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# **Service Quality of Higher Education Digital Library (DL) and Loyalty Behaviors: Testing the Mediating Role of Student Satisfaction**

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## **Abstract**

Higher academic institutions are now focusing on capturing the behaviors of the postgraduate students towards digital library. It depends on the conditions of assessing the psychological needs of both parties in which service-provider provides services to recipient and recipient reciprocate service-provider in turn to their services. Drawing from service-encounter needs theory (SENT), this study measures the service quality of the digital library of the Pakistan higher education commission (HEC) and student behaviors using the digital library. Interestingly, this study tests the service quality of the HEC digital library in the sight of postgraduate students of the public and private Universities in Punjab, Pakistan. By collecting data from 403 postgraduate students, the study uses a convenient sampling approach using designed survey questionnaires. Out of 403, 305 survey questionnaires were valid and reliable so, the response rate was 75.68%. By testing the 2nd order measurement model, the study supported the direct significant and positive impact of service quality on student satisfaction. Interestingly, satisfaction is a psychological indicator of enhancing loyalty behaviors (Zhang and Bloemer, 2008). Furthermore, this study supported the mediating role of student satisfaction between service quality and student loyalty behaviors: intention to revisit (IRT), words of mouth (WOM), and willingness to pay more (WPM) and to extend the literature of loyalty behaviors. The results showed that there was partially a significant mediating relationship between overall service quality and among RPI, WOM, and WPM. Interestingly, student satisfaction had the highest mediating link between service quality and WOM. This research guides and recommends higher education commission (HEC) provide the database structure and equipment for searching research articles and books to the postgraduate students so,

that they can easily achieve literature studies on the same subject. Moreover, the research provides the research limitations and future directions.

**Keywords:** HEC digital library, Service Quality, Student satisfaction, Student loyalty behaviors, Pakistan

## **Introduction**

Service quality and satisfaction are two important elements that many service industries would delightedly profess to be endeavoring to offer to their customers. These two elements are considerably used by service and banking industries to assess the loyalty behaviors of their customers. Particularly, service quality has been persistently expanded by experts of various industries, business schools and popular business press to obtain desirable results. However, the research says that most of them would settle without any provoking on the importance of offering their customers' service quality (Caruana, Money, & Berthon, 2000). Many practitioners have failed to distinguish between the two terms of service quality and customer satisfaction and have often used the terms interchangeably.

Service quality has been made an extensive amount of interest for social scientists, practitioners and researchers in the past two decades. The practitioners and researchers consider that service quality increases the efficiency level of the firms (Ali & Raza, 2015, Al-Hawari, 2006; Caruana, Money, & Berthon, 2000; Cheruiyot & Maru, 2013; Yoo & Park, 2007), service quality and customer satisfaction are interchangeable variables (Caruana, Money, & Berthon, 2000), service quality is positively linked to customer satisfaction by targeting customers only (Ali & Raza, 2015, Amin & Isa, 2008; Arasli, Katircioglu, & Mehtap-Smadi, 2005; Awan, Bukhari, & Iqbal, 2011; Terrence Levesque, 1996). Despite the pieces of literature works on service quality, there are some most critical areas about which the researchers know little. First, although the investigation of service quality perception is continuously growing, employee-customer dyad, a self-reporting of employees-service quality and customer experiences of satisfaction and loyalty behaviors have not received empirical consideration in the service quality literature. Second, most of the literature studies on service quality and customer satisfaction have done in service industry (Ali & Raza, 2015; Caruana, Money, & Berthon, 2000; Arasli et al., 2005; Newman & Cowling, 1996; Rust & Oliver, 1994; Wang et al., 2003; Zhu et al., 2002) and in baking industry (Caruana, Money, & Berthon, 2000; Ali & Raza, 2015; Amin & Isa, 2008; Blanchard & Galloway, 1994). Unfortunately, testing service quality of digital library of Pakistan HEC has always been neglected and given no consideration in the literature. Therefore, this study tests the service quality of Pakistan HEC digital library and its impact on student satisfaction and loyalty behaviors; intention to revisit, words of mouth and willing to pay more.

This study extends the ontological network of service quality by conceptualizing customer satisfaction as an outcome of service quality. In addition, the understanding of employees-service quality is not only limited to satisfaction assessments but also involves in achieving other

behavioral outcomes. Likewise, psychological factor of satisfaction is considered good indicator for forecasting loyalty behaviors (Zhang and Bloemer, 2008) and also helpful in building the long-term dealings (Adjei and Clark, 2010). Therefore, the study contributes to the research gap and extends the literature of service quality by conceptualizing student satisfaction as a mediating variable in achieving loyalty behaviors of the postgraduate students. Considering the importance of this, it is undisputed matter that collective impact of service quality and student satisfaction on student loyalty behaviors remains controversial (Cronin *et al.*, 2000). To handle the gap and controversial things, this study calls the future research and tries to fill the research gap.

Based on above discussion, this study has twofold objectives. First, this study aims to identify service provider-recipient encounters' relationship based on service quality and student-satisfying experiences about service quality of digital library. Service encounter needs theory (SENT) defines the mechanisms through which service encounter behaviors influence outcomes for both parties (Bradley Graham *et al.*, 2010). Further this theory suggests that adverse responses from both parties should be studied in service industries (Bradley Graham *et al.*, 2010). Drawing from SENT theory, this study aims to explore service provider-recipient dyadic relationship between digital library users and providers. The reason to choose digital library context, the previous study suggested to conduct research in different industries especially academic institutions (Alnaser, Abd Ghani, & Rahi, 2018). The main purpose of this is to see that whether the HEC says exactly the students have experienced. In simple, this study captures the images of digital library where the students self-reported the service quality of digital library because the students self-reporting behaviors are likely to be more reliable and valid and show their involvement in work than supervisors (Berry, Carpenter, & Barratt, 2012) and the students show their experiences to reciprocate the service providers because satisfaction assessment needs experiences of the students (Bolton and Drew, 1991; Cronin and Taylor, 1994). Second, the research explores the mediating role of student satisfaction between service quality and loyalty behaviors. Specially, the study explores that whether the self-reporting meets the desires of the student satisfaction and loyalty behaviors e.g., intention to revisit (IRT), words of mouth (WOM) and willingness to pay more (WPM). Therefore, this study aims on exploring the direct impact of service quality on student satisfaction in turn, on loyalty behaviors of the postgraduate students on one hand. Second, it measures the mediating role of student satisfaction between service quality and loyalty behaviors such are IRT, WOM and WPM.

## **Literature Review and Conceptual Model**

### ***Service Quality***

This is a general model and measurement instrument for all service industries. Actually, much piece of work has recently been done by researchers and social practitioners and they addressed the measurement approach and conceptualization in the development of SERVQUAL model in service industries. The SERVQUAL model has multiple dimensions and has best diagnostic characteristics of the banking and hospitality contexts over the other service quality measures such as SERVPERE (Angur *et al.* 1999), the SERVPERE dimensions were totally different from the SERVQUAL dimensions because there were some overlaps (Jabnoun and Al-Tamimi, 2003). Cui

et al. (2003) exposed SERVPERF and SERVQUAL were not unidimensional and they also revealed that while analyzing confirmatory factor analysis, the measurement scales of SERPERE lacked validity with samples from different cultures.

Even though the existence of multiple methodological problems have been contested and are debated, the majority of research work has been strongly predisposed by the conceptual model of service quality proposed by Parasuraman et al. (1985), and consequently operationalized and advanced by the same authors.

After the radical work of Parasuraman, Zeithaml, and Berry (1985), the literature studies have paid much attention to service quality model. They used the service quality construct based on 10 dimensions and proposed a gap model. Afterwards, they reduced the service quality dimensions to 5 in the year 1988. They developed the survey questionnaire of 22 items and declared it as SERVQUAL model. Parasuraman, Berry, and Zeithaml (1991; 1994) and Angur et al. (1999) stated that SERVQUAL model is the combination of diagnostic characteristics and ensures some practical implications. Now, this measurement model has been used by different service industries and many academic researchers as well (Albert Caruana, 2000; Ali & Raza, 2015; Amin & Isa, 2008; Awan et al., 2011; Dölarslan, 2014; Lam & Woo, 1997; Raza et al., 2015; Wang, Lo, & Hui, 2003; Zhu et al., 2002). These five dimensions of service quality are tangibility, reliability, responsiveness, assurance and empathy.

Literature studies show five original dimensions of service quality whereas some studies have been used six dimensions. The sixth dimension is 'compliance' which items have been taken from compliance aspect of Islamic banking SERVQUAL scale (Othman and Owen, 2001). This study conducted to multiple sectors known as multi-modeling. So, this study did not take compliance scale. Karatape et al. (2005) advocated that service quality measures addressed to one culture may influence service quality sentimentalities in a different culture. Therefore, the present study provides useful visions for researchers and academics in implementing SERVQUAL in the Pakistani multiple contexts to capture the two faced response rates that mean service provider-recipient dyad. The researchers have done much piece of works on service quality and satisfaction. These relationships are being addressed below:

### ***Service quality and customer satisfaction***

Previous literature studies argue that the service quality is a better measurement enhances customer satisfaction (Dölarslan, 2014; Anderson & Sullivan, 1993; Levesque & McDougall, 1996). Oliver (1980) explains that customer satisfaction requires the needs of customer expectations of the services and products. If the satisfaction measure matches the customer expectations or even satisfaction measure exceeds customer expectations then it can say that they are satisfied. If the performance measure does not match or exceed, they are dissatisfied (de Wulf, 2003). Previous research works have acknowledged different factors that influence the customer satisfaction in the banking sector especially in the Europe and USA.

For the satisfaction of the customers, Greek Cypriot bank in Turkey applied SERVQUAL technique to attain customer satisfaction. The service quality dimensions are used in predicting customer satisfaction and these dimensions are named as explanatory variables. In addition, the

literature study shows that the reliability dimension has highest effect on customer satisfaction (Arasly et al., 2005a). This model was consistent with Ali & Raza, (2015) and Amin & Isa, (2008) who found that there are positive and significant relationship between each SERVQUAL dimension and customer satisfaction. In the retail banking, customers put themselves under the criteria of satisfaction towards their banks to which service quality is provided. A study on college students in Bahrain described that the young customers focus more on prevailing factors like friendliness of bank staff, 24-hours ATM, bank's reputation, convenient location and availability of space where they would like to park conveyance (Almossawi, 2001). The banks can probably influence the level of student satisfaction by providing these benefits on a continuous basis.

Now, banks are providing innovative methods to satisfy the customers such as online system, internet banking, and call and telephone center. However, Levesque and McDougall (1996) identify that competitiveness and convenience are two important factors of the bank which are more likely to affect customer satisfaction. In the service industries, there are great importance gives to service quality perceptions and the association between service quality and customer satisfaction (Ali & Raza, 2015; Amin & Isa, 2008; Dölarslan, 2014; Taylor and Baker, 1994). Some academic and social researchers defined that customer satisfaction is an antecedent of service quality (Parasuraman et al., 1985, 1991, 1994; Bitner, 1990), and others stood up against this argument and mentioned that the service quality acts as an antecedent of customer satisfaction (Cronin and Taylor, 1994; Anderson and Sullivan, 1993). The recent research has been done in the UAE retail banking advocates that service quality dimensions are well correlated with customer satisfaction (Jamal and Naser, 2002). Nevertheless, there is too little literature demonstrating the importance of service quality dimensions in defining satisfaction (Levesque and McDougall, 1996). Anderson et al. (1994) suggest that if the banks use improved quality will enhance more customer satisfaction. The researchers advocate that the service quality instrument is used in determining service deficits in the banking sector than any other service measuring instrument (Angur et al. 1999).

Moreover, Awan et al. (2011) examined that service quality and satisfaction has well correlated to each other. These findings validate the importance of service quality in the Pakistan banking sector. In recent times, many literature studies have mainly focused on service quality and customer satisfaction using different contexts. For example, Ali & Raza, (2015) examined service quality dimensions and customer satisfaction in the Pakistan internet banking sector. Their findings argue that the service quality and satisfaction can only be better predicted through SERVQUAL dimensions. Based on above discussion, the present study may find a direct impact of service quality of digital library on student satisfaction. For this purpose, the study proposes the research hypothesis.

***H1.*** Service quality significantly and positively affect student satisfaction of the postgraduate students

### ***Loyalty behaviors***

According to Oliver (1997), loyalty behavior is defined as “a strong desire to revisit or re-purchase a favorite service/product constantly in the future, where same brand or hand-set is being purchased until the marketing efforts would switch off the “loyalty behavior” (Oliver, 1999). However, loyalty behavior is a dominant construct has good relationship with marketing and is based on re-buying product/service (Zhang and Bloemer, 2008). For instance, current research works have shown that customer loyalty is hypothesized from behavior, integrated and attitudinal perspectives (Dölarslan, 2014; Homburg and Giering, 2001; Hur *et al.*, 2012). In addition to the present study, Fullerton (2003), Zhang and Bloemer (2008) and Dölarslan, (2014) hypothesized loyalty as fundamentally “behavioral intention” and identified three basic type factors related to customer loyalty behavior:

- (1) Positive WOM (Word of mouth) communication;
- (2) WPM (willingness to pay more); and
- (2) ITR (Intention to revisit)

WOM communication has much importance in the service industry as defined well by (Hartline and Jones, 1996; Maxham, 2001; Zeithaml *et al.*, 1993, 1996), chiefly as it targets the customer attitudes and reduces the level of risk and uncertainty during re-purchase decisions (Wangenheim and Bayon, 2004). The previous study advocated that WOM communication can be negative, neutral or positive (Anderson, 1998), however industrial managers are seemed more interested in encouraging positive WOM communication (Hutchinson *et al.*, 2009). In addition, WPM is termed as the customer is willingness to pay maximum sum of money for a service or product (Homburg *et al.*, 2005) and the customer is willingness to re-buy this service or product even an increase in price (Srinivasan *et al.*, 2002) and also reveal that loyalty has consistent effect on both the WOM communication and WMP.

Vazquez-Casielles *et al.* (2009) define that IRT relates to customer re-buying attitude towards a service or product and the customer wants to maintain him/her within the particular product or service. Moreover, he/she commits to make transaction with the service provider of that service or product. The study shows that the RPI dimension of loyalty behavior is related to customer satisfaction (Dölarslan, 2014 Pihlström and Brush, 2008; Zhang and Bloemer, 2008). Consistently, satisfaction has been advocated to positively correlate to ITR.

## **Student satisfaction and loyalty behaviors**

### ***Satisfaction and re-purchase intention (RPI)***

Past studies have addressed that satisfaction significantly and directly affects behaviors (Brady *et al.*, 2005; Dölarslan, 2014; Cronin *et al.*, 2000; Oliver, 1999). In addition, the individuals who are highly satisfied tend to revisit the product or service (Zeithaml *et al.* 1996). In opposite way, if the individuals are strongly dissatisfied with the product or service, they find its competitor (Jiang and Rosenbloom, 2005). Particularly, some literature studies have revealed how satisfaction effects ITR (Tam, 2004), either as a good predictor of ITR (Dölarslan, 2014; Zhang and Bloemer,

2008). Therefore, the present reasonably expects that student satisfaction positively and significantly affects ITR. For this purpose, the following hypothesis is addressed.

**H2a.** Student satisfaction positively and significantly affects ITR

***Satisfaction and words of mouth (WOM)***

There are many literature evidences of finding the impact of customer satisfaction on WOM communication. Such as, the customers who are highly satisfied tend to repurchase the product or service (Zeithaml *et al.* 1996). Similarly, WOM communication is extremely influenced by customer satisfaction and dissatisfaction (Anderson, 1998). Dölarslan, (2014) showed that if the customers show dissatisfaction about the product/service rather than satisfaction, there would be greater rate of WOM communication. On the opposite direction, Brown *et al.* (2005) advocate that customer satisfaction plays an important role to repurchase behavior which often reflects positive words of mouth. However, most of studies advocate that customer satisfaction significantly and positively influences the positive WOM communication (Chang *et al.*, 2013; Hutchinson *et al.*, 2009; Lai and Chen, 2011; Gallarza and Saura, 2006; Vazquez-Casielles *et al.*, 2009). Therefore, the present study expects that the student satisfaction significantly and positively influences positive WOM communication. For this reason, a hypothesis is proposed.

**H2b.** Student satisfaction significantly and positively affects WOM communication.

***Satisfaction and Willingness to pay more (WPM)***

Anderson (1996) argues that if the customer satisfaction increases then the price elasticity of demand will decrease. In simple words, the customer satisfaction influences individuals' willingness to pay more for the product/service (Homburg *et al.*, 2005). Nonetheless, the researcher proved that the customer satisfaction has a negative relationship with the price elasticity of demand where the customers are dissatisfied with the purchase of product/service (Anderson, 1996). But many studies showed positive and significant relationship between the customer satisfaction and WPM (Homburg *et al.* 2005; Zhang and Bloemer, 2009). Therefore, this study expects that the student satisfaction may affect WPM. For this prediction, the study proposes a research hypothesis.

**H2c.** Student satisfaction significantly and positively affects WPM

***Mediating role of Student Satisfaction between Service Quality and Loyalty behaviors***

The present study is considered customer satisfaction as mediator between service quality and customer loyalty behaviors. The first study of Taylor & Baker (1994) explained that customer satisfaction acts as a moderator between service quality and customer loyalty behaviors but their later study found that customer satisfaction acts as mediator instead of moderator. In addition, the previous study found customer satisfaction mediates the positive and significant relationship between service quality and revisit-intention (Bou-Llusar *et al.* 2001). Another study provided shred of evidence that customer satisfaction is an influential factor which mediates the relationship



between service quality and ITR (Cronin et al., 2000). Service quality is based upon technological services influences customer satisfaction which in turn, determines the customer loyalty behavior in the Indian banking industry (Lenka et al., 2009). Therefore, it is found that customer satisfaction plays mediator role between service quality and loyalty behavior. Chang and Polonsky (2012) advocated that customer satisfaction partially mediates the relationship which increases positive loyalty behavior of customers. However, the study argued that the positive effect of service quality on customer loyalty behavior was possible with the overall influence of customer satisfaction and service quality (Yieh et al., 2007). Han and Ryu (2009) found that loyalty behavior can be predicted by overall effect of its antecedents and customer satisfaction.

Literature studies showed that service quality positively affects customer satisfaction, which in turn positively affects customer loyalty (Bou-Llusar et al. 2001; Izogo and Ogba, 2015; Kim and Lee, 2010; Lenka et al., 2009). A study conducted in Netherlands shows that service customer satisfaction mediates the positive relationship between service quality and customer loyalty (Bloemer et al. (1998), and in Japan (Bei and Chiao, 2001), partially mediates the relationship between service quality and customer loyalty behavior (Crauana, 2002). In addition, Kim (2011) advocates the indirect effect of service quality on customer loyalty through the mediation of customer satisfaction among the restaurants in Korea.

In this global world, customers tend to create negative word of mouth (WOM) when they feel dissatisfaction. Moreover, they induce other customers to create negative WOM (Newman, 2001; Caruana, 2002). These positive and negative WOM communications are very useful in Asian countries such as Pakistan, where cultural and social aspects are formulated in a way to create social interactions among the people. It is also highlighted by Shanka (2012) in the Ethiopian banking sector that there was positive relationship between service quality and customer loyalty. In addition, the study provided high service quality increases customer satisfaction, which in turn increases customers' loyalty. Arasli et al. (2005b) explored from the study and examined that the service quality has positive and significant indirect effect on customer WOM communication.

Willingness to pay more (WPM) is also a psychological property which defines individual behavior towards any product or service. This study posits that customer satisfaction indirectly influences the customer loyalty behavior. The literature study found that service quality affects number of behavioral intentions through the mediating role of customer satisfaction and explains whether this relationship is direct or indirect (Cronin et al., 2000). Many researchers advocate service quality has indirect positive effect on customer loyalty and this is only possible through customer satisfaction (e.g., Taylor, 2002; Gotlieb et al., 1994; Roset & Pieters, 1997). The present study also investigate the mediating relationship of customer satisfaction between service quality and WPM. While getting the literature evidences, Taylor, (2002) found that customer satisfaction acts as a mediator between the service quality and behavior intentions (WPM, switching intention and advocacy). In the said study, there was significant and positive association between service quality (independent) and customer satisfaction (dependent). On the other way, the customer satisfaction (mediator) creates positive and significant relationship between service quality and WPM, so there was partial mediation (Baron & Kenney, 1986; Taylor, 2002). Furthermore,

Jaiswal, and Niraj (2011) found the fully mediating role of satisfaction between service quality and willingness to pay more (WPM). After the depth debate and based on literature evidences, the present study proposes the following hypotheses.

**H3** Student satisfaction positively and significantly mediates the relationship between service quality and RPI.

**H4** Student satisfaction positively and significantly mediates the relationship between service quality and WOM.

**H5** Student satisfaction positively and significantly mediates the relationship between service quality and WPM.

## **Research Methodology**

### ***Participants and procedure***

To test the proposed hypotheses, this study surveyed the postgraduate students of both public and private higher educational institutions. The study distributed 403 survey questionnaires to the postgraduate students of higher educational institutions. The study targeted 403 postgraduate students because 400 and above sample is considered a good sample size (Comrey and Lee, 1992). The research personally and face to face collected data using survey questionnaires. The students were asked to rate the service quality of HEC digital library and their satisfaction level and loyalty behaviors e.g., IRT, WOM and WPM. The survey questionnaire was categorized into two parts: (1) first part indicates the demographic characteristics and (2) second part indicates the questions' items. Out of 403, 305 survey questionnaires were proved reliable and valid. The response rate was 75.68%. 63.99% respondents were male and 36.01 respondents were female. 58.45% respondents were belonged to urban areas and rest of them from rural areas. All measurement scales were measured on 5-point Likert scales.

### ***Measurement scales***

As with study 1, all measurement scales are measured on a five-point Likert ranging from (1) 'strongly disagree', (2) 'disagree', (3) 'neutral', (4) 'agree' and (5) 'strongly agree' to test the perception of employees (self-reporting) and experience of the students about the service quality of digital library. The service quality scale consists of five dimensions has been suggested by Parasuraman, (1988). This measurement scale includes five dimensions such are tangibility, reliability, responsiveness, assurance and empathy. A three items 'student satisfaction scale' have been adopted from the developed scale of literature study (Cronin *et al.* 2000). IRT and WOM communication scales have been found from the literature studies (Dölarslan, 2014; Maxham 2001; Terrence Levesque, 1996). But this study adopted two items of IRT more comprehensive and clear, suggested by (Terrence Levesque, 1996), three items of WOM communication suggested (Dölarslan, 2014) and two items of WPM communication also adapted from (Dölarslan, 2014; Zeithaml *et al.* 1996). This scale will measure on 5 point Likert scale ranging from "1=strongly disagree" to "5=strongly agree".

### ***Individual characteristics***

This study uses individual characteristics such as gender and ethnicity.

## **Results**

### ***Assessment of measurement model***

PLS-SEM provides many rigorous measures for construct reliability, convergent validity, and discriminant validity (Fornell, C., Larcker, D.F., 1981; Hair *et al.*, 2018). By using structural equation modeling, the study performed a series of confirmatory factor analyses (CFA) to assess the constructs' validity and reliability. To assess the convergent validity of the constructs, outer loadings, and AVE (average variance extracted) are measured (Hair *et al.*, 2012; 2013). Outer/factor loadings of latent constructs should be greater than 0.70 or higher in exploratory research (Joe F. Hair Jr, 2012; Hair *et al.*, 2013). Importantly, factor loadings above 0.7 explain over 50% of the indicator variance (Hair *et al.*, 2012; Joseph F. Hair, 2013). By assessing CFA, the outer loadings of all construct items were higher and according to acceptance threshold. Outer/factor loadings of constructs are shown in (Table .1). Meanwhile, AVE should be 0.5 or greater than 0.5 (Hair *et al.*, 2013), it should be greater than squared correlation (Fornell, C., Larcker, D.F., 1981) and square root of AVE of any construct must be higher than the correlation with other constructs (Wong, 2013). Therefore, the study found that AVE of all latent constructs was greater than the acceptance threshold (Table .1).

To assess construct reliability, the internal consistency of constructs typically evaluates as composite reliability and high values indicate higher reliability (Sarstedt *et al.*, 2014). Specifically, reliability values fall between 0.60-0.70 in exploratory research (Hair *et al.*, 2012) however, it should be equal to and greater than 0.70 (Hair *et al.*, 2013). The study showed good composite reliability values of all constructs in Table 1.

**Table 1:** Validity and reliability of the constructs

<b>Scales</b>	<b>Standardized loadings</b>	<b>Composite reliability</b>	<b>AVE</b>
<b>Service quality</b>			
<i>Tangibility</i>		0.859***	0.549***
Tan1	0.724***		
Tan2	0.842***		
Tan3	0.788***		
Tan4	0.830***		
Tan5	0.779***		
Tan6	0.776***		
<i>Reliability</i>		0.898***	0.745***
Rel1	0.797***		
Rel2	0.787***		
Rel3	0.836***		
<i>Responsiveness</i>		0.924***	0.710***
Res1	0.742***		
Res2	0.884***		

Res3	0.874***		
Res4	0.868***		
Res5	0.838***		
<i>Assurance</i>		0.893***	0.677***
Ass1	0.800***		
Ass2	0.818***		
Ass3	0.799***		
Ass4	0.701***		
<i>Empathy</i>		0.879***	0.645***
Emp1	0.750***		
Emp2	0.791***		
Emp3	0.824***		
Emp4	0.799***		
<b>Student satisfaction</b>		0.889***	0.666***
SS1	0.859***		
SS2	0.891***		
SS3	0.778***		
<b>Intention to revisit</b>		0.901***	0.819***
IRT1	0.905***		
IRT2	0.905***		
<b>Words of mouth (WOM)</b>		0.889***	0.727***
WOM1	0.845***		
WOM2	0.873***		
WOM3	0.839***		
<b>Willingness to pay more (WPM)</b>		0.934***	0.876***
WPM1	0.940***		
WPM2	0.932***		

**Notes:** AVE = Average variance extracted

Based on HTMT (Heterotrait-monotrait) ratio criteria (Henseler *et al.*, 2015), HTMT values should be less than 0.90. The study proved that the HTMT values of all constructs are less than the threshold value 0.90. Therefore, there was also good discriminant validity. Furthermore, the study supported the positive and significant correlation coefficient between independent and dependent constructs (Table 2).

**Table 2:** Discriminant validity (HTMT) ratio

	1	2	3	4	5	6	7	8	9
<b>Student satisfaction</b>	0.899								
<b>Empathy</b>	0.573	0.579							
<b>Intention to revisit</b>	0.597	0.542	0.810						
<b>Reliability</b>	0.708	0.700	0.599	0.562					
<b>Responsiveness</b>	0.656	0.612	0.632	0.476	0.594				

<b>Service quality</b>	0.899	0.801	0.882	0.745	0.854	0.876			
<b>Tangibility</b>	0.654	0.629	0.679	0.685	0.600	0.652	0.865		
<b>willingness to pay more</b>	0.606	0.603	0.636	0.593	0.553	0.661	0.803	0.804	
<b>words of mouth</b>	0.662	0.649	0.678	0.601	0.691	0.721	0.865	0.812	0.842

**Note:** Diagonal values represent square root of AVE and below values represent construct' correlations

### Structure equation modelling

Secondly, the structure equation modelling (SEM) was used to test the regression coefficients known as path coefficient analysis by following bootstrap technique. The path coefficient standard values fall between +1 to -1 (Hair *et al.*, 2013; Roni *et al.*, 2015) suggest that path model coefficient closer to +1 indicates high & positive relationship and on the opposite side indicates high negative relationship. The rejection and acceptance of hypothesis depends upon two parameters known as t-value should be equal to or higher than +1.96 in case of 5% significant level and p-value should be lower than 0.05 (Hair *et al.* 2013). Table 3 presents the results that overall service quality had a significant impact on student satisfaction by showing ( $b=0.773$ ,  $p=0.000$ ) that shows the highest impact of service quality on student satisfaction amongst the literature studies on both constructs. It means the service quality of digital library was good and the postgraduate students were highly satisfied by using HEC digital library for their research purposes. So, the hypothesis H1 was accepted and supported. Student satisfaction was found to have significant effect on IRT ( $b=0.441$ ,  $p=0.000$ ) so, the hypothesis ( $H2a$ ) was supported and accepted. On the other hand, student satisfaction had a significant effect on WOM ( $b=0.547$ ,  $p=0.000$ ) therefore, the hypothesis ( $H2b$ ) was supported and accepted. Finally, student satisfaction was found to have an influence on WPM ( $b=0.515$ ,  $p<0.05$ ) so that the hypothesis ( $H2c$ ) was also supported and accepted. However, student satisfaction had the highest impact on words of mouth. It means, the postgraduate students were using positive words and telling other students to use digital library for research purposes and for other purpose. The results are shown in table 3.

**Table 3:** Path coefficient

Hypo	Relationship	B	S.E	t-values	p-values	Decision	R <sup>2</sup>	Q <sup>2</sup>	f <sup>2</sup>
<b>H1</b>	SQ→SS	0.773	0.023	34.366	0.000	Accepted	0.598	0.394	1.489
<b>H2a</b>	SS→IRT	0.441	0.055	07.970	0.000	Accepted	0.402	0.155	-
<b>H2b</b>	SS→WOM	0.547	0.035	15.432	0.000	Accepted	0.575	0.210	-
<b>H2c</b>	SS→WPM	0.515	0.039	13.300	0.000	Accepted	0.524	0.230	-

Significant at \* $p < 0.05$

**Note:** IRT=intention to revisit, WOM=words of mouth, WPM=willingness to pay more, SS=Student satisfaction

Thirdly, the study explored the mediating role of student satisfaction between service quality and IRT ( $b=0.317$ ,  $p=0.000$ ) and there was a partial mediation between service quality and IRT. Therefore, the hypothesis ( $H3$ ) was accepted and supported. Secondly, student satisfaction was found to have a mediating relationship between service quality and WOM ( $b=0.393$ ,  $p=0.000$ )

and the mediation was partially mediation between service quality and WOM. So, the hypothesis (*H4*) was supported. Finally, there was also a partial mediation between service quality and WPM by the role of student satisfaction ( $b=0.370$ ,  $p=0.000$ ). Therefore, the hypothesis (*H5*) was supported and accepted. Furthermore, the study proved that student satisfaction was found to have the highest mediating link between service quality and WOM. The direct impact of student satisfaction on WOM was also the highest impact. It means, words of mouth of the postgraduate students had been highly influenced by both service quality of digital library of HEC Pakistan and student satisfaction. The mediating results are shown in table 7.

**Table 4:** Mediating role of student satisfaction between service quality and loyalty behaviors

Hyp	Relationship	Indirect Relationships				Decision	C.I	
		B	S.E	t-values	p-values		2.5%	97.5%
<i>H4</i>	SQ→SS→IRT	0.317	0.046	06.910	0.000	Accepted	0.233	0.397
<i>H5</i>	SQ→SS→WOM	0.393	0.036	10.813	0.000	Accepted	0.310	0.461
<i>H6</i>	SQ→SS→WPM	0.370	0.038	09.655	0.000	Accepted	0.295	0.443

Significant at  $*p < 0.05$

**C.I: confidence interval\***

*Note:* IRT=intention to revisit, WOM=words of mouth, WPM=willingness to pay more, SS=Student satisfaction

#### Assessment of model fitness

PLS-SEM is predictive-oriented software and deals with the parameters of model fitness;  $R^2$  (coefficient of determination),  $Q^2$  (predictive relevancy and accuracy), and  $f^2$  (effect size) (Sarstedt *et al.*, 2014; Hair *et al.*, 2018). R square value of 0.25 or higher indicates weak impact, 0.50 or higher indicates moderate impact and 0.75 or higher indicates strong impact of exogenous construct on endogenous construct (Hair *et al.* 2014). Additionally, F square value should be higher 0.02 which indicates the significant effect of exogenous on endogenous construct and Q square value ranges 0.02=weak, 0.15=moderate and 0.25 or above=strong adequacy power of exogenous construct to affect endogenous construct. Using the model fitness threshold in this study showed that the values were according to threshold values and there was good model fitness in term of model accuracy; relevancy and effect size (see tables 3 and 4).

#### Discussion and conclusion

The present study has twofold purpose to determine the dyadic interactions between service provider and service recipient such as (1) to investigate the dyadic interactive outcomes from the effect of service quality on student satisfaction about digital library of Pakistan higher education commission (HEC) and (2) to quantify the mediating role of student satisfaction between service quality and student loyalty behaviors to show their psychological underpinnings of their competence. The study supported the direct significant and positive impact of service quality on student satisfaction about HEC digital library that shows the digital structure of database on HEC websites for all postgraduate students who achieve research articles and research books for their thesis and dissertations. And this effect had the highest impact among the previous literature

studies. Therefore, the postgraduate students presented that the digital library of HEC Pakistan is facilitating the postgraduate students by providing latest research articles, books and other research works on social sciences, life sciences and arts.

Past studies have done much piece of work on service quality and satisfaction but one thing makes this research unique and different from others, is the dyadic interactions of both parties pursuing their psychological needs. Second, this research selected the postgraduate students of both public and private higher educational institutions and asked them to rate the service quality of HEC digital library to target the maximum likelihood and reliable response rate based on encountering behaviors. The study findings show that dimensions of service quality (reliability, responsiveness, assurance, and empathy) have significant and positive effect on its overall service quality scale. The results are consistent with the following studies Ali & Raza, (2015); Amin & Isa, (2008); Albert Caruana, (2000) and Terrence Levesque, (1996) examined by using the SEM approach that each dimension of service quality (tangible, reliability, responsiveness, assurance and empathy) has significant and positive effect on overall service quality. The uniqueness of this is that higher education commission of Pakistan (HEC) has provided the services in best manners and made students to reciprocate the satisfaction level and loyalty behaviors of using digital library in coming future. Moreover, the students responded exactly according to the perceptions because the participants showed their needs. So, there was a strong bonding interaction between service provider and service recipient.

Second, this study adopts the psychology behavior which involves three distinctive loyalty behaviors such as (1) IRT, (2) WOM communication and, (3) WPM. This study extends the dyadic interactions of service provider and service recipient by exploring the mediating role of student satisfaction between service quality and student loyalty behaviors (IRT, WOM and WPM). The study 2 found that there was significant and positive mediating relationship between service quality and intention to revisit (IRT), service quality and words of mouth (WOM) and service quality and willingness to pay more (WPM). Overall, student satisfaction partially mediated the link between service quality and all three loyalty behaviors such are IRT, WOM and WPM. Interestingly, student satisfaction had the highest mediating link between service quality and words of mouth (WOM) that shows the importance of HEC digital library and supports the needs of justify the usage of HEC digital library. WOM was highly recommended to support the service quality and student satisfaction in both public and private higher educational institutions.

In dyadic interactions, the students are now looking for better services and they think which types of facilities are helpful in helping their learning and searching and make them comfortable. This research suggests that the higher level of service quality gives the students, the higher level of satisfaction in turn, produces higher level of student loyalty behaviors. The findings are consistent with Karatape *et al.* (2005), Dölarıslan, (2014), Mittal and Kamakura (2001) and Homburg and Giering (2001). The uniqueness of this study also explains the positive behaviors of the postgraduate students toward HEC digital library. Dyadic interactions of both parties mutually agreed with their psychological needs and emotions. The students gave the positive views on

services exactly as they expect from their education institutions that furtherly directs student loyalty behaviors.

### **Limitations and future directions**

Every empirical research has some limitations and future directions. Therefore, this research has also some limitations are: the data was only collected from higher education commission (HEC) of Pakistan however, there is need for exploring the behavior of the students of international universities about their country-based digital libraries. Second, the sample size of this study was limited to only Punjab province however, the researcher may target the whole Pakistan including four provinces of Pakistan territory. Future research may be conducted on the mediating role of organizational culture between service quality and loyalty behaviors of the postgraduate students in both public and private higher educational institutions. Future study may focus on testing the gender-based satisfaction and loyalty behaviors among the postgraduate students in public and private Universities. Future study may be conducted on exploring the mediating effect of trust, organizational commitment, and organizational citizenship behavior. The researchers may follow the same pattern to investigate the same phenomenon in international digital library context.

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