. METHODOLOGY

A quantitative, cross-sectional survey framework was employed to analyse the links between higher education 'service quality' and 'student satisfaction' at public and private institutions located in Punjab and Chandigarh, India. Three public universities- 'Panjab University' 'Punjabi University,' and 'Guru Nanak Dev University,' and three private universities- 'Lovely Professional University', 'Chandigarh University', and 'Chitkara University' were included, with postgraduate commerce and management students as the unit of analysis. Purposive (judgment) sampling was employed, with 690 questionnaires distributed and 618 returned; after screening, 595 usable responses were retained, comprising 299 public-university and 296 private-university students. Data collection was conducted via a standardised questionnaire that used a five-point Likert scale. The service-quality instrument initially contained 42 items adapted from established measures (Abdullah, 2006; Cronin & Taylor, 1992; Kang & James, 2004; Oldfield & Baron, 2000; Senthilkumar & Arulraj, 2011; Sultan & Wong, 2010) and was refined to 38 indicators following expert evaluation. Student satisfaction was measured using nine items adapted from Athiyaman (1997), Browne et al. (1998), and Lee et al. (2000). Functional quality was specified as a second-order formative construct comprising six first-order reflective dimensions- accessibility, assurance, empathy, reliability, responsiveness, and tangibility, while institutional image, technical quality, and student satisfaction were specified as reflective constructs (Sarstedt et al., 2019). Data were examined using SPSS and SmartPLS 3.3.2.Descriptive statistics were used to summarize student satisfaction levels across public and private universities, while an independent-samples t-test was employed to examine whether the level of student satisfaction differed significantly between the two university types. PLS-SEM was employed to assess indicator reliability, internal consistency, convergent and discriminant validity, collinearity, and structural relationships (Hair et al., 2019; Sarstedt et al., 2021). A bootstrapping method utilising 5,000 resamples was used to calculate standard errors, t-values, p-values, and confidence intervals. Finally, PLS-MGA was utilised to compare the structural relationships between public and private university students.

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5. RESULTS

5.1 Sample Composition

The demographic profile consists of a sample of 595 students, comprising 299 students from public universities and 296 from private universities (table 1). Female respondents represented a slightly larger proportion of the sample (50.6%) than males (49.4%), while students aged 22 years or below accounted for 51.1%. More than half of the respondents were from urban areas (55.1%), and 51.8% belonged to business-class families. The largest income group reported a monthly family income of Rs 30,001– 60,000 (39.3%). Most respondents had not completed their graduation from the same university (56.1%), and the sample was predominantly composed of M.B.A. students (71.5%). Respondents were relatively evenly distributed across the second, third, and fourth semesters. Day scholars constituted 60.5% of the sample, while commerce (32.3%) and management (28.6%) were the most common graduation streams. Finance was the largest specialization (28.6%), followed by marketing (26.5%) and HRM (24.9%). Overall, the sample covers the major demographic and academic categories and maintains an almost equal distribution between public and private university students.

Table 1 Summary of Respondents' Demographic Characteristics

Characteristics	Category	n	%
Gender	Male	294	49.4
	Female	301	50.6
Age	≤ 22 years	304	51.1
	≥ 23 years	291	48.9
Residential Area	Urban	328	55.1
	Rural	267	44.9
Family Background	Service Class	287	48.2
	Business Class	308	51.8
Monthly Family Income	Less than Rs30,000	87	14.6
	Rs 30,001–Rs 60,000	234	39.3
	Rs60,001–Rs 100,000	137	23.0
	More than Rs 100,000	137	23.0
Graduation from Same University	Yes	262	43.9
	No	333	56.1
Course of Study	M.B.A.	425	71.5
	M.Com.	170	28.5
Term of Course	2nd Semester	216	36.3
	3rd Semester	196	32.9
	4th Semester	183	30.7

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Type of Student	Day Scholar	360	60.5
	Residential	235	39.5
Stream in Graduation	Arts	62	10.4
	Commerce	192	32.3
	Computers	56	9.4
	Engineering	72	12.1
	Science	43	7.2
	Management	170	28.6
Major/Specialization	Finance	170	28.6
	Marketing	158	26.5
	HRM	148	24.9
	Others	119	20.0
University Type	Public	299	50.3
	Private	296	49.7
Total		**595**	**100.0**

5.2 Measurement and Comparison of Student Satisfaction

To measure and compare student satisfaction across public and private universities, the mean scores of the nine satisfaction indicators and the overall satisfaction score were examined using an independent-samples t-test (Table 2). The overall satisfaction score was 31.50 (SD = 6.152) for public-university students and 32.50 (SD = 7.289) for private-university students. Although private universities reported a higher mean level of overall satisfaction, the difference was not statistically significant ($t = -1.812$, $p = 0.070$). At the individual-item level, significant differences were observed for perceptions that enrolment was a wise decision ($p = 0.022$), satisfaction with education received ($p < 0.01$), satisfaction with overall university services ($p = 0.008$), worthiness of tuition fees ($p = 0.007$), and the reasonableness of tuition and other fees relative to educational quality ($p = 0.010$). In contrast, no significant variations were observed for satisfaction with the decision to study at the university, the perceived correctness of the enrolment decision, willingness to return for further studies, or willingness to recommend the university. Thus, while several specific satisfaction dimensions differed between the two groups, the overall satisfaction score did not differ significantly between public and private university students.

Table 2. Public–Private Comparison of Student Satisfaction

Satisfaction Indicator	Public Mean (N=299)	Private Mean (N=296)	t-value	p-value
1. I am satisfied with my decision to study at this university.	3.75	3.76	−0.186	0.853
2. My choice to enroll in this university was a wise one.	3.46	3.65	−2.297	0.022*
3. I think I did right thing when I decided to enroll in	3.60	3.64	−0.485	0.628

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Satisfaction Indicator	Public Mean (N=299)	Private Mean (N=296)	t-value	p-value
this university.				
4. I am satisfied with the education that I received in this university.	3.50	3.79	−3.690	0.000***
5. I am satisfied with the overall services of this university.	3.54	3.74	−2.675	0.008**
6. I would like to come back for further studies in my university.	3.49	3.42	0.772	0.441
7. I will recommend my university to the friends, neighbors or relatives.	3.61	3.53	0.890	0.374
8. I consider that money spent on my tuition fees in this university is worthwhile.	3.23	3.46	−2.730	0.007**
9. When compared to the quality of education, the tuition and other fees of my university is reasonable.	3.32	3.53	−2.598	0.010*
Overall satisfaction	**31.50**	**32.50**	**−1.812**	**0.070**

Note:*p< .05, **p< .01, ***p<0.001

5.3 Summary of Measurement and Structural Model Results

Building on the findings of Gupta and Singh (2022), the present study extended the data analysis by examining the moderation effect of type of university on the relationship between service quality dimensions and student satisfaction. The 'measurement model' exhibited acceptable 'reliability and validity,' as shown by 'Cronbach's alpha' and 'rho.' values exceeding the suggested limit of 0.70, 'composite reliability' values ranging from 0.910 to 0.926, and 'AVE' values from 0.583 to 0.771, surpassing the suggested threshold of 0.50. 'Discriminant validity' was supported by the 'Fornell-Larcker' criterion whereby the square root of AVEs of all the constructs were greater than the correlation coefficients of remaining constructs. HTMT values remained under 0.85, with a maximum HTMT value recorded at 0.673, so affirming the discriminant validity and showing the distinctiveness of all constructs. The higher-order formative assessment of functional quality also supported its multidimensional specification, with significant indicator weights ranging from 0.205 to 0.273. It was determined that there were no multicollinearity issue in the structural inner model since the inner VIF values for 'functional quality (1.963),"institutional image (1.717),' and 'technical quality (1.737)' on 'student satisfaction' were all lower than the 3.33 threshold limit. A bootstrapping procedure using 5,000 sub samples was used to determine p-values for the presented hypotheses. Figure 2 shows the path coefficients and PLS-SEM estimations that indicate how service quality affects student satisfaction.

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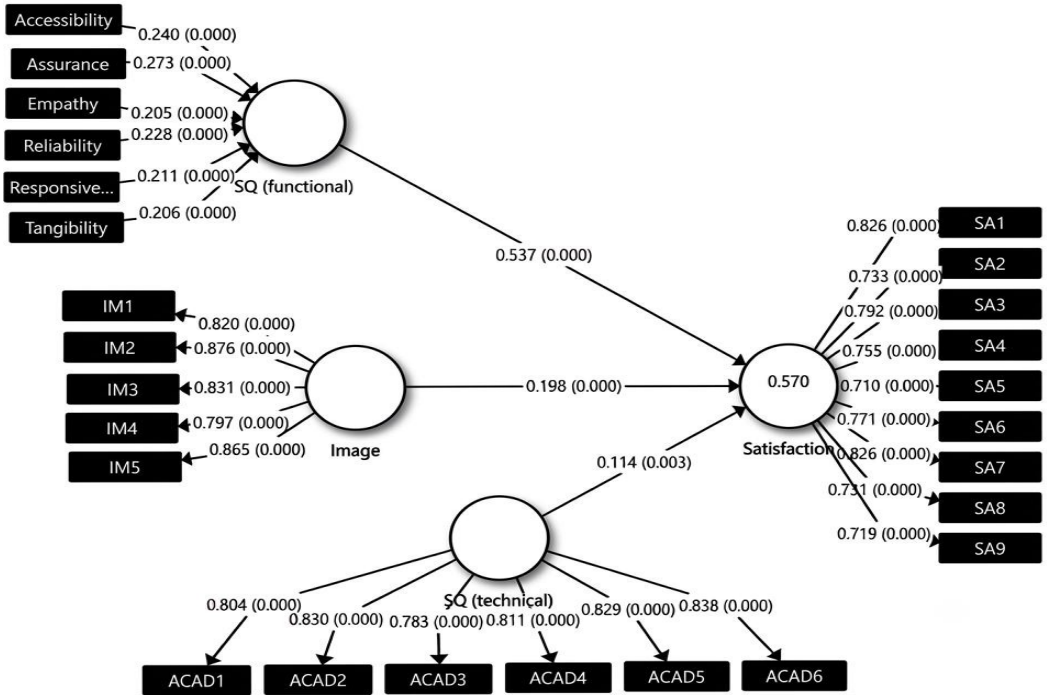


Figure 2 Relationship among service quality dimensions and satisfaction

The structural model results provided support for H1, H2, and H3 and showed that 'functional quality ($\beta = 0.537$, $p < 0.001$),' 'institutional image ($\beta = 0.198$, $p < 0.001$),' and 'technical quality ($\beta = 0.114$, $p < 0.01$)' were positively and statistically connected with student satisfaction (table 3).

Table 3. Direct Structural Effects

Hypothesis	Relationship	β	t	p	Decision	f^2
H1	Functional Quality → Student Satisfaction	0.537	13.084	0.000***	Supported	0.345
H2	Institutional Image → Student Satisfaction	0.198	4.861	0.000***	Supported	0.053
H3	Technical Quality → Student Satisfaction	0.114	2.988	0.003**	Supported	0.017

Note:*p< .05, **p< .01, ***p<0.001

The model described 56.8% of the variance in student satisfaction and demonstrated medium predictive relevance (table 4). f^2 of 0.345, 0.053 and 0.017 revealed large (functional quality), small (institutional image), and no (technical quality) effect on student satisfaction. Service quality (functional) was found to have large effect size and emerged as the most significant exogenous construct in the explanation of the endogenous variable of student satisfaction (table 3).

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Table 4. Service Quality-Student Satisfaction Relationship & Predictive Relevance

Endogenous Construct	R^2	(Q^2)
Student Satisfaction	0.568	0.326

Goodness of fit criterion was investigated by the Standardized Root Mean Square Residual (SRMR) global fit indices (Hair et al., 2020)(table 5). The SRMR value of 0.040 in both the saturated and estimated model is well below the threshold value of 0.08 indicating that the model has a good explanatory power (Henseler et al., 2009; Hu & Bentler, 1999). Further NFI value of 0.914 confirms the good explanatory power of model. These established results provide the basis for the present analysis, which extends the earlier study by examining whether these structural relationships differ between public and private universities.

Table 5. Model Fit Assessment

Fit Index	Saturated Model	Estimated Model
SRMR	0.040	0.040
Chi-Square	775.429	775.429
NFI	0.914	0.914

5.4 Multi-Group Analysis: Public versus Private Universities

To examine whether university type changes the strength of the relationships among service-quality dimensions and student satisfaction, the sample was divided into public-university students (n = 299) and private-university students (n = 296). The group-specific path coefficients were estimated using 5,000 bootstrap sub samples. The functional quality–student satisfaction relationship was found positive and statistically substantial in both 'public universities ($\beta = 0.577$, $p < 0.001$)' and 'private universities ($\beta = 0.405$, $p < 0.001$).' However, the difference between the two coefficients is 0.172, and the PLS-MGA result is statistically significant ($p = 0.041$). The parametric test ($p = 0.037$) and Welch–Satterthwaite test ($p = 0.038$) provide consistent evidence (table 6 & 7). Therefore, H4 is supported, indicating that the strength of the functional quality–satisfaction relationship differs significantly between public and private universities.

The relationship between institutional image and student satisfaction is also significant in both groups, with β coefficients of 0.136 for public universities ($p = 0.006$) and 0.342 for private universities ($p < 0.001$). The public–private difference is −0.206, and the PLS-MGA result is significant ($p=0.014$). The parametric ($p = 0.012$) and Welch–Satterthwaite ($p = 0.013$) tests lead to the same conclusion.

Hence, H5 is supported, showing that the strength of the institutional image–satisfaction relationship differs significantly across university types. For technical quality, the relationship with student satisfaction is significant in both public universities ($\beta = 0.114$, $p = 0.030$) and private universities ($\beta = 0.132$, $p = 0.011$).

Nevertheless, the difference between the coefficients is only −0.018, and the PLS-MGA, parametric, and Welch–Satterthwaite tests reveals p value of 0.810. Therefore, H6 is not supported. Although technical quality is positively associated with student satisfaction in both groups, the strength of this relationship does not differ significantly between public and private universities.

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Table 6. Path Coefficients for University Type

Relationship	Path Coefficient (β) (Public Univ.)	Public Univ. (p)	Path Coefficient (β) (Private Univ.)	Private Univ. (p)
Functional Quality → Satisfaction	0.577	0.000^{***}	0.405	0.000^{***}
Institutional Image → Satisfaction	0.136	0.006^{**}	0.342	0.000^{***}
Technical Quality → Satisfaction	0.114	0.030*	0.132	0.011^{*}

Note: $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$

Table 7. Multi-Group Comparison Result

Hypothesis	Path	Δβ (Public–Private)	PLS-MGA p-value	Parametric p-value	Welch Satterwaith p-value	Decision
H4	Functional Quality → Satisfaction	0.172	0.041*	0.037*	0.038*	Supported
H5	Institutional Image → Satisfaction	−0.206	0.014*	0.012*	0.013*	Supported
H6	Technical Quality → Satisfaction	−0.018	0.810	0.810	0.810	Not supported

Note: *p<0.05

The multi-group results therefore indicate that university type operates differently across the three service-quality relationships. The functional quality–satisfaction relationship is stronger among public-university students, whereas the institutional image–satisfaction relationship is stronger among private-university students.This indicates that for defining the connection between functional quality and student satisfaction, university type (public and private) is a significant variable. In contrast, the technical quality–satisfaction relationship is statistically comparable across the two groups.This indicates that for defining the link between technical quality and student satisfaction, university type (public and private) is not a significant variable.The 'multi-group analysis' therefore complements the preceding comparison of satisfaction levels by examining whether the strength of the relationships between 'service-quality dimensions' and 'student satisfaction' differs across university types.

5.5 Summary of Hypothesis Testing

The outcomes provide support for five of the six proposed hypotheses. Functional quality, institutional image, and technical quality each have positive and significant association with student satisfaction, supporting H1, H2, and H3. University type significantly changes the strength of the relationships involving functional quality (H4) and institutional image (H5). However, the difference in the technical quality–student satisfaction relationship among public and private universities is not statistically significant; therefore, H6 is not supported.

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6. DISCUSSION

The outcome provide a more refined understanding of student satisfaction by showing that the level of satisfaction and the factors shaping satisfaction are not necessarily the same across university types. The overall satisfaction mean was slightly higher among private-university students (32.50) than public-university students (31.50), but the variation was not statistically significant. This suggests that university type alone may not determine whether students feel satisfied with their overall university experience. However, the significant differences observed in particular aspects of satisfaction, especially regarding the education received, overall university services, and perceptions of tuition fees, indicate that students may evaluate specific components of their university experience differently even when their overall satisfaction remains broadly comparable. This pattern becomes more meaningful when considered alongside the multi-group findings. Functional quality showed a stronger relationship with satisfaction among public-university students ($\beta = 0.577$) than among private-university students ($\beta = 0.405$; $\Delta\beta = 0.172$), suggesting that the day-to-day experience of service delivery may be particularly important in the public-university context. Conversely, institutional image demonstrated a stronger association with satisfaction among private-university students ($\beta = 0.342$) than among public-university students ($\beta = 0.136$; $\Delta\beta = -0.206$), indicating that broader perceptions of the institution may carry greater relevance in the private-university setting. Technical quality did not show a meaningful difference between the two groups, implying that its contribution to satisfaction may be relatively stable across institutional contexts. The input of the present study therefore lies not simply in identifying differences among public and private universities, but in demonstrating that institutional context can alter the relative importance of service-quality dimensions in shaping students' satisfaction.

7. THEORETICAL IMPLICATIONS

This study extends the understanding of higher education service quality by demonstrating that student satisfaction is shaped by distinct but interconnected dimensions of service quality rather than by a single overall quality perception. By separating functional quality, institutional image, and technical quality, the study offers a more differentiated description of how students evaluate their university experience. The findings show that functional quality has the strongest relationship with satisfaction, while institutional image and technical quality provide additional explanatory contributions. This supports a multidimensional conceptualisation of higher education service quality and shows that the dimensions should not be assumed to have equal theoretical importance. Another theoretical implication concerns the role of functional quality as a multidimensional construct. Its formation through 'accessibility,' 'assurance,' 'empathy,' 'reliability,' 'responsiveness,' and 'tangibility' demonstrates that the service-delivery component of higher education encompasses several interrelated attributes. The significant contribution of all six dimensions indicates that functional quality is not adequately represented by a single service attribute. This strengthens the conceptual distinction between the different ways in which students experience university services and provides a more structured explanation of the service-delivery component within higher education. The study also contributes theoretically by introducing university type as moderator in the service quality–student satisfaction relationship. The findings demonstrate that university type does not moderate all relationships uniformly. It is significantly moderating influence on functional quality and institutional image, but not on technical quality, indicating that the association between service-quality dimensions and satisfaction is context-dependent. This moves the framework beyond a simple direct-effects model and suggests that institutional setting should be considered when explaining how service-quality perceptions translate into student satisfaction. Finally, the findings provide an integrated theoretical perspective in which service experience, institutional perception, and academic provision operate at different levels of importance. The results recommend that functional quality provides the strongest foundation for satisfaction, while institutional image and technical quality make complementary contributions. The model therefore offers a more appropriate explanation of student satisfaction by connecting the multidimensional nature of service quality with institutional context. This provides a basis for future research to inspect additional moderators and institutional characteristics that may further explain variation in the service quality–satisfaction relationship.

8. PRACTICAL IMPLICATIONS

The outcome provide several practical implications for university administrators looking for student satisfaction improvement. First, the stronger role of functional quality suggests that improvement efforts should focus on the quality of students' day-to-day service experiences. Accessibility, assurance, empathy, reliability, responsiveness, and tangibility should therefore be treated as interconnected service priorities rather than isolated administrative

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functions. Particular attention can be given to assurance, accessibility, and reliability because these dimensions showed relatively higher contributions to functional quality in the study. Second, universities should not focus exclusively on academic or technical provision. Although technical quality has a significant relationship with student satisfaction, its comparatively smaller contribution indicates that academic provision alone does not capture the complete student experience. Universities can therefore complement academic improvements with stronger administrative support, accessible services, responsive communication, and dependable service processes. Third, the findings highlight the practical relevance of institutional image. Universities can strengthen satisfaction by ensuring that students' actual service experiences are consistent with the broader image projected by the institution. Institutional reputation should therefore be supported by tangible and consistent student experiences rather than treated solely as a communication or branding outcome. Finally, the moderation results suggest that a uniform service-improvement strategy may not produce the same outcomes across university types. Functional quality has a stronger relationship with satisfaction among public-university students, whereas institutional image has a stronger relationship among private-university students. Managers can therefore consider the institutional context when prioritising improvement initiatives. At the same time, the absence of a significant difference for technical quality indicates that improvements in this dimension have a comparatively consistent relationship with satisfaction across both groups. Overall, the outcomes suggest that universities can improve student satisfaction more effectively by prioritising the process and manner in which services are delivered to students and improving the solution they get after actual service delivery while enhancing their perception towards the institution.

9. CONCLUSION

This study examined how functional quality, institutional image, and technical quality contribute to student satisfaction and whether these relationships vary across public and private universities. The result determines that all three dimensions have significant positive relationships with student satisfaction, but their contributions are not equal. Functional quality emerges as the strongest predictor, indicating that the way university services are delivered represents a particularly important component of students' overall evaluations. Institutional image provides an additional contribution, while technical quality remains significant but comparatively less influential when the three dimensions are considered together. In addition, the multi-group findings provide an important contextual dimension to these relationships. University type significantly changes the strength of the functional quality–satisfaction and institutional image–satisfaction relationships, whereas the technical quality–satisfaction relationship does not differ significantly between public and private universities. This indicates that university type influences selective relationships rather than uniformly changing all service-quality relationships. The comparison of satisfaction levels further reveals that overall student satisfaction did not differ significantly between public and private universities, despite differences in several individual satisfaction indicators. Thus, university type does not necessarily correspond to a significant difference in students' overall satisfaction level, while it does influence the strength of selected service-quality–satisfaction relationships. Overall, the study shows that student satisfaction in higher education is shaped by a combination of service experience, institutional perception, and academic provision, with their relative influence depending partly on institutional context. The study therefore moves beyond a general quality–satisfaction relationship by demonstrating that different dimensions of service quality contribute differently and that some of these relationships vary across university types.

10. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The study is subject to few limitations that provide directions for future research. The geographical focus on selected universities in Punjab and Chandigarh limits the generalizability of the findings, suggesting the need for future studies covering universities across different regions of India. The use of purposive sampling and the concentration on postgraduate commerce and management students also restrict the broader applicability of the findings; future research could employ broader or probability-based samples and include students from different disciplines and educational levels. The cross-sectional design captures perceptions at a single point in time, creating an opportunity for longitudinal research to examine how functional quality, technical quality, institutional image, and student satisfaction evolve throughout the student experience. Reliance on self-reported responses also suggests the value of combining perceptual measures with objective institutional indicators and qualitative evidence. Future research could also extend the framework by examining additional institutional contexts and other moderators to determine whether the dimension-specific relationships identified in this study remain consistent across different higher education environments.

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