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Study on service quality and student satisfaction: the competitive dimension of the physical infrastructure of Pakistani universities

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Abstract
The present study investigates the implication of critical Service Quality success factors on universities' students satisfaction level in Pakistan. A wide-ranging survey was conducted for data collection. A well-structured questionnaire was used, and stratified random sampling has been used to select 600 respondents. The universities of Rawalpindi and Islamabad have been selected as sample cases. These universities were further divided into three sectors, i.e., Government,semi-government, and private. 200 respondents were selected from each sector, thus making a total of 600 respondents. This research points to the importance of Service quality of infrastructure in the higher education sector of Pakistan. All the results are significant, and the overall impact of every independent variable is positive on student satisfaction.
Keywords: Service Quality, student satisfaction, student Perception, Higher education institutions (HEI).

Introduction

In today's world of competition, where the competitive educational environment plays a significant role, students have many available options to adopt (Aslam et al., 2012). Therefore, it is a severe matter of concern to study those aspects that enable educational institutions to motivate and hold students. Those Higher Educational institutions that need to avail competitive advantage in a competitive environment must find out active and inspired ways to motivate and maintain a short-term stronger relationship with students. Student satisfaction has become a great challenge for educational institutions(Arif et al., 2017). It has been recognized that higher education institutions will gain a competitive edge by satisfying students (Asaduzzaman et al., 2014). The students' happiness can also contribute to the retention and desirability of the students for new students (Arambewela& Hall, 2009). It was recorded that the long-term sustainability of higher education institutions depends on the quality of the student services (Kanji &Tambi, 1999). As a tactical tool for gaining a viable advantage (Montano & Utter, 1999) and enhanced performance (Kanji &Tambi, 1998), educational

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institutions also implement principles of excellence organization(Basheer et al., 2020). The notion of service quality and student satisfaction in the education sector had advanced. It gained significant attention (Brochado, 2009). This form of the pattern can also be observed in developing countries such as Pakistan.

Pakistan had only one public university at the partition in 1947, i.e., Lahore Punjab University, and not a single private university (Usman, 2014). Now there are three sets of educational institutions running in Pakistan, Public (Government-owned), Private (owned locally by different people), and Semi-government (owned by the government as well as local individuals). The introduction of millions of educational reforms for quality assurance by HEC is observed in Pakistani universities, both the Private and Public sectors (Jadoon&Jabeen, 2006). The trend of higher education and the number of institutions has increased in the last few decades. Moreover, the enrollment of students in such institutions has significantly increased (HEC Pakistan, 2010).At present, Pakistan has 190 universities, from which 80 falls under the auspices of Government. The reforms were initiated by HEC in 2002 to provide necessary resources to universities like high-speed internet, research scholarship programs, digital libraries, etc. Stated facts conclude that students studying in universities of Pakistan seem dissatisfied with the offering of the education sector (Hameed &Amjad, 2011). Higher education institutions seemingly fall under pressure to hold their resources efficiently, improving their activities around the world (Nazarko&Saparauskas, 2014).

The literacy rate of Pakistan is 65 percent in 2018 (Zhang Xuepieet al., 2019), while in 2016 total enrollment and literacy rate was below 60 percent (Sheikh, 2018). In 2015 this rate was 58 percent. These figures show that this rate increases over time. Pakistan Vision 2025 aims at significant development and improvements in educational quality, increasing government spending to 4.0 percent of GDP by 2018. In 2016, there were 170 universities with 94.03 thousand teachers in both the private and public sectors. In 2015, the cumulative enrolment of higher education students (universities) was estimated at 1.30 million compared to 1.59 million over the same period last year (PSLM, 2014-2015).

The aim of enlarging enrolment and retaining learners creates intensified competition among private and state-owned universities to re-examine strategies that focus on identifying indicators and elements of competitive advantage. In 2000, UNESCO Task Force on Higher Education Society and World Bank prepared and compiled a report on the better learning future of higher education in the developing world. The regulator formed a quality assurance division to keep a check on the universities and to know what else can be required to bring them to the education level of international universities (HEC Pakistan, 2011).

Pakistan's 2016-17 budget allocation is 84 trillion rupees for education and 79.5 trillion rupees for higher education (HEC Pakistan, 2016). In the 2016-17 budget, the government reserved Rs 84.19 billion for the education sector. For the last fiscal year, the amount was Rs 75.57 billion. Rs 21.5 billion under the Public Sector Development Program (PSDP) and Rs 58 billion due to current spending, indicating a 13 percent increase compared to Rs 51 billion earmarked for 2015-16. This is 11 percent higher overall than last year and the highest in the history of Pakistan (HEC Pakistan, 2016).

Government education spending in Pakistan amounts to 2.2 percent of GDP in fiscal 2015 compared to 2.1 percent in 2014. Such figures showed that, with time, educational expenditures are rising (HEC, 2016). Education spending in other developing countries as a percentage of GDP such as 2% in Bangladesh, 4.6% in Nepal, 6% in Bhutan, 3.8% in Afghanistan

Education is a prestigious investment (Malik, Danish & Usman, 2010). The focus of the government is to promote science and technology in the educational institutes of Pakistan. The primary and significant functions of universities are research, teaching, and community services by gaining considerable student satisfaction (Escrigas and Lobera, 2009). Better learning outcomes can be derived from a positive perception of the learning environment (Malik, Danish, and Usman, 2010; Huang and Fisher, 2011). The question that arises here is the critical factors of service quality of infrastructure in Pakistani Universities and the relationship between different dimensions of service quality of physical infrastructure and student satisfaction. This study has been initiated by taking public and private sector universities of Rawalpindi and

Islamabad to measure the students' response to service quality and physical infrastructure provided by universities.

Methodology

Research Design and Sampling

This research examines the diverse dimensions/attributes of service quality and factors that affect student satisfaction in universities. A cross-sectional approach is developed to gather information from the respondents. The quantitative methodology has been used in this study. Data for the research has been collected through a survey delivered to students in Rawalpindi and Islamabad. The questionnaire is the tool for the survey. A total of 600 questionnaires were distributed to students who study in different universities in Rawalpindi and Islamabad. A pilot test has been conducted to ensure the consistency and validity of the measures.

In this research, the most frequently used method of cluster sampling has been applied. So, three clusters were developed for this study. It is a non-probability sampling technique where the respondents were selected from each cluster based on convenience, availability, and closeness to the researcher of the study.

Research Instrument

A four-page questionnaire with four sections printed in English has been used to collect data. The questionnaire contained 61 questions indicative of respondents' characteristics and attitudes.

The questionnaire consisted of two sections. In the first section, the respondents' demographic data is gathered, such as name, age, genders, university name, and sector. The second section finds out the student's perception of five dimensions of service quality about the infrastructure of the University on student satisfaction.

Information regarding Variables

Tangibility

It includes transportation facilities, shuttle service, accommodation facilities, computer labs, general labs, auditorium, parking facilities, canteen/café, recreation/sports facilities, prayer facilities, playgrounds, classroom structure, library with enough literature, HEC digital access, waiting area facility, First aid centers, Banking facility, and Lavatory arrangement.

Security

It includes Feel secure, Security Cameras, Security equipment, and several guards.

Availability

It includescore textbooks, supporting books, buses, computers, required equipment at the laboratory, medicine, sports equipment, multimedia, heating & cooling facilities.

Access

It includes a help desk, university buses, library timings, computer labs, general labs, accommodation, and parking area.

Cleanliness

It includes classrooms, washrooms, computer & general labs, the atmosphere of the library, and hygiene of the cafeteria.

Student satisfaction (depended variable)

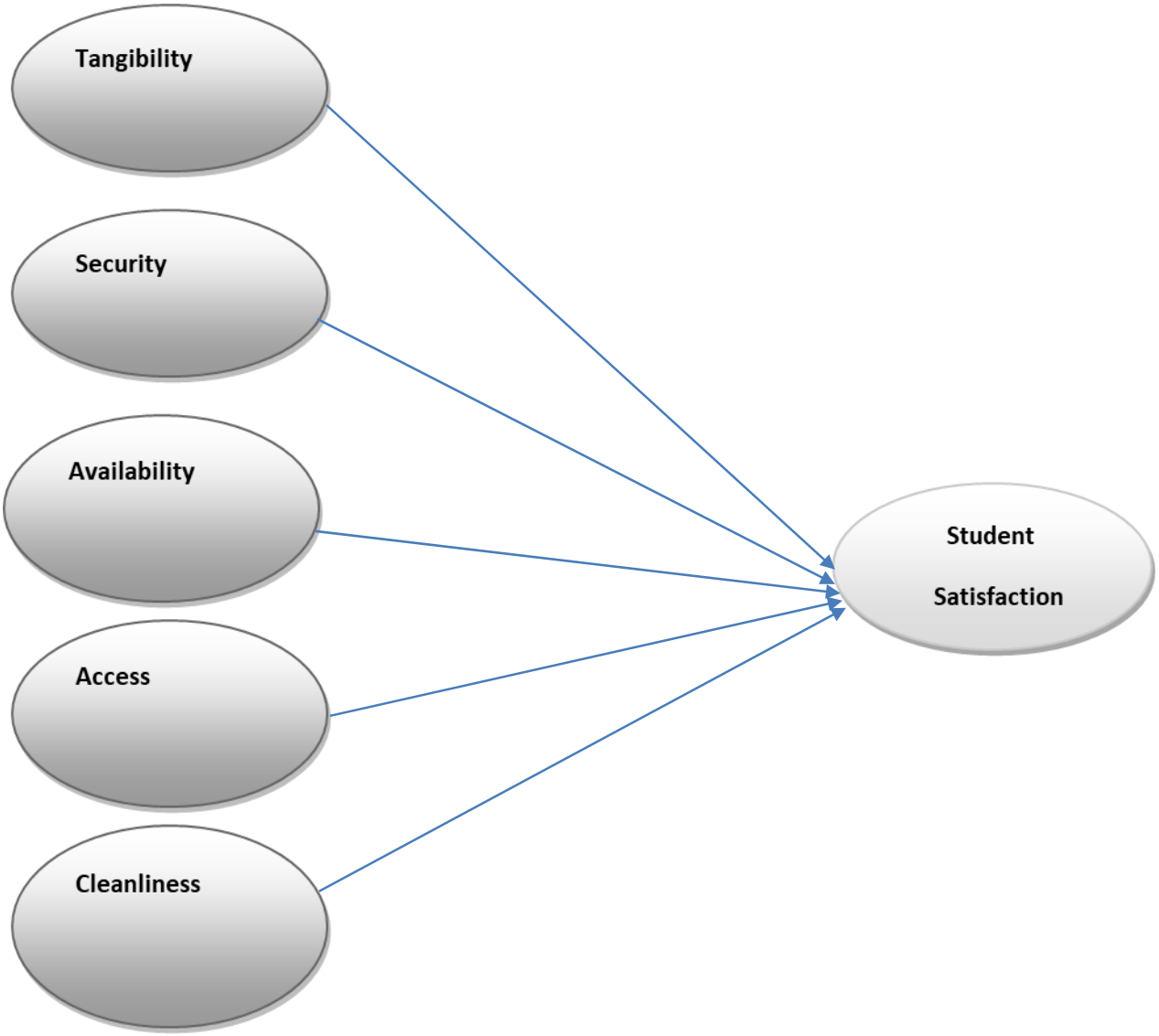
It includes satisfaction with infrastructure**,** security system**,** availability of required services**,** access of stated services**,** and cleanliness of the university.

Data analysis

The proposed research model was derived thoroughly from a review of previous literature. The independent variables are tangibility, security, availability, access, and cleanliness, whereas Student Satisfaction is the dependent variable.

Figure 1

Proposed Research framework



Proposed Research Model (Parasuraman et al. 1985)

Econometric Model

This paper employs logistic regression and descriptive analysis. Student satisfaction is treated as binary variables. The logit model is estimated to investigate the determinants of student satisfaction with universities.

Let $E(y_i|x_i)$ represents the expected mean value of a dependent variable $y_i$for a specified set of explanatory variables x_i. Suppose y is a linear function of (x1 xj) = X. In that case, the coefficients of all regressors can be estimated with the help of ordinary least squares:

$y = \beta_0 + \beta_1 x_1 \ldots\ldots + \beta_j x_j$ ..... (1)

In this way, the vector of mean values of coefficients can be computed as

$$\beta = (X'X)^{-1}X'y$$

From Eq. (1), the marginal effect of the variable $x_k$can be calculated, where k ∈ {1……j}, on dependent variable y i.e., $\partial y/\partial x_k = \beta_k$. This relationship shows that the probability for one instant change in the variable

$x_k$causes the dependent variable y by β_k units. The ordinary method to model binary variables, where it assumes only two possible types, "0" and "1, is that the dependent variable tracks some form of Bernoulli distribution. In such a situation, an analysis should be conducted using Logistic distributions. Thus, the expected value of the dependent variable will be:

$y = G(X'\beta)$ …….. (2)

In equation (2), G represents detailed binomial distribution. As y ∈ (0 or 1), the estimated value for the i^{th} observation of y will represent the conditional probability that y_i is 1, or Pr(y_i = 1). In logistic regression, the generalized form of the linear model can be detailed as:

$Pr(y_i = 1) = logit^{-1} (\beta_0 + \beta_1 x_1 + ...+ \beta_j x_j)$…… (3)

From (2), the marginal effects will be estimated via the chain rule, therefore:

$\frac{dy}{dx_k} = \beta_k \times \frac{dG}{dX'\beta}$ ..... (4)

so, the marginal effect of variable x_k depends upon the derivative $\frac{dG}{dX'\beta}$, that is either a logistic or normal probability density function, depending on the choice of G. Kleiber&Zeileis (2008) explained that there are two ways to calculate marginal effects from logistic regression models. The first method is consisting of the calculation of the average of the sample marginal effects. In contrast, the second method is the calculation of average marginal effects. The equation for the analysis of the average of the sample marginal effects is given below:

$\frac{dy}{dx_k} = \beta_k \times \frac{\sum_{i=0}^{n} g(X_i'\hat{})}{n}$ ..... (5)

There are n observations, and g is the probability density function for either the normal or logistic distribution.

In the second approach, the marginal effect for x_k can be calculated by taking predicted probability calculated; when all regressors are held at their average value from the same formulation except for adding one unit to x_k. The derivation of this marginal effect is captured as follow:

$\frac{dy}{dx_k} = G(\hat{\beta}_0 + \hat{\beta}_1 x_1 + \cdots + \hat{\beta}_k (x_k + 1) + \cdots + \hat{\beta}_j x_j) - G(\hat{\beta}_0 + \hat{\beta}_1 x_1 + \cdots + \hat{\beta}_k x_k + \cdots + \hat{\beta}_j x_j)$... (6)

Results and Discussion

This section explains the detailed results and discussion of the study. Table 1 presents the demographic summary of respondents of the survey. It consists of information about gender, age, and type of university of 600 respondents. The information on the statistic is given below in detail.

Gender

Table 1 shows that the more significant proportion of respondents comprises females' i.e., 64.7%. In comparison, the number of male respondents in the current study is 35.3%.

Table 1

Demographics of the gender of three sectors

Demographic Factor	Semi-Government	Government	Private	Total
Gender				
Female	147 (73.5%)	156 (78%)	85(42.5%)	388(64.7%)
Male	53 (26.5%)	44 (22%)	115(57.5%)	212(35.3%)

Total	200 (100%)	200 (100%)	200(100%)	600(100%)

Age

Table 2 shows, 3.7 percent (22) respondents are in the age of 18 or below, followed by 55 percent (330) respondents in the <18-22 group, 39 percent (236) are in the age group of <22-27, 1.7 percent (10) in the age group <27-37 and 0.3 percent (2) in the age group <32-37. The demographic age profile of this study demonstrates that <18-27 is the dominant group, whereas only 0.5 percent could be approached by the age group <32-37.

Table 2

Demographics of the age of three sectors

Demographic Factor	Semi-Government	Government	Private	Total
Age				
18 or Below	15 (7.5%)	4 (2%)	3(1.5%)	22(3.7%)
<18 – 22	125 (62.5%)	93 (46.5%)	112(56%)	330(55%)
<22 – 27	56 (28%)	95 (47.5%)	85(42.5%)	236(39)
<27 – 32	3 (1.5%)	7 (3.5%)	0 (0%)	10(1.7%)
<32 – 37	1 (0.5%)	1 (0.5%)	0 (0%)	2(0.3%)
38 and above	0 (0%)	0 (0%)	0 (0%)	0(0%)
Total	200 (100%)	200 (100%)	200(100%)	600(100)

University type

Table 3 shows that an equal number of respondents, i.e., 200 (33.3 percent) has been taken from each sector.

Table 3

Demographics of university type

University type	Frequency	Percent
Government	200	33.3
Private	200	33.3
Semi-government	200	33.3
Total	600	100.0

Students Perception regarding physical infrastructure

Table 4 shows the mean values of the dimensions of service quality, particularly physical infrastructure. "Security" is the most important factor, followed by "Access, Cleanliness, Tangibility, and Availability," according to semi-government students.

Government students exuberant the dimensions of service quality by considering "security" as the most important factor, followed by "Tangibility, Availability, Cleanliness, and Access." Similarly, private sector students label "Security" as the most significant factor, followed by "Availability, Cleanliness, Tangibility, and Access."

Table 4

Descriptive statistics of perception regarding physical infrastructure

	Semi-Government		Government		Private	
Factors	Mean	Rank	Mean	Rank	Mean	Rank
Tangibility	3.6366	4	3.6439	2	3.2968	4
Security	3.9088	1	3.9613	1	3.7275	1
Availability	3.6195	5	3.6430	3	3.4825	2
Access	3.6621	2	3.4664	5	3.0843	5
Cleanliness	3.6580	3	3.5000	4	3.4530	3

Cronbach's Alpha Coefficient Reliability

According to Leedy and Ormond (2005), reliability is defined as, "measuring the consistency of an action with the help of a measuring instrument:. It means besides providing correct measures, the instrument needs to give the same results constantly.

Cronbach's Alpha coefficient's threshold values must be greater than 0.7 (Gliem, &Gliem, 2003). The pilot study results of the study are mentioned in table 5. The figures in the table show the reliability of dependent and independent variables. All independent variables are having excellent reliability. In contrast, the reliability of Student Satisfaction (Dependent Variable) is slightly below 0.7. Still, it is near 0.7 so, it is also considered acceptable.

Table 5

Cronbach's Alpha Coefficient Reliability

Variables	No. of Items	Alpha Reliability Co-efficient
Tangibility	19	0.865
Security	4	0.799
Availability	10	0.822
Access	7	0.718
Cleanliness	5	0.768
Student Satisfaction	5	0.693

Logistic Regression Results

Marginal effectsshow the change in probability when the predictor or independent variable increases by one unit. Table 6 shows the change in probability for one instant change in tangibility will increase the student's satisfaction by 48 percentage points in model 1 and 31 percentage points in model 2. In contrast, in model 3, the change in probability for one instant change intangibility would decrease student satisfaction by 47 percentage points. This is because the students of the government sector do not mark cleanliness and security as essential determinants of their satisfaction. Similarly, the change in probability for one instant change in security will decrease student satisfaction by 20 percent. In model 2 and model 3, probability insecurity changes cause a positive change i-e: 24 percent and 54 percent. The change in probability for one instant change in access will decrease student's satisfaction by 30 percent in model 1 and 48 percent in model3,` while in model 2, student satisfaction increases by 24 percent. Similarly, in the case of cleanliness, a change in probability for one instant change in cleanliness reduces students' satisfaction by 31 percent in model 1 and 46 percent in model 3, while student satisfaction increases by 22 percent in model 1. This is due to the reason that the students of the government sector do not mark cleanliness and security as an importantdeterminant of their satisfaction

Table 6

Logistic Regression Results

Variables	**Marginal effect (dy/dx)[a]**		
	Model 1	Model 2	Model 3
	Govt.	Semi Govt.	Private
Tangibility	0.4880854 *(0.000)**	0.305215 *(0.001)**	-0.3632213 *(0.001)**
Security	-0.2023827 *(0.043)**	0.246385 *(0.012)**	0.5402654 *(0.000)**
Availability	0.2594955 *(0.057)**	0.227402 *(0.032)**	0.3703835 *(0.001)**
Access	0.3002835 *(0.016)**	0.243749 *(0.013)**	0.4840876 *(0.000)**
Cleanliness	-0.3125919 *(0.002)**	0.228624 *(0.021)**	-0.4665146 *(0.000)**
Pseudo R^2	0.3183	0.3387	0.4307

Note: (a) dy/dx is for discrete change of dummy variable from 0 to 1

(*) shows a significance level at 1 %,(**) shows a significance level at 5%, and (***) shows a significance level at 10%

Pooled Logistic Regression output:

Table 7 shows the overall satisfaction of students when measured against independent variables. Results reveal that change in probability for one instant change intangibility will increase student satisfaction by 29 percent point. Similarly, a change in probability for one instant change in security will increase student satisfaction by 18 percent, variable Availability and access will increase student satisfaction by 25 percent and 39 percent. While on the other hand, the change in probability for one instant change in cleanliness will decrease student satisfaction by 16 percent.

Table 7

Pooled Marginal effects

Variables |	Marginal effect (dy/dx)	Significance
Tangibility	0.285381	0.000
Security	0.176462	0.003
Availability	0.247697	0.000
Access|	0.387835	0.000
Cleanliness	-0.156609	0.010

Number of observations = 600

Pseudo R^2 = 0.2390

Note: (*) dy/dx is for discrete change of dummy variable from 0 to 1

Discussion and Conclusion

Higher education institutions consider their students as clients and treat this service as a genuine service of the business. As the primary goal of these institutions is to satisfy the needs of the ultimate customers (students in this case). These higher education institutions try to meet the growing demands and meet the students' high-quality level at this higher education level (Manzoor, 2013). Although it is a complex task to assess the quality of services relies on customer preferences, we can understand the quality of services rendered by the service providers. The universities are now also concentrating and striving to achieve customer satisfaction by providing quality teaching and non-teaching services (Petruzzellis et al., 2006). Satisfaction with the service quality makes student learning more comfortable (McCollough&Gremler, 1999). Earlier studies indicate that student satisfaction has a positive impact on customer engagement, and their findings have been similar to those found in the service marketing literature (Cronin & Taylor, 1994)

The goal of the incumbent study is to seek the impacts of quality of service on the satisfaction of students at educational institutions of twin cities. Students' satisfaction is based on the quality of the institution's learning environment and teaching, as students need to be qualified, well-learned, and skilled faculty for their academic and professional development along with suitable facilities. The key factors that impact an institution's academic environment are its teaching methodologies and the course comprehension (Abbasi etal., 2011). Furthermore, the tangible facilities such as class setup, digital laboratories and libraries, infrastructure quality and reliability, security, cleanliness, and other assured service qualities contribute to the image of excellence being created.

The marginal effects of logistic regression have shown that the efficiency of the service dimensions has a significant impact on the satisfied level of the students. The overall model is a fair match showing that a given institution's tangibility, stability, availability, access, and cleanliness have a clear and significant impacton the students' satisfaction. The result confirmed that each of the dimensions of service quality is adequately reliable. All of them are significantly related to student satisfaction. According to the semi- government sector students, tangibility, security, and access are the most essential service quality dimensions.

On the other hand, the government sector students reported that tangibility, access, and availability are essential service quality dimensions.Furthermore, according to the private students' security, access and availability have a significant relationship with their satisfaction. Besides the learning environment, some other critical facilities are also necessary for the students, i.e., the well-managed cafeteria, parking facilities, playgrounds, and other physical and mental health arrangements, e.g., clubs, gymnasiums, etc. Assuring all facilities and service quality with excellence and reliability, an institution will attract more students by making its name in the leading educational learning institutions.

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