SERVICE QUALITY MANAGEMENT IN SELECTED UNIVERSITIES OF PUNJAB: STUDENTS' PERSPECTIVE

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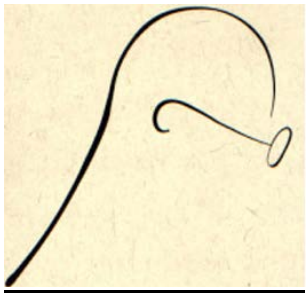

A customer is the most important visitor on our premises, he is not dependent on us. We are dependent on him. He is not an interruption in our work. He is the purpose of it. He is not an outsider in our business. He is part of it. We are not doing him a favour by serving him. He is doing us a favour by giving us an opportunity to do so.

Mahatma Gandhi

CERTIFICATE

Certified that the thesis entitled '**Service Quality Management in Selected Universities of Punjab: Students' Perspective**' which is being submitted by **Mr. Gurbinder Singh (Reg. No. 950910008)**, in fulfilment of the requirements for the award of the Degree of Doctor of philosophy at Thapar University, Patiala, is a record of candidates own work, carried out by him under my supervision and guidance. The matter embodied in this thesis has not been submitted in part or full to any other university or institute for the award of any degree.

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(GURBINDER SINGH)

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ABSTRACT

Globally, be it in an industry or in a higher education institution, service sector is fast emerging as a major contributor that energizes the socio-economic growth of a nation. Today, this sector employs much more people, globally, than any other sector and in many countries services are the major contributor to their economy. Unlike physical products, it is difficult to measure service quality of educational institutions, as we cannot determine the specific standards of quality measurement due to involvement of human behaviour. The student's satisfaction is often used to assess the educational quality, where the ability to address strategic needs is of prime importance. In the presented study effort has been made to assess and evaluate the service quality management practices in Universities and the student's perception of service quality rendered by the higher educational institutions functioning in the state of Punjab in India. The main objective of the study was to examine the differences in the student's perception on the service quality in relation to the demographic factors, academic profiles and area of specialization and to identify the service quality predictors as per the perception of the students of the selected universities. The evaluation of service quality performance from student's perspective is critical as they are directly involved in the process of education. They are both the consumer as well as customer and a product of the education institutions. Based upon the various test including the factor analysis carried out on the data collected from the three chosen universities of Punjab, it has been found that the main factors which affect the service quality being provided by HEI's are Service Quality Commitment (SQM), Tangible and Facilities.

It was observed that age of the students is a non-significant predictor of overall satisfaction from services provided by the university, whereas, gender was observed to be a significant predictor of overall satisfaction with services provided ($p \leq .05$). Hence, it can be concluded from the study that the HEI's should devise specific service policies based upon the demographic factors, academic streams and performance. It can thus be implied that HEIs

need to place emphasis on all the dimensions of service quality and take into account, more importantly the gender aspect of the demographic factor while maintaining adequate standards of service. Similarly, the service to be offered to the engineering, management and science students has to be outlined differently. Also the HEIs must look into providing different services to the students with outstanding academic performance and to those who are relatively average in their studies.

KEYWORDS: Service Quality (SQ), Higher Educational Institutes (HEI's), Universities, I-SERVQUAL, Service Quality Commitment (SQM), India

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CHAPTER – 1

INTRODUCTION

1.1 GENERAL

Open competition amongst the manufacturers, suppliers and service providers in the global markets, so as to stand up to the satisfaction of the customers, has become the essence of globalization (*Rastogi, 2002*), with quality, cost and functionality of their products and services forming the cornerstones for performance. The opportunities in free trade through products/services, provide diverse variety of choices to customers through today's seamless world, thus resulting in a constructive and continuous pressure leading to ever-increasing upgradation in quality and superiority in products/services that meet the need and expectations of the present day customer. The development, management and success of an organization, through changes in technology and values, are also some of the factors that are now driven by the demand from customers and the associated globalization of free-trade. (*Bruzelius and Skarvad 2004*). Amongst many a sector, higher education is also in the process of this transition, due to stiff international competition owing to quality choices available across the spectrum.

The process of quality thought and delivery dates back to 1920 with the rise in inspections (*Garvin 1988*), followed by a phase of process control statistics maintained by the industrial sector in USA. The two world wars further added to quality parameters in product and process performances. The true sense of quality in manufacturing, however, started gaining ground in late 1950s, with the inception of standard levels in manufacturing. This led to the development of the philosophy of responsibility sharing amongst all employees associated with product that has been developed to meet customers' satisfaction (*Garvin 1988, Juran 1988*). This approach further led to greater emphasis on quality as an important dimension to the strategic progress of the companies. The open consciousness of quality got initiated in 1980s with Hewlett-Packard questioning the quality

of products from US chip manufacturers. Soon, Total Quality Management (TQM) as an essence of quality production was introduced. However, the inculcation of quality consciousness is credited to the Japanese who incorporated TQM into their work philosophy during the time when USA was a fair distance away from accepting its principles. During the post 80's, the industrial sector in Japan improved and progressed through adoption of TQM.

In this relentless pursuit of quality, competitive edge and associated excellence, the companies' are striving hard to achieve efficient productivity, technological up-man ship by inculcating innovation, creativity and flexibility. In the present times, with the constant change in the environment of how businesses operate, the demand for adaptability among organizations is also increasing. *Durai et al (2000)* emphasized the need for quality in rural sector too, specifically stating that the design standards must be framed according to minimum serviceability.

Higher education in India has been consistently increasing in cost with consumers seeking better quality of education attached to the costs. With a growing awareness for quality education, every student expects that the university, where he/she intends to study, must have the best of infrastructure, qualified and experienced faculty and most importantly offer the best opportunities for both their personal as well as academic growth. Since Universities, as service organizations are unique, as the product and consumption are not discernly separable, it has become imperative to look into and identify the most suitable service quality dimensions for the Higher Education Institutions (HEI's). In India the higher education sector, having more than 480 universities in existence today, managed either privately or under governmental autonomy, is facing variety of challenges. Options such as lowering of entry barriers for foreign universities to set up their franchises, expansion of education so as to cater to employed candidates through distance education are being explored. For example, IGNOU, being the world's largest Open University presently caters to more than 3 million students from 35 different countries. The higher education

in India is further challenged by the establishment of private universities having academic arrangements with renowned foreign universities gaining an edge over the others. However, with exponential growth in potential students, liberalization in opportunities, lack of support from governmental agencies and increasing competitive pressures have encouraged many educational institutions and service providers to lay their focus on considering students as customers and provide best services to these potential students.

1.2 DEFINING QUALITY

In order to understand service quality, it is imperative to understand what is 'service' and what does 'quality' mean. Service is an independent entity that is self-contained and defined irrespective to the state of other services. This entity has different meaning, depending upon the sector where in it is employed (*Goyal, 2008*). However, the definition of the quality of the service is dependent upon the people who define it. Quality is a component that can be seen and experienced but difficult to define. It varies from "performing as per standard specifications", to "meeting the needs of or satisfying the customer".

The ISO 8402-1986 standards define quality as "the totality of features of a product or service that bears its ability to satisfy stated or implied needs." These features include conformance to specifications that is measured by the effectiveness of the product or service meeting the designers' targets and expectations, products' performance at its intended use or application, value for price paid for product or service utility and support services provided.

The concept of quality also applies to the environment of the organization, operational processes, and the people associated with it, in addition to services and products. In addition, other factor that contribute to the evaluation, is the perceived prestige of the product. For example, a University's excellence and quality consciousness can be judged by the efficiency and accuracy of

procedural documentation, congenial and friendly atmosphere, good facilities and infrastructure, in addition to the quality of the faculty and the academic environment.

As defined by *Juran (1988),* quality is "meeting or exceeding customer's expectations", whereas, on the contrary, *Deaming* opines that the customer's definition of quality is the definition that matters. However, there have been variety of interpretations of the concept of quality. In case of the early research, the focus has been on defining and measuring the quality of tangible goods and products (*Garvin, 1988, Juran, 1988*). *Crosby (1979),* however, defined quality as "conformance to requirements"; whereas *Garvin (1988)* measured quality by counting the malfunctions between product manufactured versus the product delivered and installed. On the other hand, *Parasuraman et al (1985)* framed the term "service quality" to differentiate between product and service. Service quality, in turn, can facilitate a significant step forward in success of a sector (*Erstad, 2001*).

Thus, as a part of the research conducted for evaluation of the service quality dimensions, in the different variety of university systems existing in Punjab, were evaluated for the following:

- Full-fledged Government aided State University (GSU)
- Deemed to be University established u/s 3 of UGC act, 1956 (DU)
- A Private State University (PSU)

1.2.1 Quality and Service Quality in any sector

Satisfaction of a customer, to a great extent, is affected by quality and service of the product that directly influences the loyalty of the customer to the product, his/her allegiance and finally by the organizations' revenue. However, the measurement criteria to assess the product and service qualities differ significantly. Service quality is a multidimensional term and not limited to the measurable physical assets, such as infrastructure and capital equipment, but also to non-

measurable aspects of the service. If service is suitable for the job it is assigned for and also technically competent then this service is expected to generate the desired outcome. Therefore, stipulation of a service needs the direct interface of the customer and source that provides service. *Ruqaya et al. (2011)* illustrated and focused on development of women entrepreneurship in Oman. They also observed and reported the hindrances in the services being offered by the women entrepreneurs and they also suggested some measures for improvement in the role of women entrepreneurs. The study concluded that one of the hindrances to the service being provided by women entrepreneurs was ineffective partnership.

Yannopoulos, P. (2011) in his paper discussed the strategic principles that low-share firms must use to overcome the competition provided by larger firms. It was concluded that strategic interdependence and interaction, in addition to element of surprise, creating qualitative motives for competitors, both in terms of product and services are the key factors.

1.2.2 Service Quality in Higher Education Sector

A country's development fundamentally relies on the quality of higher education at the universities that trains and delivers professionals competent to work and manage public and private enterprises, resources health care and education itself for the following generations. In todays rapidly changing world, Institutions associated with higher education and learning are moving in for major changes and initiatives with stakeholders such as students, employers as well as guardians, are becoming more demanding. An aspect that is more so important is to understand the perceptions of teachers' towards the growing demands. *Melo et al (2001)* rightly indicated that "Higher education has been increasingly recognized as a service industry and, as a sector, it must strive to identify the expectations and needs of its clients, who are the students".

One of the important components of education as service provider, according to *Lovelock (2001),* is that it is a service with actions that cannot be given any measurable values such as peoples' perception, that involves continuous delivery, partnership between the service provider and its client (the student). This is a service that does not involve customization of the product. The institutions, thus, must strive to achieve higher quality standards that go beyond the perceptions or expectations of the client and/or student expectations and needs. For example, the first and the foremost important non-measurable but important asset is the quality of teaching and the teacher, as it significantly influences the approach of student vis-à-vis his/her satisfaction with teachers' quality of teaching (*Trivellas & Dargenidou, 2009; Umbach & Porter, 2002; Ryan, Healy, & Sullivan, 2012*).

1.2.3 Need for Service Quality in Higher Education Sector

With the increasing cost of higher education in India, the clientele of students, expect and look forward for quality in relation to the cost incurred. Expectedly, to match with the aspirations, they look forward for best infrastructure, experienced and qualified faculty and state-of-art facilities. In addition, the clientele also expect programs that are flexible in nature and enhance their employability after graduation (*Asif & Searcy, 2013; Duque & Weeks, 2010; Lizzio, Wilson, & Simons, 2002; Yeo & Li, 2013*). Other stakeholders, apart from the students, have different perspective and demands accordingly. Additionally, the employers look forward for engaging skilled and task-oriented graduates with sharp cognitive, affective and conative domains that easily and positively integrates them into the working environment of the organization. Correspondingly, teachers, who deliver their products, look forward for congenial and healthy working space, professional growth along with timely recognition and rewards. Thus, the institutions of higher education and learning need to provide a fine balance between the

expectations of the above stakeholders and also survive to generate quality products (students) in the highly competitive market.

Thus, universities, too, also take the role of 'service' organizations, but with a difference as compared to other business organizations, wherein it is intangible or impossible to separate production from consumption.

Indian universities, with large numbers operating in public as well as private sector, are certainly in for a stiff competition and only those that provide the best of services at an affordable price, will survive leading to lowering of entry barriers and long-impacted tie-ups with foreign in a big way.

1.3 SERVICE QUALITY IN HIGHER EDUCATION IN INDIA

Investment in human capital is the key to sustainable development for any nation. With the onset of 20th century, acquisition of skill and knowledge through education started playing primary role in a nation's productivity (*Basheer, 2009*). Such transitions have also been seen in the higher education sector in India leading to significant changes since the last decade or so. In today's perspective, this service sector is being driven by market oriented forces with increasing participation of the private sector. The present world of high living standards, employability and employment status, socio-economic and professional development of individuals is significantly influenced by the background education. With education becoming a commercial entity and service providers competing in the open and competitive market, the quality of education has become a key and invisible factor that determines the socio-economic development of nation and its citizens (*Feigenbaum, 1994*).

Higher education is under immense pressure to increase value of its activities. Over the years, despite the presence of teaching community with better qualifications and expertise, delivery of

teaching has not been able to adapt to rapid changes in the teaching pedagogy. The present day focus is towards continuous improvement that fulfils the requirements of the student community. Educational enterprises in present era are laying emphasis on quality, excellence, access, equitable distribution along with expansion of domains of expertise.

In practice, in the process of creating accessibility to higher education as a service there has been tremendous growth in infrastructure and newer educational establishments. However, this has not resulted in associated development in delivery of better educational services leading to a wide gap between expectations of the stakeholders and actual delivery of education.

In India, the biggest expansion in higher education has been in the fields of engineering and technology, management and education. The limited number of state funded institutions and diminishing funds in higher education by the government caused unprecedented expansion in private institutions in the country. There is a rapid increase in seats i.e. capacity of student's intake in these private institutions, leading to stiff competition among them for student enrolments, and in contrast, a wide choice of institutions to the student community. Student community thus expects better quality of education that charts their career in particular and life in general.

Despite the private institutions investing large sums of grants towards establishing infrastructure and facilities to attract students, it can be observed that there is a wide gap between the institution's perceptions and student's expectations of quality of the service leading to large number of vacant seats in the institutions.

The basis of the measurement was to evaluate the service quality by comparing customers' expectations with their perceptions. The Government of India through various regulatory bodies at the centre and state level, aims at better delivery of education, by rigorous monitoring. Yet the quality of this sector, is way behind attaining global level of excellence. Hence, the business of

education requires a revolutionary shift in paradigm with newer concepts so as to survive in an increasingly competitive environment. In view of this global change in the needs and perceptions of the stakeholders, changing life style, knowledge expansion, population explosion, technological innovations and an overall scenario change in the changing world, there is a need take a re-look at the services of the educational sector.

1.4 RESEARCH PROBLEM

The study thus aimed to assess and evaluate the service quality management practices in Universities and student's perception of service quality rendered by the University. A consistent and reliable measure of the performance of the quality of service from students' perspective is therefore very vital. Student's views on all aspects of their experiences and perceptions are essential to monitor the quality and delivery of education. The data and information gained will help the management and the stakeholder to make judgments about quality levels at the University.

In this context the following research questions were raised:

- What is service quality?
- What dimensions in service quality in the Universities of Punjab are essential to measure and what their significance is?
- Which dimension is the best predictor of overall service quality?

1.5 OBJECTIVES

The broad objectives of the study are outlined as under:

(a) To study differences in the student's perception of the service quality in relation to their demographic factors, academic profiles and area of specialization;

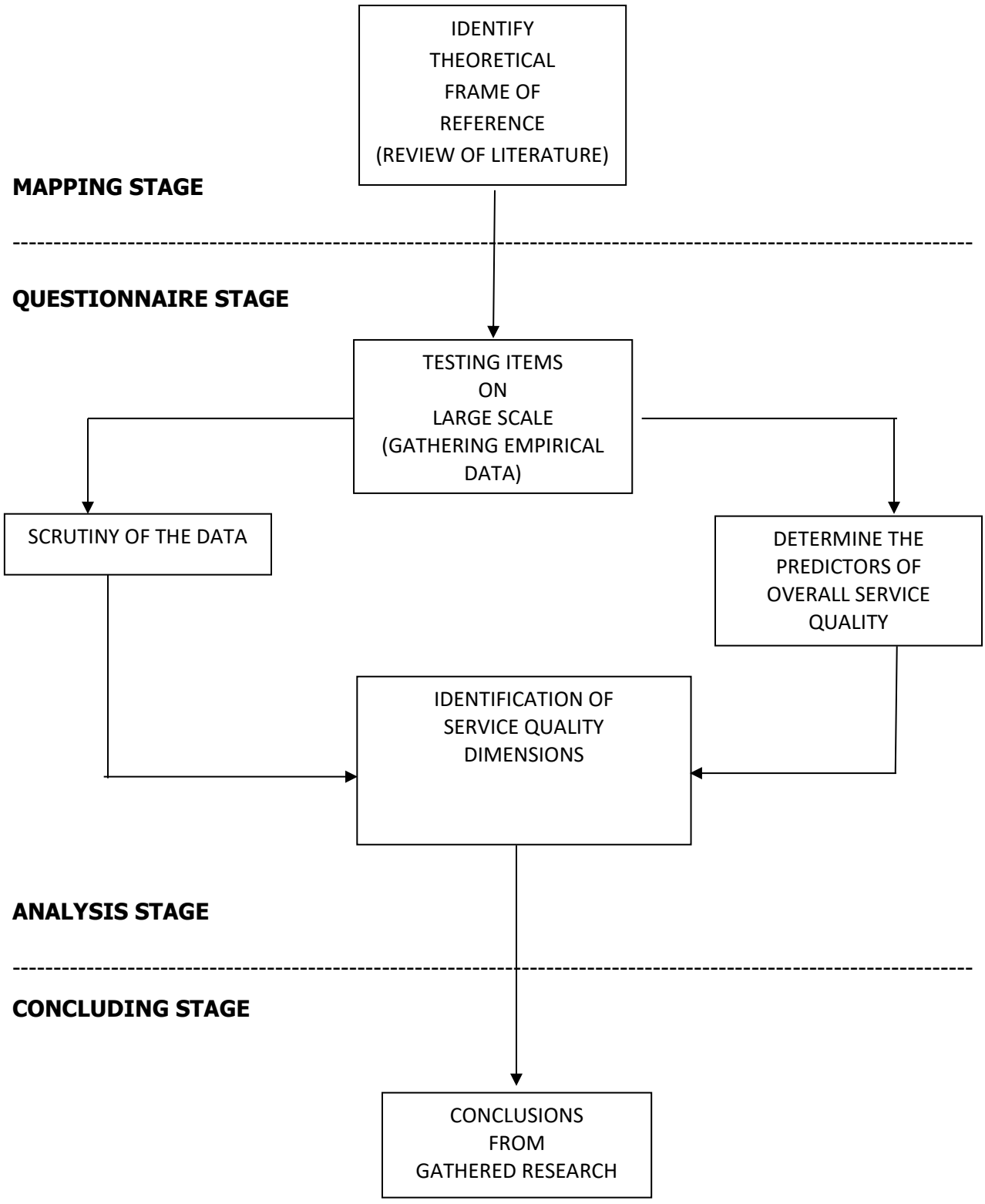
(b) To identify the predictors of service quality as per the perception of students enrolled in Post Graduate programs at different HEI;

(c) To measure perception of students regarding service quality offered by the three universities in Punjab; and

(d) To suggest improvements needed in service quality management.

1.6 PROPOSED FRAME WORK

Proposed Research Model



Items of Modified SERVQUAL Scale -6 dimensions of I-SERVQUAL

S. No	Dimension of study
1	Faculty
2	Facilities
3	Tangibles
4	Attitude
5	Reliability
6	Delivery

A five-point Likert scale is to be used for survey. Point 1 strongly disagrees and Point 5 strongly agrees. Respondents may tick at the appropriate box to show their level of agreement on the scale.

1	2	3	4	5

A similar 5-point will be used to know the overall service quality of these three Universities, the students have experienced during their stay.

Excellent	Very good	Good	Satisfactory	Poor
5	4	3	2	1

Point 5 'completely meets the expected service level' to Point 1 'did not at all meet my expected service level'.

While collecting data from students, the following parameters shall also be taken into account:

- Demographic profile of students
- Academic Standards (percentage of marks/grade)
- Name of the University from which UG done
- Age of the student

1.7 ORGANIZATION OF THESIS

Once the research problem has been identified and worked upon to its logical conclusion, the subsequent task requires presentation of the work. This involves proper and logical presentation of the data concerning different aspects so that required weightage to every aspect can be observed. The responses of the respondents, in this case the PG students, were recorded through a detailed questionnaire, and measured on a five point Likert scale. The immense data collected, was then analyzed to present the findings of the research problem. In order to present the discussion of the analytical results, the final presentation of the study has been organized into the following five chapters:

Chapter-1 introduces the topics of research, highlighting the variance between quality and service quality, need for service quality in higher education sector and the present status of research in this area. The chapter also presents the research problem and the main objectives of the study. Additionally, the organization of the research work in thesis form has also been discussed.

Chapter-2 deals with the review of literature. The ideas, empirical views and inference drawn by various researchers are presented and explained in three parts:

1. Instruments and dimensions of service quality
2. Service quality in education sector
3. Service quality in higher education

Chapter-3 covers the research methodology which provides the layout of research.

Chapter-4 deals with results analysis and discussion. This chapter covers all the variables which are important to the presented research.

Finally, **Chapter-5** covers the summary and conclusion of the study. This chapter also covers the limitations of the present research, implementation strategy and recommendations and the future scope of the study.

This is logically followed by the list of references alphabetically arranged, and appendices, which carry the information related to the questionnaire.

CHAPTER – 2

LITERATURE REVIEW

2.1 GENERAL

In this globally competitive economy today, the inculcation of innovation and effectiveness have become pre-requisites for fueling the growth of service sector. Service products distributed across regions and nations have begun to contribute significantly to the company revenue streams; further emphasizing the fact that these knowledge-intensive business services require dependable methods of measurements and assessments followed by the process of continuous improvement so as to boost the qualitative performance (*Spohrer & Maglio, 2008*). The sub-sections herein present the state-of-the-art available and researched upon, with regard to quality, in general, and service quality and its dimensions as applicable to the higher education sector, in particular, during the last more than three decades or so.

2.2 LITERATURE RELTAED TO INSTRUMENTS FOR MEASURING SERVICE QUALITY

In present day's business world, the driving force to success is customer's satisfaction with reference to service and quality. In this context, the institutions of higher education also are grappling for competitive advantage through better service quality management. This, furthermore, makes the assessment of educational service quality imperative to provide impetus to effective implementation of the educational plans and policies. The existing literature on service quality highlights the importance of monitoring the quality of the services being provided by all the higher educational institutions. This shall help these institutions, to not only provide better services, but also improve the overall quality of education. However, the choice of the best way of defining and measuring service quality in institutions of higher education is still a point of immense debate amongst researchers in this thrust area (*Becket and Brookes, 2006*). *Cheng and*

Tam (1997) cautioned that "education quality is a rather vague and controversial concept", as it has many subjective parameters. Nevertheless, it is an acceptable fact today that "universities are increasingly finding themselves in an environment that is conducive to understanding the role and importance of service quality" (*Shank et al., 1995*). Although there is a better understanding existing today on issues of quality in higher education, the formulation of an appropriate measurement instrument and its application in right perspective is still a challenge for a practitioner aiming to address issues of quality measurements associated with students' perceptions. An appropriate measurement tool would therefore facilitate managers in factually measuring service quality and also use the outcome of the measurement as tool to better the service delivery protocols. Thus, formulation or development of accurate, appropriate and reliable tools and techniques that assess service quality would be of immense value to those whose interests are towards enhancing service delivery. A review of literature will help in providing an insight in this regard.

A generic instrument with a detailed questionnaire, termed SERVQUAL, was first developed by *Parasuraman et al* (1988) that was based on input from focus groups. The authors indicated that the service quality can be calculated by deducting 'service expected' from the 'service perceived', as service quality is primarily dependent upon the correlation between expectations and perceptions of the customer. SERVQUAL, proposed by *Parasuraman et al* (1988), was thus aimed at measuring this difference. The proposed concept was termed 'disconfirmation paradigm', and derived as:

Service Quality (Q) = Perception (P) – Expectation (E)

The SERVQUAL instrument contained 22 features with each feature measuring the perception and the expectation together for a particular attribute related to service quality. Further, a consolidated measurement of service quality can be carried out by drawing the means of the

scores of all features *(Brown, Churchill, & Peter, 1992).* Following SERVQUAL, notable changes have been made by *Parasuraman and his research group* to address the issues raised by other researchers. For example, three different SERVQUAL formats were designed in 1994; wherein customer expectation scores were separated into tolerance zones.

Even to this date, the SERVQUAL methods are still being used by various research groups and is applicable to variety of organizational systems such as information management (*Van Dyke et al. 1997*) , libraries (*Banwet and Datta, 2002; Landrum and Prybutok, 2004*), etc., (*Kettinger & Lee, 1994; Nitecki, 1996*). The application of the protocol, however, has resulted in two issues wherein, the first being disparity over the component being considered in SERVQUAL and the second is the characteristics of the scores generated. For example, the usefulness of SERVQUAL in IT systems has been debated many a time; and there is a broad disagreement on whether the expected and perceived outcomes be considered as measures for quality of service or not. As an answer to the issues raised, some of the research groups recommended elimination of expectation scores/ratings completely (*Cronin and Taylor, 1992; Teas, 1993)*. Further, it has also been reported that the assessments of quality of service were affected dominantly by performance level perceptions (*Bolton and Drew, 1991; Boulding et al. 1993*). The authors indicated that the direct observations and evaluations of disconfirmation are more appropriate than considering expectations.

When only the performance to service quality is taken into consideration, this protocol uses five SERVQUAL dimensions that are 'performance only' dimensions, which constitute a subset, 'SERVPERF', as defined by *Cronin and Taylor (1992)*. The observations of this group supported that scores of performance account to more variation and expectedly provides better predictive validity than SERVQUAL. Observations of *Liljander and Strandvik (1994)*, also showed greater support to performance-only models of service quality. Significant number of reports further

reiterated the observations on the reliability and validity of performance scores over other scores (*Brady et al 2002; Landrum & Prybutok 2004; Landrum et al 2008).* Based upon these findings, it was proposed to use only performance scores to perform analysis on the five SERVQUAL service quality dimensions.

SERVQUAL also has some unstable dimensions as suggested by some of the researchers. The observations of *Cook and Thompson (2000)* differed from *Parasuraman et al. (1988).* During their investigations on the SERVQUAL's reliability and validity with reference to the library services, it has been observed that SERVQUAL only displayed three responsive dimensions with overlaps in responsive, empathy, and assurance dimensions. Further, reliability was identified as the most important and empathy as the least amongst the five quality dimensions by *Nitecki and Hernon (2000)* in their study to assess University library services at Yale. The consideration of dimensions, either four *(Jiang at al 2002)* or five *Landrum and Prybutok (2004)* has minimum relevance as long as the model eliminates customer expectations.

Badri (2003) further used SERVQUAL instruments for a larger sample to make an assessment and application of the SERVQUAL model in measuring service quality in information technology centre.

Firdaus (2006) tested and compared HEdPERF, SERVPERF and the moderating scale of HEdPERF-SERVPERF, the three service quality measuring instruments, in a set-up involving higher education. They examined the reliability of the instrument in terms of uni-dimensionality, reliability, validity and explained variance. The studies reported that the use of HEdPERF gave greater reliable estimations, greater criterion and construct validity, greater explained variance, and consequently a better fit over the other instruments considered.

Brochado (2009) also compared the performance of five alternative measures of service quality in the higher education sector, viz., SERVQUAL, weighted SERVQUAL, SERVPERF, weighted

SERVPERF, and HEdPERF. The data collected for a sample of 360 students of a University of higher education in Lisbon, Portugal, was considered for analysis and it was concluded that amongst the instruments used for measurement, SERVPERF and HEdPERF exhibited better measurement capability.

Jager & Gbadamosi (2009) in the studies carried out on measurement of service quality in South Africa's higher education scenario, examined the relationship between the measures of service quality along with other parameters such as intent to quit the university, faith in the university management and the broader levels of satisfaction with the university system. The data was collected from students (391 students from two university systems) through a structured questionnaire. The reports, on analysis, further proved that a significant relationship existed between the above mentioned variables and the service quality in educational institutions under study.

A newer protocol was further developed by *Senthilkumar and Arulraj (2011)* wherein, campus placement was taken as a factor under measurement of Indian higher education service quality (SQM-HEI). For this study, data from final-year students of some higher educational institutions of Tamil Nadu was considered, through a structured sex-sectioned questionnaire and stratified random sampling procedure. This new protocol/model revealed that the student placement was one of the excellent indicators to determine the service quality in education, in addition to availability of best faculty, excellent infrastructural resources, and choice of disciplines, particularly in the sample under consideration.

Studies carried out by *Khare A. (2011)* showed gender and age dependent quality perceptions with regards to the services offered by different multinational banks. The observations raised the importance of such perceptions in planning expansion and marketing strategies of the banking systems.

Annamdevula and Bellamkonda (2012) further evaluate the service quality in the higher education through an instrument, HiEdQUAL, with primary focus of the student as customer. The study involved five different important dimensions viz., teaching pedagogy, content in courses, administrative and support services, academic and campus infrastructure.

2.3 LITERATURE RELATED TO CHARACTERISTICS AND DIMENSIONS OF SERVICE QUALITY

As quality is a multi-dimensional phenomenon, the service quality needs to be discussed within the tenets of this phenomenon. The dimensions of services quality, to be taken into consideration, is to a great extent different from the dimensions associated with manufacturing goods. *Gronroos (1982; 2000)* further differentiated dimensions of service quality into functional and technical aspects. "How" the service is provided is considered as the functional aspect while "what" service is provided was considered as the technical aspect of service quality. "What" is received by the customer is an outcome of the process pertinent to the resources used. However, the customer also gets a perception of how the process itself functions to determine 'what' is delivered. In their discussions of service quality, *Lehtinen & Lehtinen (1982)* found that quality is associated with the two-side interactions between service provider and the customer and thus is an interactive quality between provider and the customer. This is in addition to physical quality and corporate quality (organizational image), where in physical quality refers to the measurable parameters of the service quality and corporate quality is associated with image of the service provider within current and potential customers.

As per *Spohrer & Maglio (2008),* with the service products getting distributed across the region and the globe, contributing large amounts to company revenues; reliable methods of measurement, assessment, and continuous improvement are continuously becoming more important.

The image of the service provider could be seen as a prominent unit of perception in terms of a customer's impression of quality (*Gronroos, 2001)*. The studies emphasize that, when customers continue to maintain interaction with the same service provider, it is perceived that this interaction is based on their earlier experiences and overall 'image' of a service. Image has a tremendous impact that facilitates the firm's operations and the way it is communicated in many aspects. Even a small error in delivery of services, gets magnified in the perception of the client, and in contrast even a single positive gesture in perception results in ignoring or overlooking minor errors by the service provider.

A significant observation that the evaluation of quality cannot be based on outcome of service alone was made by *Parasuraman et al (1985)* in their studies using ten dimensions influencing service quality. In continuation, this research group also redefined service quality as "the degree of discrepancy between customer's normative expectations for the service and their perceptions of the service performance" (*Parasuraman et al, 1988*). Their studies involved two evaluations, wherein, one was done after the performance of service as to "what" the service has delivered and its outcome. The second component of evaluation was based on as to "when" the service was being performed. The services incorporate value and benefits to the client spatially and temporally as an outcome of a "desired change in, or on behalf of, the one that receives the service" (*Lovelock 2001)*.

Zeithaml et al. (1996) found a strong correlation among dimensions of SERVQUAL as defined by *Parusuraman et al (1988)*, and re-arranged the dimensions by combining and redefining them as Reliability, Responsiveness, Assurance, Empathy and Tangibles. *Brady and Cronin (2001)* further included ambient conditions, facility design and social factors as elements of the service delivery process", which was followed by *Coelho (2004)* emphasizing the importance of understanding as to how the client perceives quality. *Gianesi and Corrêa (2004)* also indicated that features such

as imperceptibility, participation of client associated with simultaneous production and consumption are characteristics of service operations. *Meirelles (2006)*, however, reiterated that a service is essentially indefinable and can only be assessed in association with other tangible measurements/parameters.

2.4 LITERATURE RELATED TO SERVICE QUALITY IN HIGHER EDUCATION SECTOR

Service sector, be it any industry or in the higher education institutions, is fast emerging as a major contributor that fuels the socio-economic growth of a nation. Today, this sector employs much more people, globally, than any other sector and in many countries services are the major contributor to their economy. Higher education, in present era, is recognized as a service industry striving to identify the needs vis-à-vis expectations of its clientele, the students (*Mello et al, 2001).* Although many research groups like *Chadwick and Ward (1987), Bemoski (1991), Comesky et al (1991)*, *Bill D. (1992),* have reported on various measurement tools to measure service quality in higher education, there has been a consistent challenge to define a universally acceptable tool. *Astin (1975)* stated that one of the critical components of measuring education is the students' perception of their individual experience. The research (*Astin, 1993)* further emphasized that the students' perceptions of quality, will be the determining factor for the students' choice and his/her retention in an institution. *Ewell (1993)*, however cautioned that stringent involvement of the terms of consumer service to students is dangerous if the final unit of measurement is student's satisfaction only. Therefore, today's education service as outlined by *Lovelock (2001),* involves "actions, directed towards the minds of people, with continuous delivery, conducted through a partnership between the service organization and its client".

In a study conducted by Joseph and Joseph (1997) on the students of a New Zealand Institution, some of the important determinants of service quality were identified such as location, programs,

reputation and opportunities. Parameters such as academic reputation of the institution, quality of lecturers and the provision of facilities were further proposed by *Mavondo and Zaman (2000)*. One of the important aspects in the latter study was the passing of a positive message playing an important role in attracting prospective students to an institution. Therefore, higher education is a service that relies on significant interpersonal contact too (*Sultan & Wong, 2012)*

The studies carried out by *Wright and O'Neill (2002)* on service quality within the higher education sector in Western Australia (WA) demonstrated the usefulness of disconfirmation models for evaluating the service quality. A rigorous analysis by *Tan & Kek (2004)* demonstrated the usefulness of the enhanced SERVQUAL methodology in gathering students' perceptions. *Nicolescu, (2009)* added newer parameters in the measurement wherein (a) employers were considered as the potential customers of the service as they are the primary users of the skills and the abilities that the student acquires during his/her graduation; and (b) parents as important customers as they invest on the education of their wards with an expectation of promising return on their investment. As the student has to bear the expenditure to the assured and perceived services, they deserve the best of education, so to maintain and provide service quality as per satisfaction of the student, quality has become a competitive weapon (*Senthilkumar and Arulraj 2010).* Thus, satisfaction is a harmonious function between perceived performance and esteemed benefits. In the context of diverse cultural variability, the cultural differences directly influence the satisfaction level of students' and it is not easy to satisfy the customers coming from same and/or different cultural backgrounds. *McCallum & Harrison (1985)* and *Malhotra et al. (1994)* also reiterated that as service encounters are, first and foremost, social contacts, they need to be varied according to the cultural requirements and perceptions. Clientele in different countries can have varying perceptions and therefore service marketers' need to be sensitive to those differences.

Studies carried out by *Hanaysha et al. (2011)* on services provided by Malaysian higher education institutions found significant relationship between the students' satisfaction and the five dimensions of service quality (tangibility, reliability, responsiveness, assurance, and empathy) defined in SERVQUAL.

To maintain the competitive edge, institutions of higher education need to strive towards continuous innovation, structural diversity and continuous improvement in delivery of services, more effectively to the student community *(Jain et al. 2011)*, like any corporate entity (*Nimako et al 2012).*

Similar studies were also carried out on Indian higher education systems. For example, a study conducted on 500 students, pursuing their studies in areas of management and education in ten institutions of higher education in Haryana, India, using five dimension of service quality (SERVQUAL) protocol, found lacunae in the service quality and associated dissatisfaction in clientele (students) due to significant gap in the expectations of the students vis-à-vis the delivery of the service quality (*Chopra et al, 2014).*

2.5 OBSERVATIONS BASED UPON THE REVIEW

Service quality, being a functional measurement of the divergence between expectation and performance along the dimensions of quality, takes into reference the customers' expectations from the service and the actual service performance. As indicated earlier, *Parasuraman et al. (1985)* identified "ten dimensions (tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the customer, and access)" in terms of perception of customers towards service quality; and developed a GAP analysis model, which is outlined by the authors, as follows:

GAP1: The knowledge GAP is the difference between guest's expectations, i.e. not knowing what customers expect.

GAP2: The Standards GAP is the difference between management's perceptions of guest's expectations and service quality specifications, i.e. improper service quality standards.

GAP3: The delivery GAP is the difference between service quality specifications and service actually delivered i.e. the service performance gap.

GAP4: The communications GAP is the difference between service delivery and the communications to guests about service delivery i.e. whether promised matches delivery?

GAP5: The overall GAP is the difference between guest's expectations and perceived service. This gap depends on size and directions of the four previous mentioned gaps associated with the delivery of service quality on the marketer's side."

Brown and Bond (1995) reported that "the GAP model is one of the best received and most heuristically valuable contributions to the service literature". As per this GAP model, the first four GAP1, GAP2, GAP3 and GAP4, are functions determining the way the service is delivered, whereas GAP5 is the GAP that SERVQUAL instrument pertains to the customer (*Parasuraman et al, 1985*).

Cronin and Taylor (1992, 1994), however, raised criticism on the usage of the results of this GAP analysis, which is based upon the difference between expectations and perception, and concluded that service quality measurement based on perception only was enough. Similarly, many other researchers reported that the SERVQUAL's dimensions are relative and, therefore, not applicable in a wider spectrum of analysis (*Carmon 1990; Ekinci & Riley, 1999; Brown et al 1993; Cronin & Taylor, 1992; Teas 1993; Bouman Van der Wiele 1992; Gaglions and Hathcote 1994; Kang James 2004; Lee, 2005; Fowdar 2007*). As an alternative, *Carmon (1990)* and *Dabholkar et al. (1996)*

suggested that some of the services of the SERVQUAL instrument can be adapted/modified so as to reflect a specific service setting under investigation and accordingly incorporated and deleted.

The SERVQUAL instrument pertaining to the customer as suggested by *Parasuraman et al, (1985*) was found to be best suited for carrying out the proposed work. The same was modified to suit the dimensional requirements of service quality being offered by the Higher Educational Institutes (HEI's). The modified dimensions used in the present work are shown as a part of the framed questionnaire in the Appendix – I.

The original SERVQUAL Model of *Parasuraman et al (1991)* was modified completely making it suitable for universities/educational institutes. Original SERVQUAL has 22 questions each, in two questionnaires – one to measure expectations and one to measure perceptions. The modified and refined model has 55 items (Six dimensions) instead of 44, and only perceived service quality by the students was measured on a 5 point Likert Scale ranging from 'Strongly Disagree' to 'Strongly Agree'. In order to distinguish between the revised SERVQUAL and the version customized for this study, the latter is referred to as I-SERVQUAL. In addition to the above items in the questionnaire another question was presented, in order to get the respondents (students) opinion about their overall impression of this service quality of the university.

Based upon the GAP model and the review of literature undertaken, it was proposed to carry out the present research with the following as its main objectives:

- To examine the differences in the student's perception on the service quality in relation to the demographic factors, academic profiles and area of specialization;
- To identify the service quality predictors as per the perception of the students of HEI's;
- To measure service quality of the three universities in Punjab as perceived by the students; and
- To suggest improvements needed in service quality management.

CHAPTER – 3

RESEARCH METHODOLOGY

3.1 GENERAL

This chapter describes the methodology adopted for conducting the study undertaken to assess and evaluate the service quality management practices in Universities and students perception of service quality rendered by the University. It is critical to consistently measure the perception of the students towards the quality of service being offered by the HEIs due their direct involvement with the education process and access to the related facilities. The students are deemed to be both the consumer as well as the product of the education institutions. The views and perceptions of the student's on all aspects of their higher education experience, be it faculty or facilities or other needs, have to be considered and valuated to better monitor the education quality provided by the HEIs. After a detailed survey of the literature, a questionnaire was developed to help measure the service quality offered by the various universities of Punjab (Three in number in the case of present work). Effort has also been made to find out the quality dimensions that best define the service quality offered by the Higher Education Institutes (HEI's). Of the number of techniques available for data collection, a self-administered questionnaire was considered to be the main survey instrument for data collection in the research work undertaken. This is primarily due to the reason that it best addresses the issue of reliability of information by moderating and purging differences in the way the questions are put across, and the way they are presented. In addition these questionnaires also facilitate data collection within a shorter time span from a majority of respondents, which always is the most essential component of any research work.

One of the foundational approaches to identifying service quality parameters has come from the developers of SERVQUAL instrument and the creator of Gaps theory approach to Service quality

(*Parasuraman et al, 1991*), who have identified six dimensions of service quality which are tabulated as below in Table 3.1. The questionnaire, I-SERVQUAL, was developed by modifying the parameters ensconced in the SERVQUAL to suit the needs of the survey to be conducted for the purpose of identifying the service quality dimensions and also in measuring the service quality being offered by various HEI's of Punjab. The modified parameters have been put up alongside those identified by *Parasuraman et al (1991)* in Table 3.1.

For determining the dimensions affecting the service quality of the academic institutions, the original SERVQUAL Model of *Parasuraman et al (1991)* was modified completely, making it suitable for universities/educational institutes.

Table 3.1: DIMENSIONS OF SERVICE QUALITY

SERVQUAL		**I-SERVQUAL**	
Parameter	Meaning	Modified Parameter	Meaning
Faculty	Specialization/Experience	Faculty	Quality of service provided by the faculty members of the university
Tangibles	Appearance/Physical facilities	Facilities	Availability of facilities for academic, Co and extra-curricular activities, sports etc.,
		Tangibles	Quality of facilities and infrastructures on campus
Reliability	Ability to perform promised services.	Reliability	Curriculum and Services as put-up in the prospectus/website are delivered or not
Responsiveness	Willingness to help customers	Delivery	Concerns whether equitable service is provided to all without bias.
Assurance	Trust & confidence		
Empathy	Caring attitude	Attitude	Concerns with the attitude of the administrative staff and faculty

The modified and refined model had 55 items tentatively distributed to cover the six main dimensions of Faculty, Facilities, Tangibles, Attitude, Reliability and Delivery. The service quality

as perceived by the students was measured on a five point Likret Scale ranging from 'Strongly disagree' to 'Strongly agree' as a response to the statements in the questionnaire. In order to distinguish between the revised SERVQUAL and the version customized for this study, the latter has been referred to as I-SERVQUAL. The detailed questionnaire is provided in ***Annexure – II.***

The study used two surveys. First a pilot survey was conducted for making the right corrections and to validate the questionnaire. After making the changes, which were found necessary, the final questionnaire was designed, which was used for the main empirical research work.

The chapter herein is divided into two sections. The section 3.1 discusses the methodology used for the pilot study, whereas, the section 3.2 discusses the methodology used for the main empirical research.

3.2 PILOT STUDY

The pilot study was conducted mainly to check the validity of the questionnaire, which had to be used in the main empirical research. The purpose was also to identify as to whether any changes needed to be made in the I-SERVQUAL questionnaire and to gain familiarity with the fieldwork and the problems that can occur at different stages of the research.

The questionnaire, which was used for the pilot survey, is given in the ***Annexure – II***. Based upon the results of the pilot study the questionnaire was found to be suitable for administering to the respondents of the three identified universities, without any changes.

3.2.1 Sampling for the Pilot Study

Random sampling method has been used in the present study. The questionnaire was pre-tested with a sample of thirty-seven PG students selected purposively from the Department of Computer Engineering at Thapar University, Patiala. *Fink (2003b in Saunders, Lewis, Thornhill, 2007)* had suggested that a minimum of ten respondents was sufficient for pre-testing of the questionnaire,

and the same was kept as the basis for the pre-testing size of the sample. After carrying out the pretesting, the questionnaire was provided to the respondent population of the three universities (200 PG students each) through personal contact by the research assistants.

3.2.2 Data Analysis for the Pilot Study

An analysis was done for the data, collected for the pilot study, using the SPSS software. The initial reliability testing for the dimensions yielded a Cronbach alpha ranging from 0.906 to 0.943 indicating that the modified instrument I-SERVQUAL could be conveniently used by HEIs for measuring service quality.

3.2.3 Time frame in Data Collection Process for the Pilot Study

Preparation of the questionnaire for the pilot study took a time period of nearly 2 months. Subsequent to the preparation of the questionnaire, it was discussed with the faculty members and academicians. After considering all the suggestions, the questionnaire was handed over to the selected group of students for pre-testing.

3.3 MAIN EMPIRICAL STUDY

This sub-section deals with methods employed for data collection, selection of sample and survey areas, survey instrument, and methods of data analysis. The purpose of this analytical study is to not only measure service quality of the three universities in Punjab as perceived by the PG students, but also to identify the predictors of service quality with reference to the HEI's.

3.3.1 Primary Data Collection

The study is based on primary data collection from the three selected universities of Punjab and the data was collected by actually visiting these three universities. The questionnaire has been administered to the PG students of these three selected universities. The questionnaire was distributed to students randomly and students were asked to return the questionnaire in a few

days. The survey questionnaire was self-completed by the students. However, students were made to understand items of questionnaire and specific instructions regarding the way to fill the responses were given to such students. They were categorically asked to give the first response that spontaneously comes up in their mind after going through the questions in the questionnaire

3.3.2 Selection of Samples

The combined student strength of the three selected universities, in various PG courses, being 10,000, it was proposed to distribute the survey questionnaire to more than 1000 prospective respondents of the three universities. A total of 600 useable questionnaires were retained for final analysis (200 from each university). This was possible with repeated visits for data collection. The questionnaire for the study had six items related to the respondent's identification data, and included fifty-five items qualifying the proposed six dimensions of service quality.

The sample is supposed to include post-graduate students who are studying in their final year courses in various disciplines at the campus of the following three types of Universities of Punjab:

1. Full-fledged Government Aided State University
2. Deemed to be University established u/s 3 of UGC act, 1956
3. A Private University

Falling in the first category, is a full-fledged government aided state university, which gets most of the funding from the state government, referred to as GSU in the text of the thesis. For the second and third categories, a deemed university in the region, referred to as DU; and, a private university, referred to as PSU, were considered for data collection. Both the PSU AND du The GSU and DU considered for data collection and analysis, came into existence in the early independence era, whereas, the PSU was created under the Punjab State Private University Act 2005 and recognized by UGC under Section 2 of UGC Act 1956.

3.3.3 Data Collection

The present study uses a stratified random survey analysis. Stratified sampling, as a first step involves splitting the population into strata, i.e. sections or segments. The strata are chosen to divide a population into important categories relevant to the research interest. Herein, in the present work, the questionnaire is structured to include items pertaining to a specific dimension of service quality and stratified to take responses on the basis of the demographic and academic factors. Surveys, on the other hand, have an advantage over other methods, as these provide a quick, inexpensive, efficient and accurate means of gathering information about the population. A review of literature reveals that for collecting data and making investigations, a variety of approaches have been used. The approach that is considered to yield relatively definitive results in assessing the service quality provided by the various Higher Educational Institutions (HEI's), is the consumer survey approach, the consumer in the present study being the PG student of the three universities. Hence it was decided to use survey technique for the present study.

The research tool used for the present study is a questionnaire. After careful analysis of the objectives of the study, exercises were undertaken to construct and word appropriate questions. Many tools used by earlier researchers in the related areas were examined. The questionnaire was restructured after the pilot study to suit the population/conditions. The questionnaire was framed with demographic variables like age, gender, course of study, academic performance, and the name of the university. The questionnaire, with mostly closed-ended questions, was formulated according to the set objectives to be answered on a five-point Likert scale as shown below.

Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree
1	2	3	4	5

The questionnaire has two parts briefly explained below. The detailed questionnaire administered to the students is provided in ***Annexure – II.***

1) **Part A:** This part covers questions related to the degree of SATISFACTION with regards to the overall services, academic services, academic infrastructure, stay on campus and sports & leisure facilities. There are 5 questions in this part wherein the respondents were to respond on a scale of 1 to 5 as explained above.
2) **Part B:** This part of the questionnaire has been designed to take feedback from the PG students on specific issues, which provided specific assessment of the service quality delivery. There were a total of 55 statements split into six service quality dimensions of *Faculty, Facilities, Attitude, Tangibles, Reliability* and *Delivery*. There were 10 questions related to the *Faculty* aspect of service quality, 15 related to the *Facilities*, 8 questions concerning the *Attitude* aspect of service quality, and 11, 5 and 6 questions related to the *Tangibles, Reliability* and *Delivery* aspects, respectively, of the service quality offered by the HEI's.

Each respondent, considered for data collection in the present study, was contacted personally to get the questionnaire filled. This personal contact with the respondent's facilitated accurate collection of the data, as any clarification sought was provided on the spot by the researcher. The respondents were contacted during the day at their respective institutions in groups and informed about the details and purpose of filling up the questionnaire.

3.3.4 Statistical Analysis

Before analyzing the data, it was checked thoroughly. Not only was the print out of the data-file checked manually, range checks and logical checks were also applied on the data. The data was analyzed with the help of SPSS (Statistical Package for Social Sciences) 16.0-version package. Statistical tools like ANOVA, t-test, and post-hoc analysis and factor analysis were applied to test the hypotheses.

i) **ANOVA:** The Analysis of Variance or (ANOVA) is a significantly powerful and often used statistical analysis procedure in the realm of social sciences. Analysis of variance (ANOVA) is generally used to test significant differences between more than two sample means. By using ANOVA, we can draw conjectures as to whether dissimilar samples were taken out from the populations having the same mean. ANOVA involves finding out one estimate of the population variance from the variance among the sample means and second estimate of the population variance from the variance with in the sample. Subsequent to finding the two estimates, they are compared. If both the estimates have approximately similar values, the null hypothesis is accepted, which implies that the sample means do not vary significantly. The comparison between these two estimates of the population variance is drawn by computing the ratio of the two estimates defined as the *F* statistic.

F is the ratio of between-column variance and with-in column variance; the degrees of freedom for the numerator (between-column variance) is equal to (Number of samples-1), whereas, the degrees of freedom for denominator (with-in column variance) is equal to (Total sample size – Number of samples). In case the samples are not taken from the populations having the same mean, the numerator, i.e., the between-column variance tends to be higher than the denominator, i.e. the with-in column variance resulting in a higher value of the *F*-statistics, thereby leading to the rejection of null hypothesis.

ii) **t-test:** A t-test's statistical significance gives an indication as to whether or not the difference between the means of the two clusters, in all likelihood, reflect a "real" difference in the population from which the clusters were sampled. This statistical significance is evaluated by the size of the difference between the cluster means, the sample size, and the standard deviations of the clusters. The statistical significance,

for all practical purposes, implies that the two larger populations from which draw samples are "actually" different. The t-test values are found out by the procedure as detailed below:

Step-1 involves listing the data for sample 1 and sample 2.

Step-2: In the second step, the number (*n*) of replicates for each sample (the number of replicates for sample 1 being termed n_1 and the number for sample 2 being termed n_2) are recorded

Subsequently, the mean, the standard deviations and the variance of the difference between the two means is calculated by the formulae:

$$\sigma^2 = \frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}$$

The *t* value is then calculated as follows:

$$t = \frac{\bar{x_1} - \bar{x_2}}{\sigma_d}$$

This t-values so calculated is then read in the *t*-table at (n_1 + n_2 – 2) degrees of freedom corresponding to the chosen level of significance required (normally p = 0.05).

If the *calculated t* value *exceeds* the tabulated value it is implied that, at that level of probability, the means are *significantly different*. A significant difference at p = 0.05 signifies that if the null hypothesis were to be correct (meaning the samples do not differ) then it is expected to have a *t* value as high as this on less than 5% of occasions. This implies that, although, with reasonable confidence it can be said that the samples do differ from one another, but there still are nearly 5% chances being wrong in reaching the implied conclusion. Subsequent to this the calculated *t* value is compared with the table values for higher levels of significance (i.e. p = 0.01). These higher levels tell us the probability as to whether the conclusion being drawn is correct or not. As an example, say if our calculated *t* value exceeds the table value for p = 0.01, it implies that there is a 99% chance of the means being significantly different (and a 99.9% chance for the means

to be significantly different if the calculated *t* value exceeds the table value for $p = 0.001$). In standard terms, it is generally implied that a difference between averages or means at the 95% level is "significant", a difference at 99% level is "highly significant" and a difference at 99.9% level is "very highly significant".

iii) Post-hoc analysis: In a one-way ANOVA, the F statistic tests as to whether the sample effects are all equal or there is any variance, i.e. there are no differences amongst the averages of the clusters. A significant *F* value would imply that there are differences in the means, but this does not tell us where those differences are. For example the mean of group *A* might be different from that of group *B* but it may not be different from the average of group *C*. A series of pairwise t-test are carried out to identify and isolate the differences. However, the difficulty with this is that the significance levels can be deceptive and misleading. Considering for example, there are 7 groups, which means there would be 21 pairwise comparisons of means; if using the 0.05 level of significance, we would expect at least one statistically significant difference even if no differences exist. Post-hoc analysis is carried out for doing multiple comparisons of group means or averages.

iv) Factor Analysis: Factor analysis is carried to identify a set of dimensions that are generally not directly observable in a large set of variables. The factor analysis methodology strives to resolve a large set of measured variables in terms of a relatively few groupings, which are generally known as factors. The major use of factor analysis is to group redundant variables into a smaller number of variables which can be subsequently be used for further analysis. In other terms, the factor analysis is a tool that mainly emphasizes on investigating the interrelationships among all the pertinent variables. The main purpose of factor analysis often consists of data

reduction and condensation. In a broader sense, it addresses the problem of analyzing the structure of the inter affiliations among a relatively large sum of variables, by defining a set of common principle dimensions known as factors.

The great utility of this technique lies in condensing and simplifying a large number of factors and classifying them into relatively lesser number of groups. In the present study, factor analysis has been used for identifying and grouping the service quality dimensions into different categories.

3.3.5 Hypotheses Testing

While in all research studies hypotheses are the statements that define/identify the relationship of different variables being studied. In the present works the hypotheses have been framed to test the effect of the demographic variables in the perception of the various service quality dimensions. As compared to most other researches, there is a greater need to emphasize the speculative aspect of the hypothesis so proposed in the work carried out. One of the reasons is the review of literature, which reveals that much of the earlier research work has been done on service quality applied to various spheres other than educational institutions and mainly in the developed countries. There are only few studies on developing countries like India with different aspects. Two, many of the research objectives, outlined to be undertaken as a part of the research, have not been addressed by earlier researchers, especially in India and no such study on the service quality dimensions as perceived by the PG students of the HEI's has been carried out. The specific hypotheses examined in this study are as follows:

H1: There is a significant difference in the perceived Service quality and its various dimensions for the HEIs of Punjab on the basis of gender.

H2: There is a significant difference in the perceived Service quality and its various dimensions for the HEIs of Punjab on the basis of age.

H3: There is a significant difference in the perceived Service quality and its various dimensions for the HEIs of Punjab on the basis of their course of study.

H4: There is a significant difference in the perceived Service quality and its various dimensions for the HEIs of Punjab on the basis of their academic performance.

3.3.6 Validity and Reliability of the Questionnaire

The questionnaire needs to be unambiguous, short and easy to answer. To test its effectiveness a pilot study was conducted. A total of thirty-seven PG students were purposively selected from the Department of Computer Engineering at Thapar University, Patiala for the pilot testing of the questionnaire. *Tull and Hawkins (1984)* give a comprehensive and easy to understand explanation of the types of validity, which range from the easy to determine to the tough to establish. The questionnaire was tested for its validity and reliability.

The term **Validity** refers to the notion, that the tool actually measures what it is intended to measure. The present questionnaire's validity was measured by using the method of content validity. The questionnaire was shown to various fellow academicians and experts for checking its validity. A few modifications as deemed fit were made on the basis of suggestions received from the experts. In addition a pilot survey was also conducted, the results of which have already been discussed in the section 3.1, wherein, it was found that the dimensions initially framed were suitable for carrying out a detailed empirical study.

Reliability refers to the proposition that when the outcome of a particular measurement process can be reproduced with accuracy, then the measuring instrument is deemed to be reliable. The concept of reliability applies to a measure when similar results are obtained over time and across varying situations. The two main dimensions underlying the reliability concept are: repeatability and consistency. To measure the reliability of the present scale Cronbach Alpha

was used which was found to range between 0.906 and 0.943. Hence, the questionnaire was found to be valid and reliable for the present study.

3.3.7 Scope of the Study

Globalization, in its literal sense, cutting across the barriers between different types of industry, signifies open competition among firms for customers in worldwide markets (*P.N.Rastogi, 1996*) and the basis of this competition is quality, cost and performance of their products and services. The changes in business environment have led to development of new techniques for organizing and managing companies/organizations. These changes have been necessitated due to international competition, and, in that regards, higher education is no exception. Higher education in India is expensive and all consumers want 'good value' for every penny they spend on, be it the classroom experience or beyond. Every student expects that the university, where he or she intends to study, must have the best of infrastructure, highly qualified faculty and the best of facilities.

Service sector, be it any industry or in the higher education institutions, today is fast emerging as a major contributor that fuels the socio-economic growth of a nation. Today, this sector employs much more people, globally, than any other sector and in many countries services are the major contributor to their economy. The universities too fall under the ambit of service organizations, where most important characteristic separating them neatly from products is the sheer impossibility to separate production from consumption. In India we have approximately 480 universities covering both public and private sector, and in the current scenario as it exists, the Indian Higher Education Sector is facing turbulent times. Entry barriers are being lowered; distance education is being expanded – IGNOU for example has become world's largest university with 3 million students and presence in 35 countries; private universities are mushrooming; and foreign universities are all set to enter India in a big way. The higher education in India will

certainly face stiff competition and, as such, only those with quality will not only survive but would also have an edge over the others. The huge growth of students numbers, internationalization of education, urgent need to reduce on government funds and increasing competitive pressures have prompted many universities and other education providers to focus on quality customer service. The Higher Education Institutes (HEIs) that provide good quality service to their customers, who are primarily students, would undeniably be able to improve their standings and be in a better position to stave-off the challenge posted by the foreign universities. The difference in the perception of the students with regards to the quality of the services provided by different educational institutes is dependent upon the perceptions of the students' and their experiences with the earlier institutes they have attended, specifically during their under-graduate studies.

Thus, to be able to serve the customers (students and their parents) well, it has become mandatory for all higher educational institutes to combine promptness with reliability, and innovating technology with human element. Consequently, it is imperative for the HEIs to uncover what attributes are utilized by the consumers, in this case the students, in their assessment of overall service quality.

The present study confines to three different types of universities of Punjab which include a Full-fledged Government aided State University (GSU), a deemed-to-be-university established u/s 3 of UGC act, 1956(DU) and a Private State University formed under the State Act (PSU). These three types shall cover the entire ambit of the PG students, studying under varying environment provided by these three universities. The purpose of carrying out the research only for PG students was that such students would already have studied for their under-graduate degree in a Higher Educational Institution and thus, can better appreciate the service quality being offered by the selected universities. This study would be greatly helpful to the personnel who are engaged in the formulation of marketing strategies and polices for their respective universities.

The findings of the study can help identify the specific dimensions of service quality that the different HEI's must put emphasis on so that the student experience on the campus can be enhanced/improved. Also more importantly the universities would know as to what kind of service is best preferred by the students based on their demography and course of study. The study would significantly help the management of these institutes as to how they must assess and monitor the service quality in their institutions and recognize its importance in development and maintenance of their relationship with their students.

CHAPTER – 4

DATA ANALYSIS AND INTERPRETATION: RESULTS & DISCUSSION

4.1 DEMOGRAPHIC FACTORS

In this section of the chapter, differences in the students' perception of the dimensions in relation to the demographic and educational factors like gender, age, course of study and academic performance were studied. The review of literature indicated that the customers differ in their perception of service quality and its dimensions. This difference in perception may be due to some demographic factors or the laid down educational factors. The analysis was carried out in relation to the initially assumed dimensions of service quality for which the questionnaires were administered to the respondents. The aim was to study the effect of demographics on the service quality of various HEIs as perceived by the post-graduate students of various universities. The questionnaire, I-SERVQUAL, was developed by modifying the parameters, as laid down in the SERVQUAL to suit the needs of the survey to be conducted for the purpose. The Table 4.1 shows the modified parameters, put up alongside those designed by *Parasuraman et al (1991)*. The modified and refined model had 55 items tentatively distributed to cover the six main service quality dimensions of Faculty, Facilities, Tangibles, Attitude, Reliability and Delivery. The service quality as perceived by the students was measured on a five point *Likert Scale* ranging from '*Strongly disagree*' to '*Strongly* agree' as a response to the statements in the questionnaire. In order to distinguish between the revised SERVQUAL and the version customized for this study, the latter has been referred to as I-SERVQUAL. The initial reliability score for the dimensions yielded a Cronbach alpha ranging from 0.906 to 0.943 indicating that the modified instrument I-SERVQUAL could be conveniently used by HEIs for measuring service quality.

Considering the expected responses as laid down in the reviewed literature, the hypotheses were formulated as under:

HT1: There is a significant difference in the perceived Service quality and its various dimensions for the HEIs of Punjab on the basis of gender.

HT2: There is a significant difference in the perceived Service quality and its various dimensions for the HEIs of Punjab on the basis of age.

HT3: There is a significant difference in the perceived Service quality and its various dimensions for the HEIs of Punjab on the basis of their course of study.

HT4: There is a significant difference in the perceived Service quality and its various dimensions for the HEIs of Punjab on the basis of their academic performance.

Table 4.1: DIMENSIONS OF SERVICE QUALITY

SERVQUAL		**I-SERVQUAL**	
Parameter	Meaning	Modified Parameter	Meaning
Faculty	Specialization/Experience	Faculty	Quality of service provided by the faculty members of the university
Tangibles	Appearance/Physical facilities	Facilities	Availability of facilities for academic, Co and extra-curricular activities, sports etc.,
		Tangibles	Quality of facilities and infrastructures on campus
Reliability	Ability to perform promised services.	Reliability	Curriculum and Services as put-up in the prospectus/website are delivered or not
Responsiveness	Willingness to help customers	Delivery	Concerns whether equitable service is provided to all without bias.
Assurance	Trust & confidence		
Empathy	Caring attitude	Attitude	Concerns with the attitude of the administrative staff and faculty

4.1.1 Sample

Since the purpose of the study was to understand students' perception towards service quality of HEIs, the survey was conducted for the PG students who are studying in various disciplines at the campuses of the three Universities of Punjab, each belonging to a different category. The study used random stratified sampling. One of the participating university was a full-fledged government university (GSU), the second a deemed-to-be-university (DU) and the third participating university was a private state university established under the State Act (PSU). A self-administered, structured questionnaire was used to collect the data from the students studying in final year at these campuses in various PG courses. More than 1000 questionnaires were distributed to prospective respondents of the three universities. A total of 600 useable questionnaires were retained for final analysis (200 from each university). Thus, the response rate is 60 percent. This was possible with repeated visits for data collection. The questionnaire for the study had six items related to the respondent's identification data, and included fifty-five items qualifying the proposed six dimensions of service quality. In order to accomplish the objectives, T-test and ANOVA were applied. Post-hoc analysis tests were conducted, wherever applicable, to draw and discuss further inferences.

4.1.2 Respondent Characteristics

Table 4.2 exhibits the characteristics of the respondents from the three universities taken for the present study. In total 598 usable questionnaires were retained for analysis. An almost equal proportion of 33% of respondents were taken from each of three universities under study. A total of 73% respondents were below the age of 25 years and 27% were above the age of 25 years. Out of the 598 respondents, 54% were male and 46% of the PG students were female. The students of three postgraduate courses (MBA, M.Sc. and M. Tech) were the respondents of the study. Respondents in equal proportion (33%) from each course were selected for study to

minimize the response bias. The academic performance of students was measured in terms of marks obtained in the last semester. It can be seen from the Table 6.1 that 51.17% student respondents had scored between 60% to 75% marks, approximately 22% had scored between 75% to 85% and 11% of the respondents had scores above 85%. Only 16% of the respondents scored below 60% marks till the last semester of their study.

To study the differences or variation in student's perception of service quality in relation to demographic variables, T-test and ANOVA were applied.

Table 4.2: Demographic profile of respondents

Demographic Variable	Category	Frequency (N=598)	Percent
University	Punjabi University	198	33.1
	LPU	200	33.4
	Thapar University	200	33.4
Age	Below 25 years	437	73.1
	Above 25 years	161	26.9
Gender	Male	323	54.0
	Female	275	46.0
Course	Engineering (Group 1)	200	33.4
	Science (Group 2)	199	33.3
	Management (Group 3)	199	33.3
Academic Performance (Marks %age)	Less than 60% (Group 1)	98	16.4
	Between 60 to 75% (Group 2)	306	51.2
	Between 75 to 85% (Group 3)	130	21.7
	More than 85% (Group 4)	64	10.7

4.1.3 Difference in the Perceived Service Quality and Its Dimensions for the HEI's of Punjab on the Basis of Gender of the PG Students

In order to find out the difference in the perception of the male and female PG students of the three universities of Punjab, an independent t-test was performed. The results of the t-test analysis are presented in Table 4.3.

As can be observed from the table, the t-value is greater than the table value for only faculty and reliability dimensions of the service quality, indicating that the perception of male and females vary significantly only for these dimensions. This also indicates that the service quality perception by both males and females for the other four dimensions of facilities, tangibles, attitude and delivery is indistinguishable.

Thus, the first hypothesis HT1 pertaining to the significant difference based on gender was accepted only for the faculty and reliability dimensions. The finding is in coherence with the inferences drawn by *Joseph and Joseph (1998)* and *Ham and Hayduk (2003)*, which also presented similar outcomes, however, this result contradicts with the results portrayed by *Soutar and McNeil (1996),* which shows a significant difference between gender and service quality

Table-4.3: t-test for the difference in the perceived service quality and its dimensions for PG students of HEIs of Punjab on the basis of gender

Group Statistics						
Dimension	**Gender**	**N**	**Mean**	**St. Dev**	**t-value**	**p**
Faculty	Male	323	34.91	7.01	2.51**	.0126**
	Female	275	36.34	6.92		
Facilities	Male	323	52.21	10.05	0.21	.8333
	Female	275	52.03	10.84		
Tangibles	Male	323	30.15	5.93	0.10	.9182
	Female	275	30.20	5.94		
Attitude	Male	323	38.49	8.27	1.43	.1798
	Female	275	39.46	8.39		
Reliability	Male	323	17.50	4.07	3.10**	.003**
	Female	275	18.49	4.03		
Delivery	Male	323	20.41	4.84	1.68	.0946
	Female	275	21.08	4.92		
Service Quality	Male	323	193.67	34.50	1.36	.1763
	Female	275	197.61	36.57		

*** 0.05 level of significance*

4.1.4 Difference in the Perceived Service Quality and its Dimensions for the HEIs Of Punjab on the Basis of Age of the PG Students

Table 4.4 depicts the t-test analysis results based on the age, of the PG students of the three universities of Punjab, for service quality and its dimensions.

Table-4.4: t-test for the difference in the perceived service quality and its dimensions for PG students of HEIs of Punjab on the basis of age

Group Statistics						
Dimension	**Age**	**N**	**Mean**	**St. Dev**	**t-value**	**p**
Faculty	Less than or equal to 25 years	437	35.76	6.99	1.07	.2853
	More than 25 years	161	35.07	7.02		
Facilities	Less than or equal to 25 years	437	52.27	10.65	0.60	.5671
	More than 25 years	161	51.72	9.76		
Tangibles	Less than or equal to 25 years	437	30.27	5.97	0.69	.489
	More than 25 years	161	29.90	5.83		
Attitude	Less than or equal to 25 years	437	39.05	8.62	0.59	.5717
	More than 25 years	161	38.62	7.52		
Reliability	Less than or equal to 25 years	437	17.96	4.04	0.032	.9577
	More than 25 years	161	17.94	4.20		
Delivery	Less than or equal to 25 years	437	20.75	4.95	0.22	.8243
	More than 25 years	161	20.65	4.7		
Service Quality	Less than or equal to 25 years	437	196.06	36.32	0.69	.5096
	More than 25 years	161	193.90	33.19		

** 0.05 level of significance*

The data was analyzed for PG students split into two groups viz. having age less than or equal to 25 years and with age more than 25 years.

As can be observed from the table, the t-value is less than the table value for all the dimensions of the service quality indicating that the perception does not vary with the age of the students.

Thus, the second hypothesis HT2 pertaining to the significant difference based on age of the students was rejected. This is very similar to the findings of *Ham and Hayduk (2003)* that found no relationship between age and service quality.

4.1.5 Difference in the Perceived Service Quality and its Dimensions for the HEIs of Punjab on the Basis of Course of Study of the PG Students

Table 4.5(a) depicts the Analysis of Variance (ANOVA) based on the course of study of the PG students for service quality and its dimensions for the HEIs of Punjab.

Table-4.5(a): ANOVA for the difference in the perceived service quality and its dimensions for PG students of HEIs of Punjab on the basis of course of study

ANOVA						
Dimension	**Course of study**	**Sum of squares**	**Df**	**Mean square**	**F**	**p**
Faculty	Between groups	347.59	2	173.80	3.578	.029*
	Within groups	28995.47	597	48.57		
	Total	29343.06	599			
Facilities	Between groups	1512.07	2	756.04	7.119	.001***
	Within groups	63397.56	597	106.19		
	Total	64909.63	599			
Tangibles	Between groups	222.72	2	111.36	3.191	.042*
	Within groups	20831.25	597	34.89		
	Total	21053.97	599			
Attitude	Between groups	614.25	2	307.13	4.477	.012*
	Within groups	40950.22	597	68.59		
	Total	41564.47	599			
Reliability	Between groups	297.22	2	148.61	9.172	.000***
	Within groups	9673.47	597	16.20		
	Total	9970.69	599			
Delivery	Between groups	370.11	2	185.05	7.950	.000***
	Within groups	13896.85	597	23.288		
	Total	14266.96	599			
Service Quality	Between groups	17176.97	2	8588.49	6.955	.001***
	Within groups	737210.70	597	1234.86		
	Total	754387.67	599			

** p ≤ 0.05 level of significance; ** p ≤ 0.01 level of significance; *** p ≤ 0.001 level of significance*

There were an equal number of respondents from the masters programs in engineering, management and sciences.

It can be observed from the table that the calculated value of F is more than the table value for all the dimensions of service quality. Following up on the results of F-value analysis, post-hoc analysis was carried out to identify the differences in the perception of service quality dimensions based upon the course of study. **Table-4.5(b)** shows the results of the multiple comparisons using the post-hoc analysis. Group 1 in the table represents the engineering stream PG students, whereas the groups 2 and 3 represents science and management students, respectively. It can be observed from the Table-8 that there is a significant difference in the 'faculty' dimension of service quality as perceived by students of group 1 and 3, and similarly a significant difference is perception is observed for the students of group 2 and 3. This indicates that the PG students of Engineering and Management stream, and Science and Management streams perceive the faculty dimension of service quality differently. However, there is no significant difference in the perception of the students of group 1 and 2, i.e. Engineering and Science stream students, indicating that these students have similar perception, when it comes to service quality being offered by the faculty of the university. A similar trend, to that of the perception of faculty dimension, is also observed for the other dimensions viz. 'facilities', 'tangibles', 'attitude' and 'delivery' excluding the reliability dimension. This indicates that the science and engineering stream PG students perceive all the service quality dimensions except the 'reliability' dimension in a similar manner. The perception of the management students is different from that of the science and engineering stream students for all dimensions except, reliability, where there is a significant difference in the perception of group 1 and 2, and group 1 and 3, while there is no significant difference in the perception of students belonging to group 2 and 3. This indicates that

science and management students have the similar perception about the reliability dimension of service quality.

Table-4.5(b): Post-hoc multiple comparisons for the difference in the perceived service quality dimensions for PG students on the basis of course of study

Dependent Variable	(I) course of study	(J) course of study	Mean Difference (I-J)	Std. Error	Sig.
Faculty	1 (Engineering)	2	-.0950	.69691	.892
		3	***-1.6600****	.69691	.018
	2 (Sciences)	1	.0950	.69691	.892
		3	***-1.5650****	.69691	.025
	3 (Management)	1	***1.6600****	.69691	.018
		2	***1.5650****	.69691	.025
Facilities	1	2	-1.4200	1.03050	.169
		3	***-3.8450****	1.03050	.000
	2	1	1.4200	1.03050	.169
		3	***-2.4250****	1.03050	.019
	3	1	***3.8450****	1.03050	.000
		2	***2.4250****	1.03050	.019
Tangibles	1	2	-.1600	.59070	.787
		3	***-1.3650****	.59070	.021
	2	1	.1600	.59070	.787
		3	***-1.2050****	.59070	.042
	3	1	***1.3650****	.59070	.021
		2	***1.2050****	.59070	.042
Attitude	1	2	-1.3500	.82821	.104
		3	***-2.4750****	.82821	.003
	2	1	1.3500	.82821	.104
		3	-1.1250	.82821	.175
	3	1	***2.4750****	.82821	.003
		2	1.1250	.82821	.175
Reliability	1	2	***-1.0450****	.40254	.010
		3	***-1.7100****	.40254	.000
	2	1	***1.0450****	.40254	.010
		3	-.6650	.40254	.099
	3	1	***1.7100****	.40254	.000
		2	.6650	.40254	.099
Delivery	1	2	***-.7200***	.48247	.136
		3	***-1.9050****	.48247	.000
	2	1	.7200	.48247	.136
		3	***-1.1850****	.48247	.014
	3	1	***1.9050****	.48247	.000
		2	***1.1850****	.48247	.014

Grand total	1	2	-4.7900	3.51406	.173
		3	***-12.9600****	3.51406	.000
	2	1	4.7900	3.51406	.173
		3	***-8.1700****	3.51406	.020
	3	1	***12.9600****	3.51406	.000
		2	***8.1700****	3.51406	.020

Based on observed means.
The error term is Mean Square (Error) = 1234.859.
**. The mean difference is significant at the .05 level.*

Hence, the hypothesis HT3 for significant difference based on the course of study of the PG students has been accepted for all the service quality dimensions. Thus the science and engineering students perceive service quality, more or less, in a similar manner in comparison to the management students. This study, thus in a sense, tends to agree that students are inclined to be more critical of their evaluation of service quality as they become more experienced (in the study students are PG students), as suggested by *Oldfield and Baron (2000)*. Also the findings are in close agreement to the research conducted by *O'Neill (2003),* who looked upon the time factor which influences the rating on service quality by suggesting that the expectations rise with age, which in the end affects the perceptions of the previous service.

4.1.6 Difference in the Perceived Service Quality and its Dimensions for the HEIs of Punjab on the Basis of Academic Performance of the PG Students

The data as obtained from the survey was split into four groups on the basis of the academic performance of the PG students, as shown in Table 4.2. ANOVA was carried out to find out the effect on various dimensions of service quality as perceived by PG students belonging to different groups based upon their academic performance. Table 4.6(a) depicts the results of one-way ANOVA test among the differently performing groups of PG students for various service quality dimensions.

Table-4.6(a): ANOVA for the difference in the perceived service quality and its dimensions for PG students of HEIs of Punjab on the basis of academic performance

ANOVA						
Dimension	**Course of study**	**Sum of squares**	**Df**	**Mean square**	**F**	**p**
Faculty	Between groups	938.71	3	312.91	6.566	.000***
	Within groups	28404.35	596	47.66		
	Total	29343.06	599			
Facilities	Between groups	1737.82	3	579.27	5.465	.001***
	Within groups	63171.81	596	105.99		
	Total	64909.63	599			
Tangibles	Between groups	349.33	3	116.44	3.352	.019*
	Within groups	20704.64	596	34.74		
	Total	21053.97	599			
Attitude	Between groups	874.64	3	291.55	4.270	.005**
	Within groups	40689.83	596	68.27		
	Total	41564.47	599			
Reliability	Between groups	163.13	3	54.38	3.304	.020*
	Within groups	9807.56	596	16.46		
	Total	9970.69	599			
Delivery	Between groups	311.77	3	103.92	4.438	.004**
	Within groups	13955.19	596	23.42		
	Total	14266.96	599			
Service Quality	Between groups	21629.55	3	7209.85	5.864	.001***
	Within groups	732758.12	596	1229.46		
	Total	754387.67	599			

** p ≤ 0.05 level of significance; ** p ≤ 0.01 level of significance; *** p ≤ 0.001 level of significance*

Post-hoc analysis was carried out to find out the difference in perception of service quality dimensions based upon the academic performance of the students. For the purpose the students were grouped into four categories as shown in Table 4.2. The group 1 has students with marks less than 60%. The group 2 and group 3 has students with marks lying in the 60 to 75% range and 75-85% range, respectively. The groups 4 has students with marks more than 85%. Table-4.6(b) shows the results of the multiple comparisons using the post-hoc analysis.

Table-4.6(b): Post-hoc multiple comparisons for the difference in the perceived service quality dimensions for PG students on the basis of academic performance

Dependent Variable	(I) academic performance	(J) academic performance	Mean Difference (I-J)	Std. Error	Sig.
Faculty	1	2	***-1.8655****	.80097	.020
		3	***-2.4693****	.92202	.008
		4	***-4.8294****	1.10949	.000
	2	1	***1.8655****	.80097	.020
		3	-.6038	.72045	.402
		4	***-2.9639****	.94863	.002
	3	1	***2.4693****	.92202	.008
		2	.6038	.72045	.402
		4	***-2.3601****	1.05284	.025
	4	1	***4.8294****	1.10949	.000
		2	***2.9639****	.94863	.002
		3	***2.3601****	1.05284	.025
Facilities	1	2	***-2.9948****	1.19449	.012
		3	***-3.5188****	1.37502	.011
		4	***-6.5807****	1.65460	.000
	2	1	***2.9948****	1.19449	.012
		3	-.5240	1.07441	.626
		4	***-3.5859****	1.41471	.012
	3	1	***3.5188****	1.37502	.011
		2	.5240	1.07441	.626
		4	-3.0619	1.57011	.052
	4	1	***6.5807****	1.65460	.000
		2	***3.5859****	1.41471	.012
		3	3.0619	1.57011	.052
Tangibles	1	2	***-1.9469****	.68384	.005
		3	***-1.5609****	.78719	.048
		4	***-2.5794****	.94725	.007
	2	1	***1.9469****	.68384	.005
		3	.3860	.61510	.531
		4	-.6325	.80991	.435

	3	1	***1.5609****	.78719	.048
		2	-.3860	.61510	.531
		4	-1.0185	.89888	.258
	4	1	***2.5794****	.94725	.007
		2	.6325	.80991	.435
		3	1.0185	.89888	.258
Attitude	1	2	***-1.9253****	.95866	.045
		3	-1.7072	1.10354	.122
		4	***-4.7411****	1.32793	.000
	2	1	***1.9253****	.95866	.045
		3	.2181	.86229	.800
		4	***-2.8158****	1.13540	.013
	3	1	1.7072	1.10354	.122
		2	-.2181	.86229	.800
		4	***-3.0339****	1.26012	.016
	4	1	***4.7411****	1.32793	.000
		2	***2.8158****	1.13540	.013
		3	***3.0339****	1.26012	.016
Reliability	1	2	-.7460	.47065	.114
		3	-.9233	.54178	.089
		4	***-2.0344****	.65195	.002
	2	1	.7460	.47065	.114
		3	-.1773	.42334	.675
		4	***-1.2885****	.55742	.021
	3	1	.9233	.54178	.089
		2	.1773	.42334	.675
		4	-1.1112	.61866	.073
	4	1	***2.0344****	.65195	.002
		2	***1.2885****	.55742	.021
		3	1.1112	.61866	.073
Delivery	1	2	-.8041	.56142	.153
		3	***-1.4791****	.64627	.022
		4	***-2.6397****	.77768	.001
	2	1	.8041	.56142	.153
		3	-.6751	.50498	.182
		4	***-1.8356****	.66492	.006
	3	1	***1.4791****	.64627	.022

		2	.6751	.50498	.182
		4	-1.1605	.73797	.116
	4	1	***2.6397****	.77768	.001
		2	***1.8356****	.66492	.006
		3	1.1605	.73797	.116
Grand total	1	2	***-10.2826****	4.06820	.012
		3	***-11.6586****	4.68302	.013
		4	***-23.4047****	5.63523	.000
	2	1	***10.2826****	4.06820	.012
		3	-1.3760	3.65923	.707
		4	***-13.1221****	4.81820	.007
	3	1	***11.6586****	4.68302	.013
		2	1.3760	3.65923	.707
		4	***-11.7461****	5.34748	.028
	4	1	***23.4047****	5.63523	.000
		2	***13.1221****	4.81820	.007
		3	***11.7461****	5.34748	.028

Based on observed means.
The error term is Mean Square(Error) = 1229.460.
** The mean difference is significant at the .05 level.*

It can be observed from the Table-4.6(b) that there is a significant difference in the 'faculty' dimension of service quality as perceived by students of group 1 and 2, and similarly a significant difference is perception is observed for the students of group 1 and 3, and groups 1 and 4. However, there is no significant difference in the perception of the students belonging to groups 2 and 3. This means that the perception of the students of group 1(marks less than 60%) is different from all the other students, and similarly the perception of the students of group 4(marks more than 85%) is also different from the other students. However, the students with marks lying in the range 60 to 75% and 75 to 85% perceive the 'faculty' dimension of service quality share similar perception.

A very similar trend to that of the perception of 'faculty' dimension, is also observed for the two other dimensions viz. 'facilities' and 'tangibles' dimensions of service quality. On observing the

post-hoc results for the 'attitude', it is seen that there is a significant difference in the perception of the students belonging to groups 1 and 2, group 1 and 4, group 2 and 4, and groups 3 and 4. It is only for the groups 1 and 3, and groups 2 and 3, thus they tend to perceive the 'attitude' dimension in a similar manner. In general it can be said that most of the students, irrespective of their academic performance have different views with regards to the 'attitude' dimension of service quality. For the 'reliability' and 'delivery' dimension of service quality it is observed that there is a significant difference in the perception for group 1 and 4 and group 2 and 4. This indicates, as earlier observed, that the students of group 1 and group 4 tend to perceive the service quality dimensions very differently, whereas, on comparative basis, it can be said that the students of groups 2 and 3 more or less think alike. Thus, it can be concluded that the students with very less marks and very high marks tend to perceive service quality very differently from the students who have average or above average academic performance, who more or less perceive the service quality dimensions in a very similar manner.

Hence, the hypothesis HT4 for significant difference based on the academic performance of the PG students is accepted for all the service quality dimensions.

4.1.7 Summary of Analysis of Demographic Factors

The results highlighted a significant difference in the perception of service quality and its dimensions, for the higher educational institutes of Punjab, for most of the demographic and educational factors envisaged in the study. The perception of the male and female students varied significantly for the faculty and reliability dimensions of service quality, which also meant that the service quality perception on the basis of gender for the other four dimensions of facilities, tangibles, attitude and delivery was indistinguishable. As opposed to the gender, there was no significant difference in the perceived service quality dimensions on the basis of the age of students.

On observing the educational factors it can be concluded that there was a significant difference in the perception of all the service quality dimensions on the basis of course of study, as well as the academic performance of the PG students. It is concluded that the science and engineering students perceive service quality, more or less, in a similar manner and differently from the management students. This is evident also as the students in engineering and science streams have different way of analysing things as compared to the management students. On the basis of the academic performance of the students, it is also be inferred that the students with below average performance and those on the other extreme, with exceptional performance, tend to perceive service quality very differently, whereas, the PG students who have average or above average academic performance, more or less perceive the service quality dimensions in a very similar manner.

Thus, on the basis of this study it can be concluded that the service quality is indeed a very important component of the higher educational institutions. The findings reinforce the fact that HEIs need to place emphasis on all the dimensions of service quality and take into account, more importantly the gender aspect of the demographic factor while maintaining adequate standards of service. Similarly, the service to be offered to the engineering, management and science students has to be outlined differently. Also the HEIs must look into providing different services to the students with outstanding academic performance and to those who are relatively average in their studies. The management of these institutes must periodically assess and monitor the service quality in their institutions and recognize its importance in development and maintenance of their relationship with their students.

4.2 FACTOR ANALYSIS

In this section of the chapter it is intended to measure the service quality of three universities of the state of Punjab in India as perceived by the students through factor analysis**.** Empirical

researches take the help of wide range of statistical tools for data analysis to establish the theory or add more knowledge to the theory. In this study various statistical procedures were applied along with a careful research methodology.

The first and most important step in data analysis was to examine the quality of the data that would fit to the statistical procedure planned to analyze the data. Then the service quality dimensions were extracted using Exploratory Factor Analysis (EFA) technique. Once the factors were extracted, these were named based on the underlying theme of factors. The reliability of these factors was established using Cronbach's alpha, which is a measure of internal consistency of measurement variables. The Confirmatory Factor Analysis technique was used to purify the scale further. The 'goodness of fit' statistics of confirmatory factor analysis was examined. Composite reliability and composite validity was examined for each factor or dimension of service quality. Mean scores of three universities under study on the established factors of service quality were compared using ANOVA, which established the status of three universities on dimensions of service quality as perceived by the students.

4.2.1 Examination of Quality of Data

In this section the procedure adopted to examine the quality of data is discussed. The following three steps were used for the said purpose –

- Identification of missing values and missing values imputation
- Identification of outliers
- Assessing the normality of the data

4.2.1.1 Identification of missing values and missing values imputation

Missing values are the responses on which respondents fail to provide information because of what so ever reason. These missing values are not desirable. A total of 600 questionnaires were analyzed case wise and variable wise for missing values and 2 questionnaires were rejected

because the missing values reported for two cases were more than 10%. According to *Hair (2010),* the questionnaire with missing values more than 10% should not be used for analysis. Besides this, there were 6 questionnaires, where the reported missing values were below 0.5%. The missing values were replaced with the median. Therefore, the usable questionnaires were reduced to 598.

4.2.1.2 Identification of Outliers

Outliers are the cases whose scores are substantially different from those of the other respondents in the data. Outliers may be univariate and multivariate. A univariate outlier has extreme score on one variable whereas a multivariate outlier has extreme scores on two or more than two variables (*Rex Kline, 2005*). There are various methods of testing the univariate outliers. The SPSS software provides outputs in the form of box and whisper plot. Although the Box and Whisper plot showed few outliers, but careful examination of these outliers concluded that the values of variables were well within the permissible limit. The measurements are on scale of 1 to 5 and any discrete value, lying between 1 and 5, is acceptable and not concluded as outliers. Finally, no univariate outliers were identified.

As such, there is no direct way of examining multivariate outliers in SPSS. But multivariate outliers were examined using Mahalanobis distance in regression (subsequently discussed in succeeding section). Mahalanobis distances were found to be statistically non-significant (p>0.001).

Also, influential cases were examined using Df Beta statistics in regression.

$$DfBeta = {}^{2}/_{\sqrt{N}}$$

N=598 implies that the value of

$$DfBeta = {}^{2}/_{\sqrt{598}} = 0.082$$

This value indicates that the cases with Df Beta value greater than 0.082 are to be considered as influential cases. No influential case was identified as the values of Df Beta for all cases were below the test statistics of 0.082.

4.2.1.3 Analysis of Normality

Many statistical tests require that the data should meet the assumption of normality. In case of multivariate test, the assumption of multivariate normality should be met, which means that the combination of more than two variables should follow a normal distribution. The univariate normality of each variable can easily be tested individually, whereas, the multivariate normality cannot be directly measured using SPSS. Multivariate normality was measured using AMOS when CFA was applied.

To measure the univariate normality, descriptive statistics of each variable was performed using SPSS22. The skewness and kurtosis are the measures of normality. It is suggested that skewness should be less than 2.2 and Kurtosis should be less than 7, beyond which it may adversely affect the normality. The skewness of variables was less than 2 and kurtosis was less than 3. [***See Appendix – II]***

Multivariate normality is tested using AMOS in CFA. It gives the Mardia's coefficient which is a measure of multivariate normality. The upper limit of the Mardia's coefficient is 5 beyond which it may adversely affect the model (*Byrne, 2010*).

4.2.2 Exploration and Analysis of Service Quality Dimensions

Perceived service quality is a multi-dimensional construct, but the major point of concern is with regards to the number of dimensions service quality should be comprised of (*Dabholkar et al 2000;, Ladhari 2009*). The number of sub-constructs, the perceived service quality has, depends upon the work settings or domain of research. The following section is divided into two parts. In the first part, perceived service quality dimensions are extracted using Exploratory Factor Analysis

and in the second step the existence of service quality dimensions is confirmed through confirmatory factor analysis using ***AMOS22 software***.

4.2.2.1 Exploratory Factor Analysis (EFA)

EFA is a multivariate statistical technique, which is based on interdependence of variables. The primary purpose of factor analysis was to define the underlying structure among the variables in the analysis (*Hair et al, 2010*). In multivariate statistical analysis, large numbers of variables are used at one time for analysis. Factor analysis groups the highly correlated variables, which is called a factor. A factor contains highly correlated variables that are assumed to represent a dimension within the data (*Hair et al 2010*). These dimensions or factors may actually have a meaning, which is not adequately defined by a single variable/statement.

To identify the dimensions of perceived service quality, an instrument containing 55 statements that were modified to fit the need of the present research, was developed. These 55 statements are shown in Table 4.7. Factor analysis was then used to identify the underlying dimensions or structure of relationship among the variables. These dimensions were nothing but a composite of specific variables, which allowed dimension to be interpreted and described.

The software used to perform factor analysis is SPSS V22. The method of factor extraction used is Maximum Likelihood Estimation (MLE) with Promax rotation. The advantage of MLE technique over the other methods of factor extraction is manifold. It provides the index of goodness of fit, which can be directly used to assess the quality of the model, and it has direct compatibility with confirmatory factor analysis, which is the next step in scale purification. In confirmatory factor analysis, the default factors extraction technique is maximum likelihood estimation. Promax is a type of oblique rotation in which factors are allowed to correlate.

Table 4.7: Modified Service Quality Instrument to measure the perceived quality dimensions

CODES	DIMENSIONAL ITEMS
V1	University faculty shows interest to solve students' problems
V2	University faculty is well qualified and knowledgeable
V3	University faculty gives confidence and motivation to students.
V4	The faculty provides correct answers to students' questions.
V5	Faculty is never too busy to attend to students' problems and is available beyond office timings i.e. easily accessible.
V6	University faculty inculcates interest in the subject among students.
V7	The faculty is immaculately dressed befitting their status.
V8	The faculty provides prompt and timely service to you
V9	Faculty communicates in a language that you understand.
V10	Examination papers are evaluated without bias and in time
V11	The university library is easily accessible to students
V12	The university library is modern and well stocked with access to print and e – journals
V13	University Hostels are comfortable to stay in with modern and appealing facilities
V14	Food/Beverages served in Hostels are as per students liking
V15	University hostels have internet connectivity and other facilities like Gymnasium, common room etc.
V16	The university has a proper arrangement to give medical aid to students in emergency
V17	University canteens are hygienic and have a wide range of servings of food and beverages.
V18	University genuinely helps students in placements and has a dedicated placement cell.
V19	University arranges recreational activities (Co and extra-curricular) for students around the year
V20	University arranges sports activities for students around the year
V21	The university has sufficient transportation facilities
V22	Accurate and secure student records are maintained
V23	Specific opportunities and support for you to attain your personal goals are provided in the form of finishing schools etc.
V24	Complete and accurate information is provided to you in good time.

CODES	DIMENSIONAL ITEMS
V25	The university has a student counselling cell to cater to the needs of weak students
V26	The university has excellent infrastructure like buildings, roads etc.
V27	The university has excellent infrastructure for sports and games
V28	The university has excellent infrastructure for organizing cultural and technical festivals
V29	University classrooms are well lit and are modern with appealing fixtures
V30	University classrooms are well equipped with projection systems
V31	University laboratories are well lit and are modern and well equipped to handle classes
V32	The university has well equipped computer labs with requisite and licensed software
V33	A full range of up-to-date physical facilities and equipment are provided in the laboratories
V34	University academic staff is easily available to students for guidance
V35	The administrative staff is courteous to students and willing to solve their problems
V36	The university maintains cleanliness at the campus
V37	Teachers and students communicate well in the classroom
V38	Your complaints are constructively handled
V39	A flexible service is provided to meet your individual needs.
V40	Faculty/Staff reassures you in terms of your personal anxieties, concerns and problems.
V41	Staff are sympathetic to your individual needs, while respecting your privacy
V42	You feel safe under the care of the staff
V43	Staff respect your confidences and feelings
V44	The behavior of the staff makes you feel that you can trust them and have confidence in them.
V45	The teaching and learning process is up-to-date as promised by the university
V46	Students feel safe and secure in the university
V47	University curriculum is need based and useful for future job
V48	The behavior of the staff makes you feel that you can trust them and have confidence in them
V49	University shows interest in solving problems
V50	The required level of service is delivered, with clearly stated terms and conditions
V51	The full range of services is delivered to meet your changing needs.

CODES	DIMENSIONAL ITEMS
V52	Appropriate services are delivered as promised
V53	A dependable service which does not vary over time is provided
V54	An equitable service is delivered to individual students, as well as groups of students
V55	The interpersonal skills are adequately addressed in the curriculum

a) Discussion of EFA results

The Table 4.8 exhibits the results of Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and Barlett's test of Sphericity. KMO test gives a measure of sample size adequacy i.e. whether the sample size is large enough to apply factor analysis. Although in the study, sample size of 598 is used, which is fairly large, but it was still good to test it statistically. The value of KMO test statistics, as derived, should lie in the range of 0 to 1, with a desirable value of the test greater than 0.50. Higher the values better the results. As shown in the Table 4.8, the achieved KMO test statistic value is 0.958, which is meritorious (*Andy Field, 2009*).

Bartlett's test of Sphericity is statistical test for identifying the presence of correlation among the variables. A statistical significant Batrlett's test ($p<0.05$) indicated that sufficient correlation exists among the variables to proceed with factor analysis (*Hair et al, 2010*). Table 4.8 shows that Bartlett's test is highly significant at alpha level of 5% ($p<0.05$), which was a desired result.

Table 4.8: Outputs of KMO and Batrlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.958
Bartlett's Test of Sphericity	Approx. Chi-Square	5259.079
	Df	465
	Sig.	0.000

Table 4.9 shows the factors extracted and eigenvalue associated with each factor before and after rotation. It is generally said that there should be as many as eigenvectors as there are variables, therefore, there would be as many factors as variables. The eigenvalue of a factor represent the variance explained by that factor. As there were 31 factors, therefore the total variance was also 31. The initial eigenvalues explained the variance explained by four factors having eigenvalue greater than 1. The first factor with eigenvalue of 15.435 explained 49.791% of total variance (15.435/31*100). The second factor with eigenvalue of 2.035 explained 6.563% variance, whereas, the third factor with an eigenvalue of 1.608 explained 5.188% variance. The fourth variable with an eigenvalue of 1.252 explained only 4.038% variance. In total four factors, with eigenvalues greater than 1, were extracted and these four factors explained 65.58% variance. The column named as *Extraction Sum of Squared Loadings* represent the variance extracted. Since the factors are correlated, the extraction sums of squared loadings were less than the initial eigenvalues. The four factors extracted explained 60.702% of total variance in the data, which was sufficient variance as retained in the factor analysis. *Rotated sum of squared loading* represent the variance explained after factor rotation. In case the factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Communality is the total amount of variance an original variable shares with all other variables included in the analysis. The *Initial* is the variance in a variable at the beginning and *Extraction* is the amount of variation retained out of total variance. *Extraction* is always less than the *Initial* variance because during the process of dimension reduction, certain loss of information is there. From the Table 4.10, we can infer that 70.6% of variance associated with variable V42 is common or shared variance, or 70.6% of variance associated with V42 is explained by the underlying factors. The amount of variance in each variable that can be explained by the retained factors is represented by the communalities after extraction (*Andy Field, 2009*).

Table 4.9: Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	**15.435**	**49.791**	**49.791**	**15.033**	**48.495**	**48.495**	**13.771**
2	**2.035**	**6.563**	**56.354**	**1.614**	**5.206**	**53.701**	**10.159**
3	**1.608**	**5.188**	**61.542**	**1.277**	**4.120**	**57.821**	**11.936**
4	**1.252**	**4.038**	**65.580**	**0.893**	**2.881**	**60.702**	**7.452**
5	0.852	2.748	68.328				
6	0.718	2.316	70.644				
7	0.701	2.260	72.905				
8	0.653	2.107	75.011				
9	0.596	1.924	76.935				
10	0.555	1.790	78.725				
11	0.546	1.760	80.485				
12	0.491	1.583	82.068				
13	0.467	1.507	83.575				
14	0.447	1.443	85.017				
15	0.431	1.391	86.409				
16	0.424	1.369	87.777				
17	0.376	1.213	88.990				
18	0.369	1.189	90.179				
19	0.317	1.023	91.202				
20	0.301	.971	92.173				
21	0.287	.925	93.098				
22	0.279	.900	93.998				
23	0.259	.835	94.834				
24	0.250	.807	95.640				
25	0.244	.787	96.427				
26	0.229	.740	97.168				
27	0.206	.664	97.831				
28	0.194	.626	98.457				
29	0.178	.573	99.030				
30	0.164	.530	99.560				
31	0.137	.440	100.000				

Extraction Method: Maximum Likelihood.

a. *When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.*

Also, it can be seen that the lowest communality is 0.337 of variable V10 that is towards the lower side. The mean or average variance explained or communality of all 31 variables is 0.61, which is on the higher side.

Table 4.10: Communalities

Statement	Initial	Extraction
Attitude9 (V42) You feel safe under the care of the staff	.716	.706
Attitude10 (V43) Staff respect your confidence and feelings	.742	.732
Attitude11 (V44) The behavior of staff makes you feel that you can trust them and have confidence in them.	.716	.706
Attitude4 (V37) Teachers and students communicate well in classroom	.602	.580
Attitude6 (V39) A flexible service is provided to meet your individual needs.	.718	.648
Attitude7 (V40) Faculty/Staff reassure you in terms of your personal anxieties, concerns and problems.	.682	.607
Attitude8 (V41) Staff are sympathetic to your individual needs, while respecting your privacy	.718	.625
Faculty1 (V1) University faculty shows interest to solve students problems	.567	.500
Faculty3 (V3) University faculty gives confidence and motivation to students.	.601	.525
Faculty4 (V4) Faculty provides correct answers to student's questions.	.625	.556
Faculty5 (V5) Faculty is never too busy to attend to student's problems and is available beyond office timings i.e. easily accessible.	.503	.477
Faculty8 (V8) Faculty provide prompt and timely service to you	.598	.543
Faculty9 (V9) Faculty communicates in a language that you understand.	.568	.550
Faculty10 (V10) Examination papers are evaluated without bias and in time	.435	.337
Reliability4 (V48) The behavior of staff makes you feel that you can trust them and have confidence in them	.702	.678
Tangible1 (V26) University has excellent infrastructure like buildings roads etc.	.602	.647
Tangible2 (V27) University has excellent infrastructure for sports and games	.625	.593
Tangible3 (V28) University has excellent infrastructure for organizing cultural and technical festivals	.664	.673

Tangible4 (V29) University class rooms are well lit and are modern with appealing fixtures	.559	.523
Tangible5 (V30) University Class rooms are well equipped with projection systems	.592	.511
Tangible6 (V31) University laboratories are well lit and are modern and well equipped to handle classes	.594	.504
Attitude3 (V36) University maintains cleanliness at the campus	.564	.513
Delivery1 (V50) The required level of service is delivered, with clearly stated terms and conditions	.746	.696
Delivery2 (V51) The full range of services is delivered to meet your changing needs.	.730	.683
Delivery3 (V52) Appropriate services are delivered as promised	.692	.679
Delivery4 (V53) A dependable service which does not vary over time is provided	.666	.712
Delivery5 (V54) An equitable service is delivered to individual students, as well as groups of students	.665	.659
Delivery6 (V55) The interpersonal skills are adequately addressed in the curriculum	.642	.661
Facility3 (V13) University Hostels are comfortable to stay in with modern and appealing facilities	.594	.629
Facility4 (V14) Food/Beverages served in Hostels are as per students liking	.650	.750
Facility5 (V15) University hostels have internet connectivity and other facilities like Gymnasium, common room etc.	.602	.615
Average		**0.61**
Extraction Method: Maximum Likelihood.		

The Table 4.11 represents the results of Goodness of fit of model or quality of factors extracted. This is the test statistics produced with Maximum Likelihood Estimation extraction criterion. The recommended value of CMIN/df is below 3 (*Byrne, 2010*). The CMIN/df statistics obtained is 1.59, which is very good and indicates that the factors extracted were very good in quality.

Table 4.11: Goodness of fit test

Chi-Square	df	Sig.	CMIN/Df	Remarks
552.260	347	.000	1.59	Excellent

Table 4.12 shows the pattern matrix of extracted factors. This matrix is obtained after the factors are extracted and rotated. Promax rotation method was used which is a kind of oblique rotation. The pattern matrix shows the factors extracted and the factor loading each variable has on the factor it belongs to. As it can be seen from the pattern matrix table a total of four factors were extracted. The strength of relationship between a factor and its variables is measured by factor loading. The factor loadings are the linear weights, which represent the relative importance of the variable to a factor. Factor loadings below 0.40 were suppressed, as these are not considered to be significant. The first factor had fifteen variables loading on to it. This means, first factor was measured using fifteen indicator variables and each variable measured significant portion of this factor, or in other words it may be understood as fifteen variables correlated significantly with factor1. The highest factor loading of 0.998 was shown by attitude11 V44 variable. The second highest loading of 0.875 was shown by variable attitude9 V42, whereas, the lowest factor loading of 0.474 was shown by attitude7 V40. The second factor had seven variables loading on it and highest and lowest factor loadings were 0.891 and 0.445 as shown by V26 and V31, respectively. Third factor had highest and lowest factor loadings of 0.863 and 0.445 respectively and has six variables loaded on to it. Three variables loaded on to factor four with highest and lowest factor loadings of 0.882 and 0.752, respectively.

The Table 4.13 exhibits the factor correlation matrix, which presents the correlation between the factors extracted. It can be observed from the table that the correlation between factor 1 and factor 2 is 0.673 and that between factor 1 and factor 3 is 0.765, whereas, the correlation between

the factor 1 and factor 4 is 0.573. The correlation value above 0.70 is considered to be a higher level of correlation between the factors and it indicates second order factor analysis. Second order factor analysis means, factor1 and factor3 are sub-constructs of larger constructs. All other correlations were found to be below 0.7.

Table 4.12: Pattern Matrix

Pattern Matrix[a]				
	Factor			
	1	2	3	4
Cronbach's Alpha	**0.95**	**0.888**	**0.925**	**0.841**
Attitude11 V44 The behavior of staff makes you feel that you can trust them and have confidence in them.	.998			
Attitude9 V42 You feel safe under the care of the staff	.875			
Attitude10 V43 Staff respect your confidences and feelings	.865			
Faculty1 V1 University faculty shows interest to solve students problems	.678			
Attitude4 V37 Teachers and students communicate well in classroom	.667			
Faculty5 V5 Faculty is never too busy to attend to student's problems and is available beyond office timings i.e. easily accessible.	.649			
Faculty4V4 Faculty provides correct answers to student's questions.	.644			
Faculty8 V8 Faculty provide prompt and timely service to you	.625			
Faculty10 V10 Examination papers are evaluated without bias and in time	.621			
Faculty9 V9 Faculty communicates in a language that you understand.	.605			
Reliability4 V48 The behavior of staff makes you feel that you can trust them and have confidence in them	.602			
Faculty3 V3 University faculty gives confidence and motivation to students.	.600			
Attitude8 V41 Staff are sympathetic to your individual needs, while respecting your privacy	.569			
Attitude6 V39 A flexible service is provided to meet your individual needs.	.556			
Attitude7 V40 Faculty/Staff reassure you in terms of your personal anxieties, concerns and problems.	.474			

Total Eigen Value	**15.44**			
Percentage of variance explained	**49.80**			
Tangible1 V26 University has excellent infrastructure like buildings roads etc.		.891		
Tangible3 V28 University has excellent infrastructure for organizing cultural and technical festivals		.865		
Tangible2 V27 University has excellent infrastructure for sports and games		.785		
Tangible4 V29 University class rooms are well lit and are modern with appealing fixtures		.592		
Attitude3 V36 University maintains cleanliness at the campus		.575		
Tangible5 v30 University Class rooms are well equipped with projection systems		.565		
Tangible6 V31 University laboratories are well lit and are modern and well equipped to handle classes		.445		
Total Eigen Value		**2.04**		
Percentage of variance explained		**6.56**		
Delivery4 V53 A dependable service which does not vary over time is provided			.863	
Delivery5 V54 An equitable service is delivered to individual students, as well as groups of students			.837	
Delivery3 V52 Appropriate services are delivered as promised			.735	
Delivery6 V55 The interpersonal skills are adequately addressed in the curriculum			.729	
Delivery2 V51 The full range of services is delivered to meet your changing needs.			.514	
Delivery1 V50 The required level of service is delivered, with clearly stated terms and conditions			.454	
Total Eigen Value			**1.61**	
Percentage of variance explained			**5.19**	
Facility4 V14 Food/Beverages served in Hostels are as per students liking				.882
Facilty3 V13 University Hostels are comfortable to stay in with modern and appealing facilities				.788
Facilty5 V15 University hostels have internet connectivity and other facilities like Gymnasium, common room etc.				.751
Total Eigen Value				**1.25**
Percentage of variance explained				**4.04**

Table 4.13: Factor Correlation Matrix

Factor	1	2	3	4
1	1.000	.673	.765	.573
2	.673	1.000	.609	.428
3	.765	.609	1.000	.592
4	.573	.428	.592	1.000
Extraction Method: Maximum Likelihood. *Rotation Method: Promax with Kaiser Normalization*.				

b) Identification of the extracted factors

The Table 4.14 exhibits the description of items loading on to factor1. Item number V1, V3, V4, V5, V8, V9, and V10 describes the personality and behaviour related aspects of faculty or how fairly the faculty members dealt with students. V37, V39, V40, V41, V42, V43, V44, and V48 describe the attitude of faculty towards students. Therefore, the first factor consisting of the above extracts describe the behavioral and attitudinal aspects of faculty towards their students. Also, the surrogate variables with highest loadings showed the attitudinal aspect of faculty, thus the factor is named as *ATTITUDE AND BEHAVIOUR OF FACULTY.*

Table 4.14: Description of items loading on to factor1

CODE	**FACTOR-1**	**Factor Loading**
V1	University faculty shows interest to solve students' problems	0.678
V3	University faculty gives confidence and motivation to students.	0.600
V4	The faculty provides correct answers to students' questions.	0.644
V5	Faculty is never too busy to attend to students' problems and is available beyond office timings i.e. easily accessible.	0.649
V8	The faculty provides prompt and timely service to you	0.625
V9	Faculty communicates in a language that you understand.	0.605
V10	Examination papers are evaluated without bias and in time	0.621

CODE	FACTOR-1	Factor Loading
V37	Teachers and students communicate well in the classroom	0.667
V39	A flexible service is provided to meet your individual needs.	0.556
V40	Faculty/Staff reassures you in terms of your personal anxieties, concerns and problems.	0.474
V41	Staff are sympathetic to your individual needs, while respecting your privacy	0.569
V42	You feel safe under the care of the staff	**0.875**
V43	Staff respect your confidences and feelings	**0.865**
V44	The behavior of the staff makes you feel that you can trust them and have confidence in them.	**0.998**
V48	The behavior of the staff makes you feel that you can trust them and have confidence in them	0.602

The Table 4.15 shows the 7 items loaded on to second factor. As can be observed that V26, V27, V28, V29, V30, and V31 were directly related to the physical facility of the institutes, which included the institutional building, equipment, teaching aid material. All these aspects provided direct aid to the students' learning. V36 is related to cleanliness of the campus, which is an aspect of campus infrastructure maintenance. All these items are tangible in nature. Therefore the factor is named as *TANGIBLE*.

Table 4.15: Description of items loading on to factor2

CODES	FACTOR 2 – STATEMENT OF ITEMS	Factor Loading
V26	The university has excellent infrastructure like buildings, roads etc.	0.891
V27	The university has excellent infrastructure for sports and games	0.785
V28	The university has excellent infrastructure for organizing cultural and technical festivals	0.865
V29	University classrooms are well lit and are modern with appealing fixtures	0.592
V30	University classrooms are well equipped with projection systems	0.565
V31	University laboratories are well lit and are modern and well equipped to handle classes	0.445
V36	The university maintains cleanliness at the campus	0.575

The Table 4.16 shows the 6 items loaded on to third factor. As is obvious V50, V51, V52, V53, V54, and V55 showed the consistent delivery of service to the students. Therefore, the factor was named as *DELIVERY.*

The Table 4.17 shows the 3 items loaded on to fourth factor. V13, V14, and V15 were related to facilities offered by institutes to the students. These facilities include comfortable stay in the hostels, and other facilities provided therein. Therefore the factor is named as *FACILITY*.

Table 4.16: Description of items loading on to factor3

CODES	FACTOR 3 – STATEMENT OF ITEM	Factor Loading
V50	The required level of service is delivered, with clearly stated terms and conditions	0.454
V51	The full range of services is delivered to meet your changing needs.	0.514
V52	Appropriate services are delivered as promised	0.735
V53	A dependable service which does not vary over time is provided	0.863
V54	An equitable service is delivered to individual students, as well as groups of students	0.837
V55	The interpersonal skills are adequately addressed in the curriculum	0.729

Table 4.17: Description of items loading on to factor4

CODES	FACTOR 4 - STATEMENT OF ITEMS	Factor Loading
V13	University Hostels are comfortable to stay in with modern and appealing facilities	0.882
V14	Food/Beverages served in Hostels are as per students liking	0.788
V15	University hostels have internet connectivity and other facilities like Gymnasium, common room etc.	0.751

The Table 4.18 shows the summary of factors obtained. It added no further value to the model but just provides the structure and names to the factors extracted.

Table 4.18: Summary of factors emerged

Emerged Factor	Items retained	Name of Factor given
1 (15 items)	V44, V42, V43, V1, V37, V5, V4, V8, V10, V9, V48, V3, V41, V39, V40	**Attitude and behaviour of faculty**
2 (7 items)	V26, V28, V27, V29, V36, V30, V31	**Tangibles**
3 (6 items)	V53, V54, V52, V55, V51, V50	**Delivery**
4 (3 items)	V14, V13, V15	**Facilities**

c) Reliability Analysis:

Construct reliability is one of the most important steps in establishing the explored factors. Once the factors are extracted, the next step is to test the reliability of factors. Reliability means, a person should get same score on a questionnaire if they complete it at two different points in time (*Andy Field, 2009*).

The most common measure of reliability is Cronbach's Alpha. It measures the internal consistency of items. The recommended value of Cronbach's Alpha is 0.70. As it can be observed from Table 4.19 that the Cronbach's alpha of all of four constructs was well above the recommended value of 0.70, which indicated that the constructs are reliable. Two of the constructs i.e. *Attitude and behavior of faulty* and *Delivery* had reported alpha of 0.95 and 0.925 which were very high signifying the very high level of construct reliability. Other two constructs i.e. *Tangibles* and *Facility* also showed the alpha value of 0.888 and 0.841, respectively, which were well above 0.80. Therefore, it may be concluded that the four constructs extracted are highly reliable.

Table 4.19: Cronbach's alpha of factors extracted

Factor Label	Cronbach's Alpha	Specification of obtained construct
Attitude and behavior of faculty	0.950	Reflective
Tangibles	0.888	Reflective
Delivery	0.925	Reflective
Facilities	0.841	Reflective

Also, the constructs, which were extracted and named, are reflective in nature. A reflective construct is one in which measures represent the effects (or manifestation) of an underlying construct (*Hair et.al, 2012*). A reflective construct may be understood as one in which the relationship goes from construct to its measures, or, a construct in which measurements or indicator items are caused by the same construct. The items are highly correlated with each other and the items are interchangeable.

4.2.2.2 Confirmatory Factor Analysis (CFA) – Perceived Service Quality Dimensions

The primary objective of conducting CFA was to assess the goodness of fit of a predefined or hypothesized factor model to fit an observed set of data. In CFA, the indicator variables loading on to a particular factor are fixed in advance based on the factor analysis. It provides different parameter estimates, which are used to judge the goodness of fit of the proposed model. The parameters used to evaluate the model are as under –

- Factor loadings
- Factor variance/Square multiple correlations
- Inter construct correlations and covariance
- Indicator error variance and covariance

Before applying confirmatory factor analysis it is imperative to check that the

i) data must be free from missing values;

ii) data must not have any outliers;

iii) data should have univariate and multivariate normality; and

iv) sample size should be sufficiently large.

The ratio of the sample size (N=598) to the number of extracted variables (k=31) is approximately 19, which is sufficiently large for confirmatory factor analysis. The data was examined for all above laid down assumptions and found to be good for confirmatory factor analysis.

Confirmatory Factor Analysis (CFA) was applied using AMOS22 software, which used Maximum Likelihood Estimation (MLE) technique to estimate the parameters. MLE technique maximizes the likelihood of the parameters given in the data (*Cousineau and Helie, 2013*). It can also be implied that the MLE technique estimates parameters such that the probability of getting the observed data is maximum. MLE technique provides parameters with its standard error, which is used to calculate the critical ratio and p-value to determine the level of significance parameter.

a) Hypothesized Measurement Model

The measurement model is a visual representation that specifies the relationship between constructs and its indicator variables, and interrelationships among constructs. A total of four constructs were extracted using exploratory factor analysis, as explained in the preceding sub-section. These four constructs and its indicator variables are summarised in the Table 4.20. First construct *Attitude and Behaviour of Faculty* had 15 indicator variables, whereas, the other three constructs viz. *Tangible*, *Delivery*, and *Facilities* had 7, 6 and 3 indicator variables, respectively.

Table 4.20: Constructs and Indicator variables of hypothesized measurement model

Constructs	Indicator variables	Total Indicator variables
Attitude and behaviour of faculty	V44, V42, V43, V1, V37, V5, V4, V8, V10, V9, V48, V3, V41, V39, V40	**15 items**
Tangibles	V26, V28, V27, V29, V36, V30, V31	**7 items**
Delivery	V53, V54, V52, V55, V51, V50	**6 items**
Facilities	V14, V13, V15	**3 items**

Figure 4.1 shows the hypothesized measurement model with four constructs and 31 indicator variables. The arrows going out from construct to indicator variable depicts that the constructs are reflective in nature and indicator variables are the effect of construct. The double headed arrows connecting the constructs depict the covariance or correlation between the constructs. The reliability and validity of constructs depends upon the strength of relationship between the estimated coefficients.

The two of the constructs, obtained after EFA, i.e. *Attitude and Behavior of Faculty* and *Delivery* had reported high level of correlation between them (refer Table 4.13), which means these two constructs are sub-constructs of some higher-level constructs. The higher-level construct, which was parent construct of these two sub-constructs, is termed as the ***Service Quality Commitment (SQM)***. Subsequently in the model a second order confirmatory factor analysis with first order confirmatory factor analysis was carried out.

The Figure 4.2 shows the measurement model with estimated parameters. It can be observed that this figure shows lesser number of indicator variables as compared to those shown in the Figure 4.1.

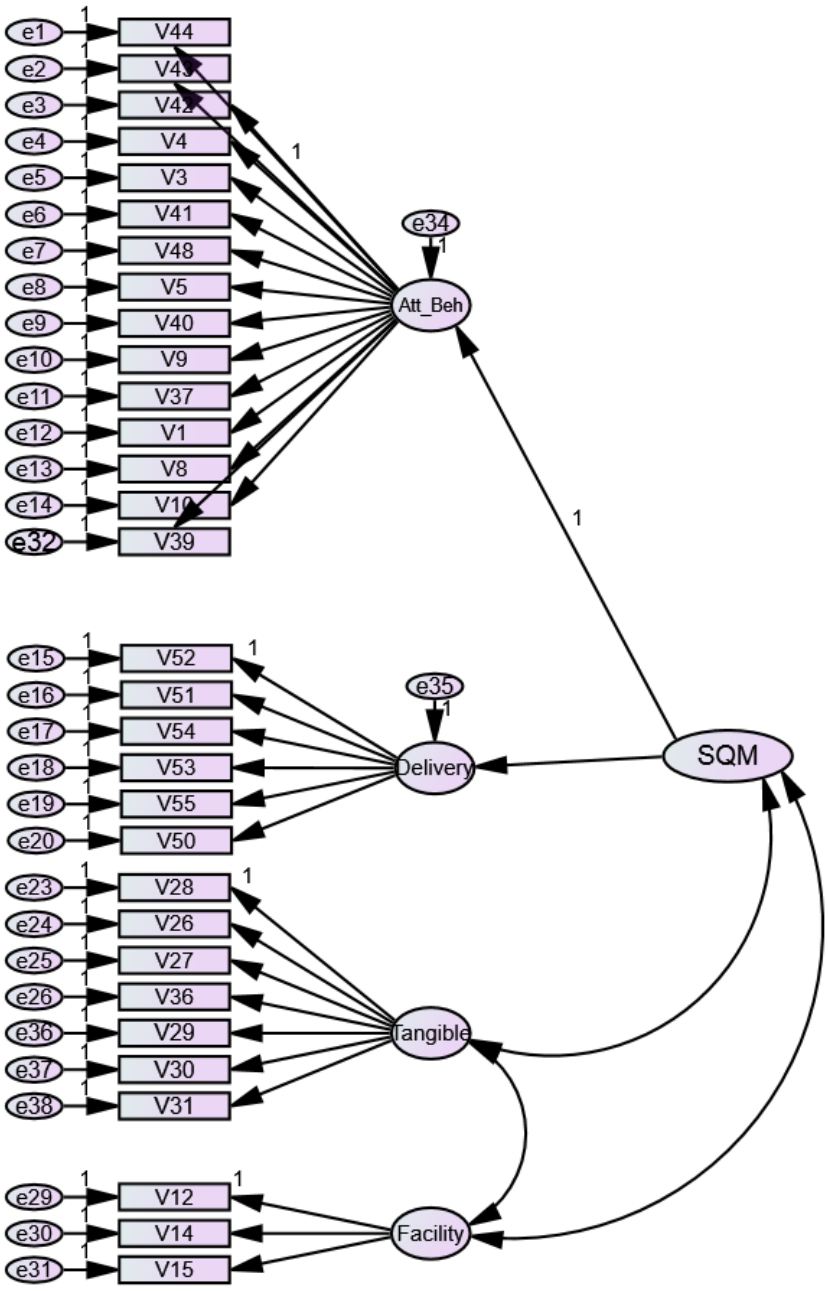


Figure 4.1: Hypothesized Measurement Model

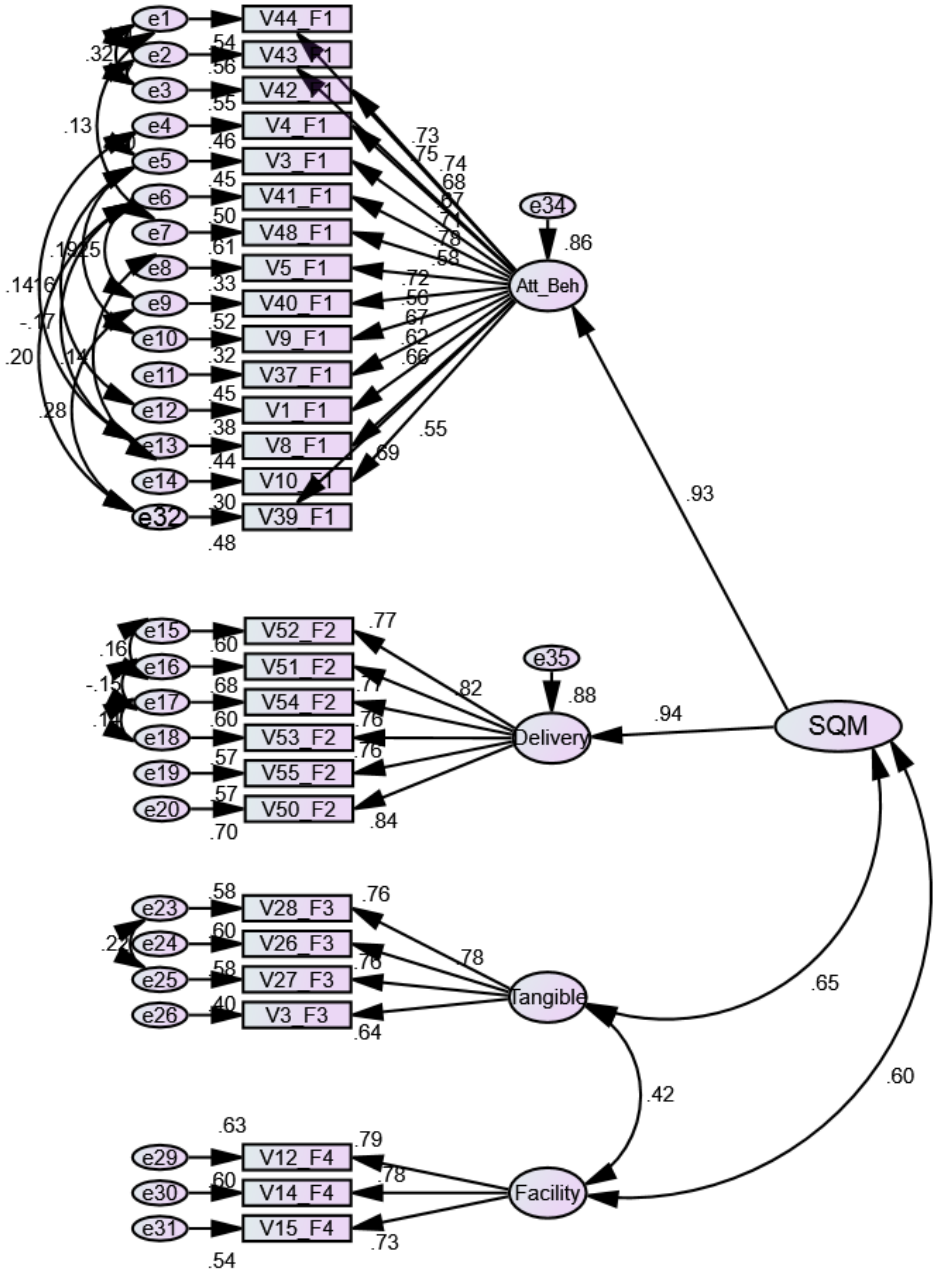


Figure 4.2: Measurement model with estimated parameters.

In the Figure 4.2 a total of 28 indicator variables are available, while in the hypothesized measurement model, there were 31 indicator variables. This loss of three variables can be attributed to the lower value of factor loadings. The *Tangible* component had 7 indicator variables in the hypothesized model from which 3 indicator variables (V29, V30, and V31) were removed due to slightly poor factor loadings. Thus, in order to improve the model fit these three indicator variables were desirable to be removed from the model. Also, modification indices were used to fit the model. Modification indices are type of model misspecification that, if estimated freely, leads to an improvement in the model.

The Table 4.21 exhibits the results of 'goodness of fit' indices. The measurement model indicated reasonable model fit with all of 'goodness of fit' statistics viz. CMIN/Df, GFI, CFI, NFI, IFI, and TLI, falling within or above the recommended limits, thereby exhibiting a reasonable model fit. RMR and RMSEA are measures of badness of fit.

Table 4.21: Goodness of fit statistics

Measure of Goodness of Fit	**Estimated Goodness of Fit measure**	**Recommended values**
CMIN/DF	2.617	< 3
RMR	0.046	< 0.05
GFI	0.901	> 0.900
CFI	0.945	> 0.900
NFI	0.915	> 0.900
IFI	0.946	> 0.900
TLI	0.937	> 0.900
RMSEA P CLOSE	0.052 0.210	< 0.08 > 0.05

The estimated parameters for badness of fit statistics were well below the recommended value. RMSEA was non-significant which means the Root Mean Squared Error was not significantly

different from zero. This is another way of assessing the model for goodness of fit. Also, all indicator variables loaded significantly on their respective constructs. The minimum standardized factor loading came out to be 0.548, which is significant at 1% level ($p \leq 0.01$).

The Table 4.22 exhibits the inter-construct covariance and correlations. The column "Estimated Covariance" is inter-construct covariance, whereas, SE is the standard error of "Estimated Covariance", and critical ratio is the ratio of estimated covariance and SE. The *P* column in the Table 4.22 tells the significance level of estimated covariance. Three stars in the P column indicate that the estimated covariance is significant at 0.01 level of significance ($p \leq 0.01$). The last column shows the estimated correlations between the constructs i.e. inter-construct correlations, which are a standardized form of covariance.

Table 4.22: Inter-construct covariance and correlations

			Estimated Covariance	S.E.	C.R.	P	Estimate Correlation
Tangible	<-->	Facility	0.262	0.035	7.433	***	0.422
Tangible	<-->	SQM	0.311	0.032	9.821	***	0.648
Facility	<-->	SQM	0.388	0.041	9.567	***	0.602

**** = Significant at 0.01 level*

Table 4.23 exhibits the unstandardized regression coefficients and their significance level. The column '*unstandardized estimates'* are the estimated regression coefficients in the unstandardized form, whereas, S.E. is the standard error of estimated unstandardized regression coefficients. C.R is critical ratio, which is defined as the ratio of estimated regression coefficients and its SE. The *P* column in the table shows the significance level of regression coefficients.

As can be observed from the Table 4.23, all of regression coefficients are significant at 0.01 level ($p \leq 0.01$).

Table 4.23: Unstandardized and Standardized Regression Coefficients

			Unstandardized Estimates	S.E.	C.R.	P	Standardized Estimates
Att_Beh	<---	SQM	1				0.926
Delivery	<---	SQM	0.97	0.064	15.266	***	0.938
V44	<---	Att_Beh	1				0.739
V43	<---	Att_Beh	0.982	0.04	24.5	***	0.748
V42	<---	Att_Beh	1.066	0.048	22.156	***	0.743
V4	<---	Att_Beh	0.839	0.051	16.464	***	0.678
V3	<---	Att_Beh	0.856	0.053	16.215	***	0.669
V41	<---	Att_Beh	0.941	0.055	17.232	***	0.710
V48	<---	Att_Beh	1.031	0.053	19.333	***	0.786
V5	<---	Att_Beh	0.801	0.057	14.089	***	0.584
V40	<---	Att_Beh	0.957	0.055	17.5	***	0.719
V9	<---	Att_Beh	0.647	0.048	13.571	***	0.564
V37	<---	Att_Beh	0.787	0.048	16.302	***	0.671
V1	<---	Att_Beh	0.836	0.056	14.847	***	0.614
V8	<---	Att_Beh	0.817	0.051	16.131	***	0.666
V10	<---	Att_Beh	0.77	0.058	13.179	***	0.548
V52	<---	Delivery	1				0.774
V51	<---	Delivery	1.113	0.047	23.55	***	0.825
V54	<---	Delivery	1.009	0.051	19.724	***	0.775
V53	<---	Delivery	0.952	0.049	19.24	***	0.755
V55	<---	Delivery	1.032	0.053	19.391	***	0.757
V50	<---	Delivery	1.114	0.051	21.917	***	0.838
V28	<---	Tangible	1				0.760
V26	<---	Tangible	1.141	0.072	15.944	***	0.776
V27	<---	Tangible	1.126	0.057	19.763	***	0.765
V36	<---	Tangible	0.866	0.063	13.8	***	0.635
V13	<---	Facility	1				0.794
V14	<---	Facility	1.002	0.058	17.254	***	0.776
V15	<---	Facility	0.94	0.057	16.587	***	0.732
V39	<---	Att_Beh	0.9	0.053	16.859	***	0.694

**** = Significant at 0.01 level*

Column Standardized estimates exhibits the standardized regression coefficients estimated in the model. It can also be seen that even the lowest standardized regression coefficient, which is reported as 0.548, is also significant at 0.01 alpha level ($p \leq 0.01$).

b) *Reliability and validity of constructs*:

i) Construct validity is the extent to which a set of measured variables actually represents the theoretical latent construct they are designed to measure.

Construct validity is supported when a construct established convergent and discriminant validity, or in other words, the construct validity is a combination of convergent and discriminant validity. The Cronbach's alpha values of constructs after confirmatory factor analysis are shown in Table 4.24. As it can be seen from the Table 4.24, all of the values of Cronbach's alpha were well above 0.80 levels, which are well acceptable and support that the constructs are truly reliable.

Table 4.24: Cronbach's Alpha of Constructs after model fitting

Factor Label	**Cronbach's Alpha** *Recommended value > 0.70*	**Number of Items**
Attitude and behavior of faculty	0.926	15
Tangibles	0.829	4
Delivery	0.909	6
Facilities	0.810	3

The Table 4.25 shows the composite reliability of constructs. Composite reliability (CR) is a measure of reliability and internal consistency based on the square of the total of factor loadings for a construct. It is a superior measure to examine the reliability of constructs.

Table 4.25: Reliability and Validity Statistics

	CR	AVE	ASV
Facility	0.811	0.589	0.270
Tangible	0.825	0.542	0.299
SQM	0.930	0.869	0.391

The recommended value of composite reliability is above 0.70 (*Fornell and Larcker, 1981*). *SQM* is observed to be a second order construct and had composite reliability (CR) of 0.930 (which is much larger than the recommended limit of 0.70), which established the reliability of construct. The CR of other two constructs i.e. *Facility* and *Tangible* was also greater than 0.80, which are sufficiently large to establish the reliability of constructs.

ii) Convergent Validity means measures or indicator variables of constructs that are hypothesized (theoretically assumed to be related to each other) are related to each other. Convergent validity is extent to which indicator variables of a specific construct 'converge' or share a high proportion of variance in common. Convergent validity is assessed through examining the standardized factor loadings and average variance extracted (AVE). From the Table 4.23 it can be seen than the standardized factor loadings are significant at 0.01 level ($p \leq .01$). All of the indicator variables had significant loadings on their respective construct ($p \leq .01$) and minimum and maximum observed loadings were 0.548 and 0.938, respectively. This supports the convergent validity of constructs. The average variance extracted (AVE) is a summary measure of convergence among a set of items representing a construct. It is the average percent of variation explained among the items. The support to the assumption of convergent validity is given by average variance extracted (AVE). The average variance extracted is the variance retained or explained in a construct by the corresponding indicator variables. The recommended value of AVE is 0.50 (*Fornell and*

Larker, 1981). As can be seen from the Table 4.25, all of the constructs had AVE more than 0.50 which means their indicator variables explain more than 50% of variance in the construct which is very strong support to the convergent validity of constructs.

iii) Discriminant Validity means the measures of construct, that theoretically or hypothesized are not related to each other, are actually observed to be not related to each other. In other words, discriminant validity may be understood as the extent to which a construct is truly distinct from other constructs. According to *Fornell and Larcker (1981)*, the discriminant validity of a construct can be evaluated by comparing the inter-construct squared correlation with corresponding average variance extracted (AVE), or by comparing the inter-construct correlation with square-root of AVE (√AVE). If the square root of AVE (√AVE) is greater than the inter-construct squared correlation, then the discriminant validity is said to have been achieved. In the Table 4.26, the off diagonal values are the estimated inter-construct correlations, whereas, at the diagonals are the values of square root of AVE (√AVE).

Table 4.26: Discriminant validity statistics as per Fornell Larcker Criterion (1981)

Discriminant validity			
Construct	**Facility**	**Tangible**	**SQM**
Facility	**0.768**		
Tangible	0.422	**0.736**	
SQM	0.602	0.648	**0.932**

As can be observed from the Table 4.26, the values of square root of AVE (√AVE) were larger than the inter-construct correlations, thereby supporting the discriminant validity of constructs.

Average Shared Variance (ASV) is the average of variance a construct shared with other constructs. This value is observed to be significantly low, thereby establishing the discriminant validity.

From the above analysis, it may be concluded the four constructs of perceived service quality meet all the criterion of being true constructs of it.

4.2.3 Service Quality of Case Specific Universities

The service quality of three universities under study was studied using ANOVA. The four factors or dimensions confirmed through confirmatory factor analysis were the four parameters of comparison between the three universities, designated as GSU (Government State University), DU (Deemed University) and PSU (Private State University). To compare the service quality of three universities under study, a single score of each dimension was generated using summation of scale. Summated scale is formed by adding the responses on all the measurements of a construct and, subsequently, these mean scores of summated scores were compared using ANOVA in which summated score was used as dependent variable and universities are used as factors.

4.2.3.1 ANOVA for the First Factor 'Attitude and Behavior of Faculty'

ANOVA was used to test the following hypothesis –

a) Null hypothesis Ho(a): Three universities were not significantly different from each other on *Attitude and Behavior of faculty*.
b) Alternate hypothesis H1(a): At least one of the universities was significantly different from other universities on *Attitude and Behavior of faculty*.

Before performing ANOVA, the homogeneity of variance was tested using Levene test. A non-significant Levene statistic was desirable. Levene statistics of 0.969 with 2 and 595 degrees of freedom was found to be non-significant ($p>.05$), as desired, which fulfilled one of the desirable

conditions of performing ANOVA on the data. The Table 4.27 shows the results of ANOVA for summated scores of *Attitude and Behavior of faculty* dimension of perceived service quality. The mean scores of *GSU, PSU and DU* were found to be 49.68, 53.53 and 56.87, respectively. The '*F*' statistics is significant at alpha level of 5% ($p \leq .05$). This lead to rejection of null hypothesis and acceptance of alternate hypothesis i.e. at least one of three universities is significantly different from others on Attitude and Behavior of faculty.

Table 4.27: ANOVA statistics of Attitude and Behavior of faculty

ANOVA						
Factor: Attitude and Behavior of Faculty						
	N	*Mean*	*Standard Deviation*	*Standard Error*	*ANOVA*	
					F_stat	Sig.
GSU	198	49.68	9.429	0.670	24.703	0.00
PSU	200	53.53	10.906	0.771		
DU	200	56.87	10.203	0.721		

The Table 4.28 shows the Benferroni multiple comparisons for the three universities. Benferroni test of multiple comparisons show the pairwise comparison of three universities among themselves. Universities listed in column '*I*' was compared with universities in column '*J*'. Column, *I–J*, is the mean differences between the universities. It can be observed from the Table that all of mean differences were significant at alpha level of 5% ($p \leq .05$). This means all of three universities are significantly different from each other or three universities on *Attitude and Behavior of faculty*.

Table 4.28: Benferroni multiple comparison table for 'Attitude and Behavior of faculty'

(I) University	*(J) University*	*Mean Difference (I-J)*	*Std. Error*	*Sig.*	*95% Confidence Interval*	
					Lower Bound	Upper Bound
GSU	PSU	**-3.85***	1.02	0.001	-6.303	-1.393
	DU	**-7.18***	1.02	0.000	-9.637	-4.727
PSU	GSU	**3.85***	1.02	0.001	1.393	6.303
	DU	**-3.33***	1.02	0.003	-5.781	-0.886
DU	GSU	**7.18***	1.02	0.000	4.727	9.637
	PSU	**3.33***	1.02	0.003	0.886	5.783
**. The mean difference is significant at the 0.05 level*						

4.2.3.2 ANOVA for the Second Factor 'Delivery'

The Table 4.29 exhibits the results of ANOVA for the second dimension of service quality, which was *Delivery*.

ANOVA was used to test the following hypothesis –

a) Null hypothesis Ho(b): Three universities were not significantly different from each other on *Delivery*.
b) Alternate hypothesis H1(b): At least one of the universities was significantly different from other universities on *Delivery*.

On similar lines, as per the analysis for the first dimension, before performing ANOVA, the homogeneity of variance was tested using Levene test. A non-significant Levene statistic was desirable. The Levene statistics was observed to be 0.140, which was non-significant as desired,

indicating that the variance across the groups is homogenous, which is a desirable property for ANOVA.

Table 4.29 exhibits the results of ANOVA, from where it is observed that the means of *GSU, PSU and DU* were 19.48, 20.36 and 22.50, respectively. The *F* statistic of 22.517 is significant at 5% alpha level ($p \leq .05$), which rejected the null hypothesis Ho(b) and accepted the alternate hypothesis H1(b) i.e. at least one of the university was significantly different from other universities on the dimension of *Delivery*.

Table 4.29: ANOVA statistics of Delivery

ANOVA						
Factor: Delivery						
	N	*Mean*	*Standard Deviation*	*Standard Error*	*ANOVA*	
					F stat	Sig.
GSU	198	19.485	4.36	0.31	22.517	0.000***
PSU	200	20.366	4.77	0.34		
DU	200	22.505	4.71	0.33		

**** = Significant at 0.01 level*

The Table 4.30 shows the Benferroni multiple comparisons for the three universities. Benferroni test of multiple comparisons show the pairwise comparison of three universities among themselves. Universities listed in column *'I'* was compared with universities in column *'J'*. Column, *I – J*, is the mean differences between the universities.

Table 4.30: Benferroni multiple comparison table for 'Delivery'

(I) University	*(J) University*	*Mean Difference (I-J)*	*Std. Error*	*Sig.(p)*	*95% Confidence Interval*	
					Lower Bound	Upper Bound
GSU	PSU	-0.881	.4631	0.173	-1.993	0.231
	DU	-3.020*	.4631	**0.000*** **	-4.131	-1.908
PSU	GSU	0.881	.4631	0.173	-0.231	1.993
	DU	-2.140*	.462	**0.000*** **	-3.248	-1.030
DU	GSU	3.020*	.463	**0.000*** **	1.908	4.131
	PSU	2.140*	.462	**0.000*** **	1.030	3.248
*** p< 0.001*						

From the Table 4.30 for Benferroni test of multiple comparisons it could be made out as to which group was significantly different from other groups. As it can be seen from the Table 4.30 that the two universities, GSU and PSU are not significantly different from each other at 5% alpha level (p>.05), whereas, the DU is significantly different from both Punjabi University and LPU on the dimension of *Delivery* (p≤.05).

4.2.3.3 ANOVA for the Third Factor 'Tangible'

The Table 4.31 exhibits the results of ANOVA for the third dimension of service quality, which was *Tangible*.

The ANOVA was used to test the following hypothesis –

a) Null hypothesis Ho(c): Three universities were not significantly different from each other on *Tangible*.
b) Alternate hypothesis H1(c): At least one of the universities was significantly different from other universities on *Tangible*.

On similar lines, as per the analysis for the first two dimensions, before performing ANOVA, the homogeneity of variance was tested using Levene test. A non-significant Levene statistic was desirable. The Levene statistics was observed to be 6.153, which was significant at ($p \leq .05$). A significant Levene test indicates that the variance across the groups is not homogenous, which is not a desirable property for ANOVA. In such case, F statistics may not be a true measure to find the group differences. Thus, herein, along with F statistics, the Rubust tests of equality of means are also used.

The Table 4.31 exhibits the results of ANOVA from wherein it is observed that the means of *GSU, PSU and DU* were 14.78, 15.73 and 16.64, respectively.

Table 4.31: ANOVA statistics of Tangible

ANOVA										
Factor: Tangible										
	N	Mean	Std. Dev.	Std. Error	*ANOVA*		*Welch*		*Brown-Forsythe*	
					F_stat	Sig.	Stat.	Sig.	Stat.	Sig.
GSU	198	14.78	3.32	.236	18.97	0.000	20.56	0.000	18.95	0.000
PSU	200	15.73	3.20	.226						
DU	200	16.64	2.47	.175						

The *F* statistic of 18.97 is significant at 5% alpha level ($p \leq .05$). As we know that when Levene statistics is significant, F test is not a good measure for examining the mean differences, and then Welch and Brown Forsythe tests are required to be looked into as they are considered to be a better measure than *F* test. Both Welch and Brown-Forsythe tests were significant at alpha level of 5% ($p \leq .05$). This leads to the rejected the null hypothesis Ho(c) and acceptance of the alternate hypothesis H1(c) i.e. at least one of the university was significantly different from other universities on the third dimension ***Tangible***.

The Table 4.32 shows the Benferroni multiple comparisons for the three universities. Benferroni test of multiple comparison showed that all of mean differences are significant at alpha level of 5% (p≤.05) (refer column 5 of the Table 4.32), which means that all the three universities are significantly different from each other on the service quality dimension of *Tangible*.

Table 4.32: Benferroni test of multiple comparisons for 'Tangible'

(I) University	*(J) University*	*Mean Difference (I-J)*	*Std. Error*	*Sig.*	*95% Confidence Interval*	
					Lower Bound	Upper Bound
GSU	PSU	-0.953	.303	**.005****	-1.680	-0.226
	DU	-1.866	.303	**.000*****	-2.593	-1.139
PSU	GSU	0.953	.303	**.005****	0.226	1.680
	DU	-0.913	.302	**.008***	-1.639	-0.188
DU	GSU	1.866	.303	**.000*****	1.139	2.593
	PSU	0.913	.302	**.008****	0.188	1.639
p<.05. **p <.01;* p< .001.*						

4.2.3.4 ANOVA for the Fourth Factor 'Facility'

The results of ANOVA test for fourth dimension *Facility* are shown in the Table 4.33. The ANOVA was used to test the following hypothesis –

a) Null hypothesis Ho(d): Three universities were not significantly different from each other on *Facility*.
b) Alternate hypothesis H1(d): At least one of the universities was significantly different from other universities on *Facility*.

The homogeneity of variance was tested using Levene test. A non-significant Levene statistic was desirable. The Levene statistics was observed to be 9.237, which was significant at (p≤.05). A

significant Levene test indicates that the variance across the groups is not homogenous, which is not a desirable property for ANOVA. In such case, F statistics may not be a true measure to find the group differences. Thus, herein, along with F statistics, the Rubust tests of equality of means are also used.

Table 4.33: ANOVA statistics of Facility

ANOVA											
Factor: Tangible											
	N	Mean	Std. Dev.	Std. Error	*ANOVA*		*Welch*		*Brown-Forsythe*	
					F_stat	Sig.	Stat.	Sig.	Stat.	Sig.
GSU	198	9.26	2.65	0.19	71.00	0.000	79.57	0.000	71.01	0.000
PSU	200	8.83	3.04	0.22						
DU	200	11.80	2.33	0.16						

Table 4.33 exhibits the results of ANOVA. It is observed from the table that the means of *GSU, PSU and DU* were 9.26, 8.83 and 11.84, respectively. The *F* statistic of 71.0 is significant at 5% alpha level ($p \leq 0.05$). As we know that when Levene statistics is significant, F test is not a good measure for examining the mean differences, and then Welch and Brown Forsythe tests are required to be looked into as they are considered to be a better measure than *F* test. Both Welch and Brown-Forsythe tests were significant at alpha level of 5% ($p \leq .05$). This lead to the rejection of the null hypothesis Ho(d) and acceptance of the alternate hypothesis H1(d) i.e. at least one of the university was significantly different from other universities on facility, or in other words, the facilities offered by each of the three universities are not same.

Table 4.34 shows the results of Benferroni multiple comparisons. It can be observed from the values enumerated in the Table that GSU and PSU are not significantly different at 5% alpha level ($p > .05$), whereas, again DU is significantly different from PSU and PSU ($p \leq .05$).

Table 4.34: Benferroni test of multiple comparisons for 'Facility'

(I) University	*(J) University*	*Mean Difference (I-J)*	*Std. Error*	*Sig.*	*95% Confidence Interval*	
					Lower Bound	Upper Bound
GSU	PSU	0.425	.269	.345	-0.222	1.072
	DU	-2.538*	.269	**.000***	-3.185	-1.891
PSU	GSU	-0.425	.269	.345	-1.072	0.222
	DU	-2.963*	.269	**.000***	-3.608	-2.318
DU	GSU	2.538*	.269	**.000***	1.891	3.185
	PSU	2.963*	.269	**.000***	2.318	3.608
**. The mean difference is significant at the 0.05 level*						

4.2.4.4 Comparative Analysis of the Mean Scores

The Figure 4.3 exhibits the mean scores of three universities on four dimensions of service quality. It is obvious from chart that on all of four dimensions of perceived service quality that DU has obtained the highest scores, which clearly indicates that the DU offers better service quality as compared to the other two universities undertaken for the study purposes, viz. PSU and GSU on perceived service quality dimensions. The Deemed University (DU) is followed by the Private state university (PSU) scoring second highest scores on *Attitude and Behaviour of Faculty*, *Delivery* and *Tangibles* dimensions, however, the Government State University (GSU) has scored higher than PSU on the *Facility* dimension of service quality.

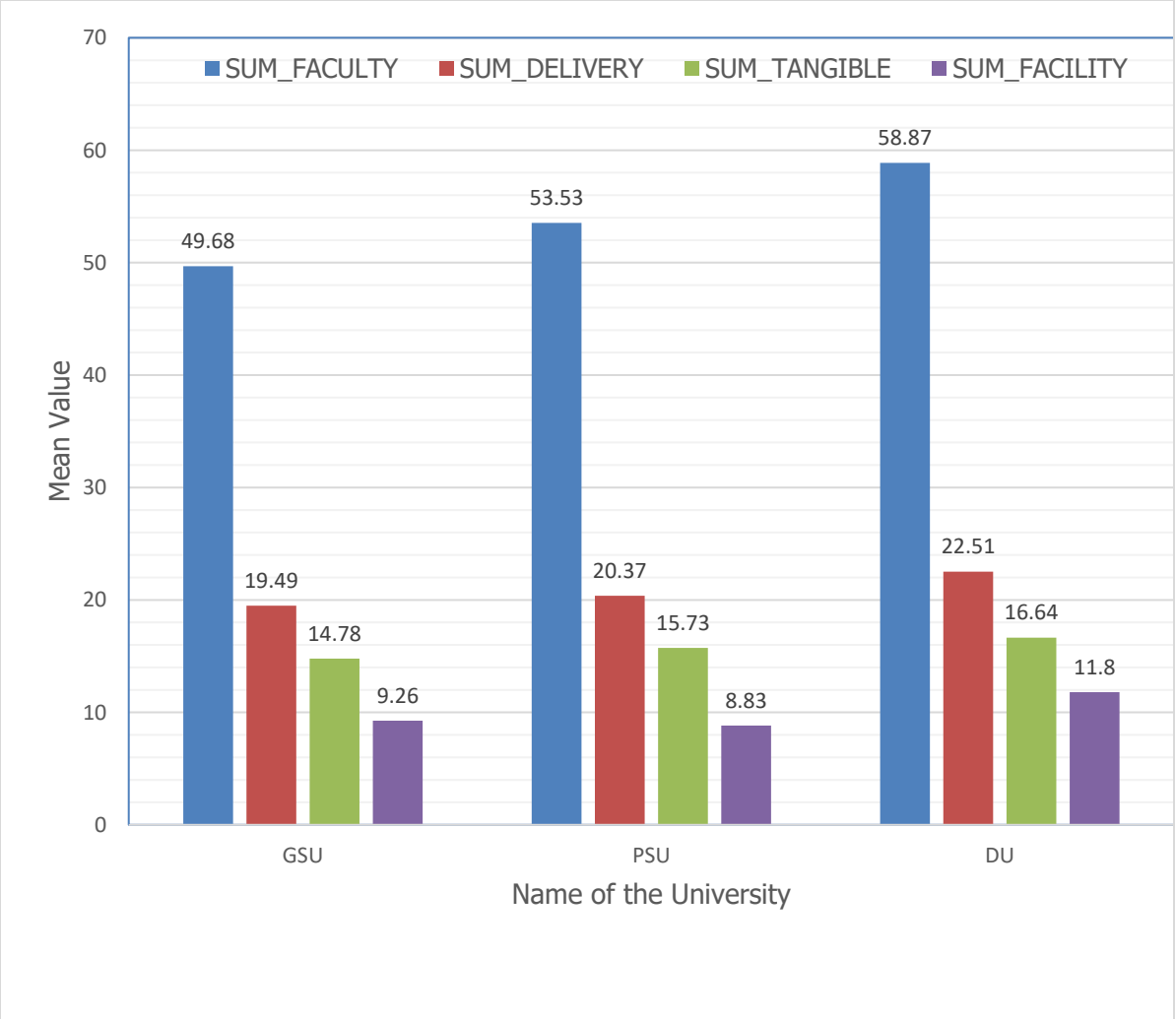


Figure 4.3: Comparative chart of universities

4.3 MODELLING AND REGRESSION

In this section, the predictors of service quality have been discovered. The three dimensions of perceived service quality were used as the predictors of service quality and *'Satisfaction'* of students was considered as dependent variable. The three dimensions of service quality confirmed using confirmatory factor analysis were *Service Quality Commitment (SQM), Tangibles* and *Facility*. *Service Quality Commitment (SQM)* is a second order construct and has two sub-constructs i.e. *Attitude and Behavior of Faculty* and *Delivery*.

'Satisfaction' of students was measured using four statements on five point *Likert scale*. The students were asked to rate their level of satisfaction on four types of services provides by their university i.e. Academic services, Academic infrastructure, Stay on campus services, and Sports and leisure services. The detailed questionnaire is provided in ***Annexure – I***

4.3.1 Structural Equation Modeling

Structural equation modeling is used to measure the effect of service quality dimensions on the level of '*Satisfaction*' of PG students. Figure 4.4 shows the full structural model, which is combination of measurement model and structural model. Three dimensions of service quality were used as the predictors of satisfaction of service quality and '*Satisfaction*' with four indicator variables was the dependent variable.

The estimation technique used is Maximum likelihood estimation. The Table 4.35 exhibits the estimated unstandardized and standardized regression coefficients. First column shows the dependent variables or endogenous variables in the model. Predictors were the exogenous or independent variables in the model. The unstandardized coefficients are the estimates of coefficients in the unstandardized form, and SE is the standard error of estimates. CR is the critical ratio, which is the ratio of unstandardized coefficients and SE which follows t-distribution, whereas, p is the significance level of coefficients estimated.

Table 4.35: Estimated un-standardized and standardized regression coefficients

Dependent Variables		Predictors	Unstandardized Estimate	S.E.	C.R.	P	Standardized Estimate
Satisfaction	<---	SQM	0.270	0.059	4.58	***	0.323
Satisfaction	<---	Tangible	0.099	0.046	2.16	0.031*	0.123
Satisfaction	<---	Facility	0.245	0.040	6.12	***	0.390

****=significant at 0.001 level; * = significant at 0.05 level.*

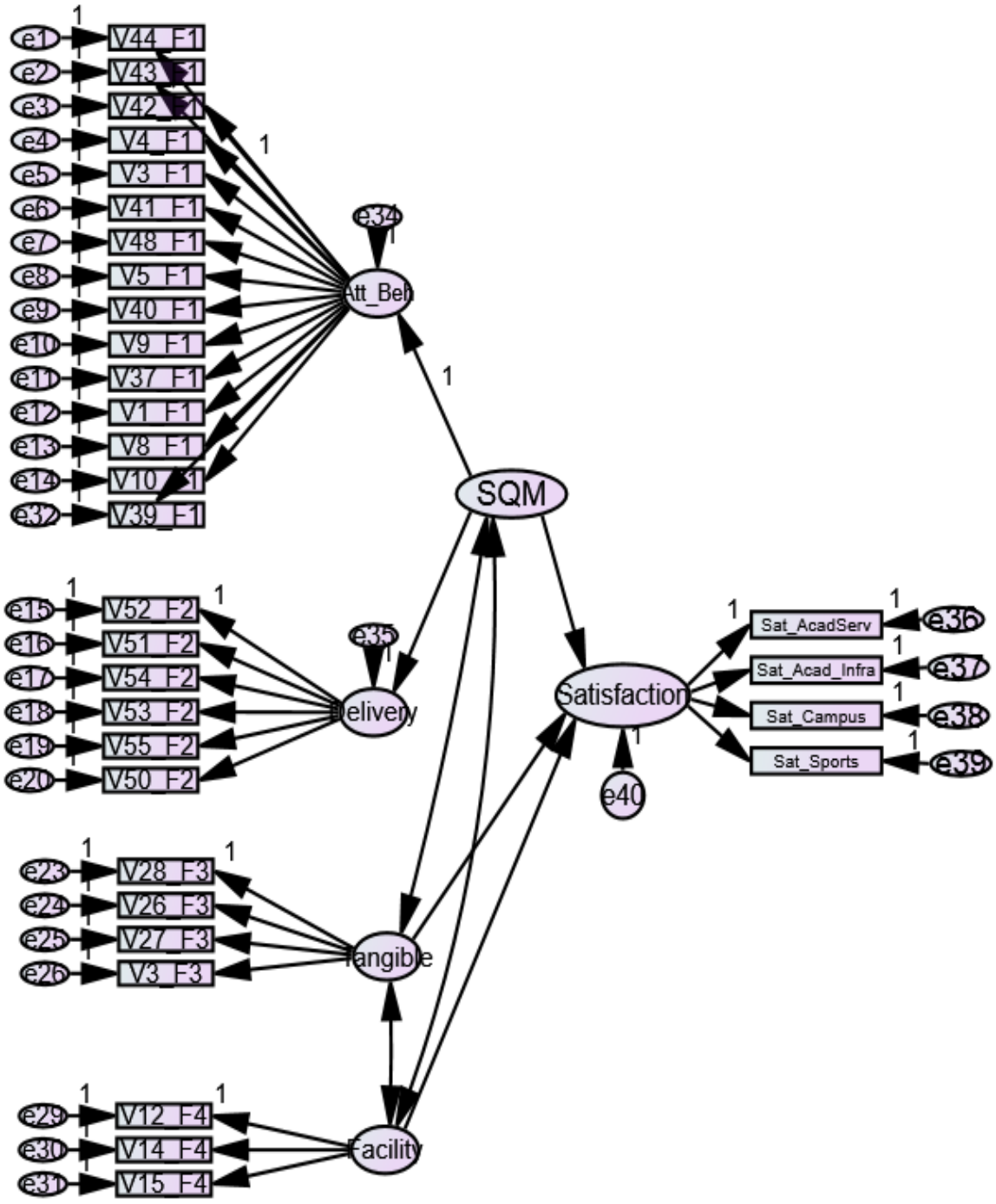


Figure 4.4(a) Measurement model of service quality dimensions

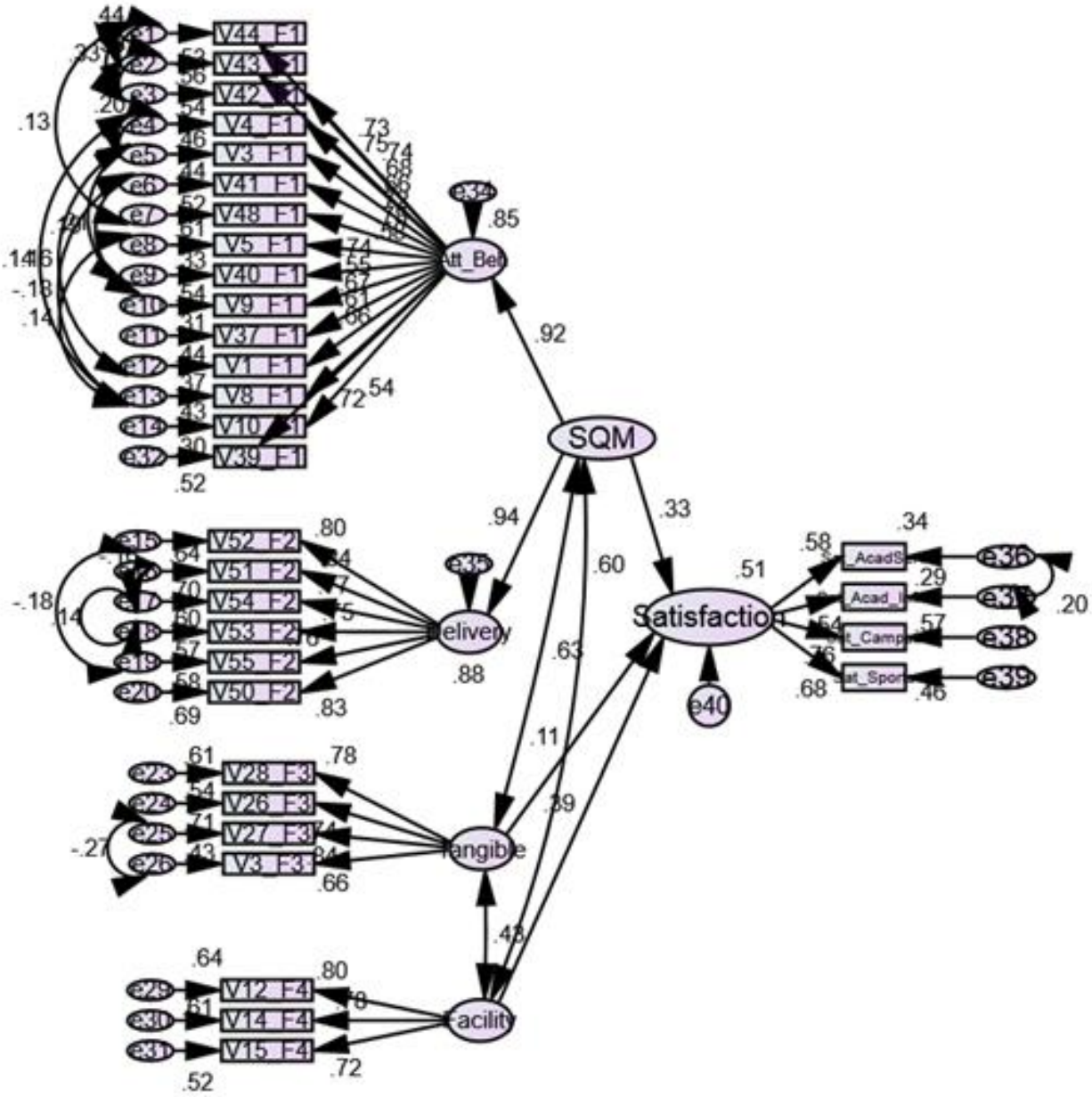


Fig. 4.4(b) Measurement model with estimated parameters

As can be observed from the Table 4.35, all of three independent variables had significant effect on dependent variable. *SQM* and *Facility* were found to be significant at 0.001 level of significance ($p \leq .001$), whereas, *Tangible* dimension of service quality was found to be significant at 0.05 level of significance ($p \leq .05$). Standardized estimates were the standardized beta coefficients. *Facility*

had the highest value of standardized coefficient (β_3 = 0.390), which indicated that *Facility* is the most important variable out of three independent variables. *SQM* had the second highest value of standardized beta coefficient (β_1 = 0.323); which meant that *SQM* is relatively second most important variable and *Tangible* is the third most important variable (β_2 = 0.123).

The Table 4.36 shows the goodness of fit statistics for the structural model. CMIN/Df, CFI, IFI, TLI are well above the recommended lower limits supporting adequate level of model fit. Also the value of RMSEA is less than the desired value of 0.08, indicating its non-significance (p>.05) as desired thereby supporting the model fit.

Table 4.36: Goodness of fit statistics for structural model

Measure of Goodness of Fit	**Estimated Goodness of Fit measure**	**Recommended values**
CMIN/DF	2.692	< 3
RMR	0.051	< 0.05
GFI	0.886	> 0.900
AGFI	0.863	> 0.900
CFI	0.931	> 0.900
NFI	0.895	> 0.900
IFI	0.931	> 0.900
TLI	0.922	> 0.900
RMSEA P CLOSE	0.053 0.072	< 0.08 > 0.05

Table 4.37 exhibits the squared multiple correlation, which means the variance explained in dependent or endogenous variable by exogenous variable. As can be seen from the Table 4.37, 51.1% of *satisfaction* may be explained with three independent/exogenous variables in the model,

whereas, the remaining 48.9% variance may be associated with the other factors, which are not part of the model. As has already been defined that *Service Quality Commitment (SQM)* is a second order construct and has two sub-constructs i.e. *Attitude and Behavior of Faculty* and *Delivery*. From the Table 4.37 it can also been seen that SQM explained 89% and 85% variance in *Delivery* and *Attitude and Behaviour of faculty*, respectively.

Table 4.37: Squared Multiple Correlations

Endogenous variable	Estimate
Satisfaction	0.511
Delivery	0.888
Attitude and Behavior of faculty	0.847

4.3.2 Predictors of Overall Satisfaction

To measure the overall satisfaction of students, a single statement question asking to rate the overall satisfaction with regard to overall services provided by their respective universities was included in the questionnaire. The responses were used as dependent variable and the three dimensions of perceived service quality were used as independent variables. Multiple regression analysis was used to find the joint effect of three independent variables on the dependent variable.

Table 4.38 exhibits the results of multiple regression, wherein, it is observed that F statistic is significant ($p \leq .001$). On variable wise evaluation, *SQM* was found to be highly significant affecting overall satisfaction ($p \leq .001$), and the second dimension of *Facility* was also found to be significant, although, at 5% significance level ($p \leq .05$). However, the third dimension *Tangible* was found to be non-significant ($p > .05$). Although the *Tangible* dimension, which was also the least important of the three variables in SEM model, was significant in the factor analysis, but herein, it has been found to be non-significant. The adjusted R^2 value after multiple regression

analysis was found to be 0.162 indicating that only 16.2% of variance may be explained by the three independent variables in the model which is very less from a good model point of view.

4.3.3 Multiple Regression with Categorical Variables (Dummy Variables)

The university as predictor of service quality is meaningful because the students expect high level of service quality from well-established universities. In the study, out of three universities, the Deemed University (DU) and the Government State University (GSU) are fifty years old universities and are well established and well known for their academic environment. The DU was established by well-known business house of India, whereas, the GSU is a state university established more than fifty years back and has well established courses in all fields including science, arts, engineering etc. The third university, PSU, considered for analysis is less than a decade old and is propagated by a well-known business house of region and is claimed to be having best infrastructure facility. Three universities had different structure and philosophy to run organization. Therefore, it was justified to have university as one of the predictor variable.

In addition the demographic parameters have also been considered to study their effect on the perceived service quality of the considered higher education institutions of Punjab.

Age of respondent was assumed to have an effect on perceived service quality since the students less than 25 years of age were too young and their expectations regarding service quality were expected to be scaled down as compared to those of the students above more than 25 year of age.

The academic course was considered as a predictor of perceived service quality, considering the variation in the curriculum of study and the academic background with which the students join these courses.

Table 4.38: Multiple regression results

Dependent Variable	*Independent Variables*	*'b' coefficient*	*SE*	*Standard Beta Coefficient*	*T-Value*	*Significance*	*F Stat*	*Significance*	*Adjusted R Square*
Overall Satisfaction with services provided by university.	(Constant)	1.482	0.191		7.754	0	29.42	0.000	0.162
	SQM	0.417	0.061	0.336	6.806	0.000			
	Facility	0.082	0.039	0.093	2.113	0.035			
	Tangible	0.03	0.051	0.027	0.585	0.559			

Table 4.39: Dummy variables regression

Dependent Variable	*Independent Variables*	*'b' coefficient*	*SE*	*T-Value*	*Significance*	*F Stat*	*Significance*	*Adjusted R Square*
Overall Satisfaction with services provided by university.	(Constant)	2.769	.112	24.673	.000	13.86	0.000	0.109
	Univ_PSU	.204	.086	2.375	.018			
	Univ_DU	.568	.090	6.301	.000			
	Age_above25	-.042	.079	-0.526	.599			
	Gen_female	-.139	.071	-1.970	.049			
	AP_60_75	.238	.098	2.423	.016			
	AP_75_85	.237	.116	2.041	.042			
	AP_above_85	.146	.144	1.015	.311			
	M. Sc.	.265	.087	3.055	.002			
	M. Tech	.327	.086	3.796	.000			

The students of three courses of study, undertaken for analysis, include (1) MBA, which is purely a course on social and management sciences, (2) M. Sc. – which is a pure science course, and (3) M. Tech – which is purely a research based engineering and technology course. All of these three courses demanded different levels of services and students of different courses were expected to have different expectations from respective universities.

The academic performance too is expected to have an influence on the expectations of students of different courses, which in turn is expected to affect the service quality expectations from their respective universities.

Therefore, five demographic variables were expected to have effect on perceived service quality in higher education institutions. In order to measure the effect of demographic variables on overall satisfaction with services provided by their university, the statistical tool used was multiple regression in which overall satisfaction with services was the dependent variable and five demographic variables were predictor variables. Since, all of predictor variables were categorical in nature, dummy regression is applied for the same.

4.3.3.1 Dummy Coding

The categorical variables were converted to dichotomous variables with codes of 0 and 1. Code 0 is the reference category or category not in analysis and code 1 is given to category present in the analysis and is interpreted with respect to absent or reference category. The number of dummy variables created is always one less than the number of categories in the variable. The coding details for various parameters is provided as below:

University:	PSU:	Univ_PSU = 1 and all others = 0
	DU:	Univ_DU = 1, and all other =0
Gender:	Female:	Gen_female = 1, and all others = 0

Age:	Age above 25 years = 1, all others = 0	
Academic performance:	60% - 75%:	AP_60_75 =1, all others = 0
	75% - 85%:	AP_75_85 = 1, all others = 0
	Above 85%:	AP_above_85 = 1, all others = 0
Course:	M. Sc.:	M. Sc. = 1, all others = 0
	M. Tech:	M. Tech = 1, all others = 0

Table 4.39 exhibits the results of multiple regression in which five demographic variables are used as independent variables in the dummy form. The coefficient of first dummy variable i.e. Univ_PSU shows change in the mean score of overall satisfaction between PSU and Non-PSU University. Observing the Table 4.39, we can say that the students from PSU are estimated to be 0.204 units higher on the average in their mean overall satisfaction score than those who are from other universities than PSU, keeping all other variables constant. The positive sign of the unit indicates that the overall satisfaction of a student from LPU was expected to be more than students not from PSU. The second dummy variable was Univ_DU has an estimated regression coefficient of 0.568, which was significant. This indicates that the PG students from DU are estimated to be 0.568 units higher on the average overall satisfaction score as compared to the students from universities other than DU, keeping all other variables constant. The sign of the coefficient was positive which means that the likelihood satisfaction score of student from the Deemed University (DU) is expected to be more than students who are not from DU. These two dummy variables were actually compared with the base category, coded as zero, which was Government state University (GSU). The PG students of PSU and DU both had positive and significant coefficients, concluding that PSU and DU University students have significantly more mean satisfaction score than that demonstrated by the students of GSU.

As can be further observed from the Table 4.39, age of the students was found to be a non-significant predictor of overall satisfaction from services provided by the university.

On the other hand, gender was observed to be a significant predictor of overall satisfaction with services provided ($p \leq .05$). The sign of the regression coefficient was observed to be negative which means female are less likely to be satisfied with the service provided by the university as compared to males.

The academic performance, too, was found to be a significant predictor of overall satisfaction level of students as out of the three dummy variables of academic performance considered, two were found to be significant. The students with academic performance lying between 60% to 75% and 75% to 80% had regression coefficients of 0.238 and 0.237, respectively, and were significant which indicates that the students with academic performance of 60% to 75% and 75% to 85% were expected to be significantly more satisfied with the services provided by their universities as compared to students with academic performance below 60%, keeping other things constant. However, students with academic performance of 85% and above were not significantly different from the students with academic performance of below 60%, as the regression coefficient was non-significant ($p > .05$).

The course of study also proved to be a significant predictor of satisfaction with the service provided by the universities. A student of M.Sc. was expected to have mean overall satisfaction score of 0.265 higher than mean overall satisfaction score of a student from MBA course, keeping other variables constant. Also, a student of M. Tech was expected to have mean overall satisfaction score of 0.327 units higher than the mean overall satisfaction score of MBA students.

Out of five demographic variables, four were found to be significant predictors of overall satisfaction with the service quality provided by the various universities to which these students

belong. The value of adjusted R^2 was 0.109 which indicates that approximately 11% variance in overall satisfaction was associated with four significant demographic variables.

CHAPTER – 5

CONCLUSIONS

This chapter highlights the major findings of the research undertaken, their implications for the higher education institutions, the limitations of the research and scope for future research in this field.

5.1 MAJOR FINDINGS OF THE STUDY

Higher education in India, even if viewed globally, is very costly and it all converges on to consumers wanting value for their money. They need quality education proportionate to the high fee. They expect the universities, where they intend to study, to have the best infrastructure, highly qualified faculty and the best of facilities. The huge growth in student numbers, internationalization of education, government looking at reducing funding and increasing competitive pressures have prompted many universities and other education providers to focus on quality customer service.

The first part of the research work was undertaken to study the differences in the students' perception of the service quality dimensions in relation to the demographic and educational factors like gender, age, course of study and academic performance. A questionnaire was so designed to extract the responses with regards to the PG students' perceptions and were neatly segregated on the basis of academic and demographic factors.

The second part of the research focused on identifying the predictors of service quality in higher educational institutions of Punjab. An exploratory factor analysis followed by confirmatory analysis was carried out to extract the important service quality dimensions.

The final part of the research was undertaken to measure the service quality of the three universities in Punjab as perceived by the students**.** The service quality of three universities under

study was studied using ANOVA. The four factors or dimensions confirmed through confirmatory factor analysis were the four parameters of comparison between the universities.

The major findings of the research are presented in the succeeding subsections:

5.2 REVISITNG THE OBJECTIVES

5.2.1 Objective 1: To study differences in the student's perception of the service quality in relation to their demographic factors, academic profiles and area of specialization.

Since the purpose of the study was to understand students' perception towards service quality of HEIs, the survey was conducted for the PG students who are studying in various disciplines at the campuses of the three Universities of Punjab, each belonging to a different category. To study the differences or variation in student's perception of service quality in relation to demographic variables, T-test and ANOVA were applied.

Based upon the analysis of results the following can be concluded:

i) On the basis of gender, the difference in service quality perception by both males and females for the four dimensions of facilities, tangibles, attitude and delivery is insignificant. The perception of the male and female students varied significantly for the faculty and reliability dimensions of service quality, which also meant that the service quality perception on the basis of gender for the other four dimensions of facilities, tangibles, attitude and delivery was indistinguishable.

ii) As opposed to the gender, there is no significant difference in the perceived service quality dimensions on the basis of the age of students.

iii) On observing the educational factors, it can be concluded that there was a significant difference in the perception of all the service quality dimensions on the basis of course

of study, as well as on the basis of academic performance of the PG students. It is concluded that the science and engineering students perceive service quality, more or less, in a similar manner but differently from the management students. This is evident as the students in engineering and science streams have different way of analysing things as compared to the management students.

iv) On the basis of post-hoc analysis carried out to study the effect of academic performance of the students, it can be inferred that the students with below average performance and those on the other extreme, with exceptional performance, tend to perceive service quality very differently, whereas, the PG students who have average or above average academic performance, more or less perceive the service quality dimensions in a very similar manner.

Hence, it can be concluded that the service quality is indeed a very important component of the higher educational institutions.

5.2.2 Objective-2: To identify the predictors of service quality

In this section of the chapter it is intended to measure the service quality of three universities of the state of Punjab in India as perceived by the students through factor analysis**.** For deriving adequate conclusions various statistical procedures were applied along with a careful research methodology.

i) The first factor, namely, ATTITUDE AND BEHAVIOUR OF FACULTY, having 15 items loaded on to the factor, describes the behavioral and attitudinal aspects of faculty towards their students. Also, the surrogate variables with highest loadings showed the attitudinal aspect of faculty.

ii) The second factor, namely, TANGIBLES, has 7 items loaded on to it and these are directly related to the physical facility of the institutes, which included the institutional

building, equipment, teaching aid material. All these aspects provided direct aid to the students' learning and are tangible in nature.

iii) There are 6 items loaded on to the DELIVERY factor, which highlight the consistent delivery of service to the students.

iv) Lastly the fourth factor, namely FACILITY, with 3 items loaded on to it, relates to the facilities offered by institutes to the students. These facilities include comfortable stay in the hostels, and other facilities provided therein.

v) From CFA it was found that two of the constructs, obtained after EFA, i.e. *Attitude and Behavior of Faculty* and *Delivery* are sub-constructs of some higher-level constructs. The higher-level construct, which was parent construct of these two sub-constructs, is termed as the SERVICE QUALITY COMMITMENT (SQM).

Thus, it can be concluded that the main factors which affect the service quality being provided by HEI's are Service Quality Commitment (SQM), Tangible and Facilities.

5.2.3 Objective-3: To measure perception of students regarding service quality offered by the three universities in Punjab.

The four factors or dimensions confirmed through confirmatory factor analysis were the four parameters of comparison between the three universities identified for comparative analysis. To compare the service quality of three universities under study, a single score of each dimension was generated using summation of scale. The major conclusions drawn regarding the case specific universities are as below:

i) All the three universities are significantly different from each other on the service quality dimension of *Attitude and Behavior of faculty*.

ii) The two universities viz. a Government State University (GSU) and a Private State University (PSU) are not significantly different from each other for $p \leq 0.5$, whereas,

the third, a Private Deemed University (DU) is significantly different from both GSU and PSU on the dimension of *Delivery* ($p \leq .05$).

iii) All the three universities are significantly different from each other on the service quality dimension of *Tangible*.

iv) It was found that GSU and PSU are not significantly different at 5% alpha level ($p > .05$), whereas, DU is significantly different from GSU and PSU ($p \leq .05$), when they are compared with regards to the *Facility* dimension of service quality.

v) It can be concluded from the study that the DU offers the best services for all the service quality dimensions and is followed by PSU scoring second highest scores on *Attitude and Behaviour of Faculty*, *Delivery* and *Tangibles* dimensions, however the GSU has scored higher than PSU on the *Facility* dimension of service quality. Hence, it can be said that the Deemed Universities tend to offer better service quality as compared to the private and state run sample universities. But, since the government funding is significantly large, the state run universities tend to provide better facilities as compared to the private state university. This could be also be attributed to the fact that the fee component charged from the students in a Government State University is significantly lower than the other universities.

5.3 MODELLING AND REGRESSION

The three discovered dimensions of perceived service quality were used as the predictors of service quality and *'Satisfaction'* of students was considered as dependent variable for the purpose. The three dimensions of service quality confirmed using confirmatory factor analysis were *Service Quality Commitment (SQM), Tangibles* and *Facility*. *Service commitment (SQM)* is a

second order construct and has two sub-constructs i.e. *Attitude and Behavior of Faculty* and *Delivery*.

It was found that *SQM* and *Facility* were found to be significant at p≤0.001 level of significance, whereas, *Tangible* dimension of service quality was found to be significant at 0.05 level of significance (p≤.05). Subsequently, it could be concluded that *Facility* is the most important variable out of three independent variables. *SQM* had the second highest value of standardized beta coefficient (β_1 = 0.323); which meant that *SQM* is relatively second most important variable and *Tangible* is the third most important variable (β_2 = 0.123).

It was found that 51.1% of *satisfaction* may be explained with three independent/exogenous variables in the model. On further analysis, it is concluded that SQM explained 89% and 85% variance in *Delivery* and *Attitude and Behaviour of faculty*, respectively.

To measure the overall satisfaction of students, a single statement question with the objective of rating overall satisfaction with regard to overall services provided by their respective universities was included in the questionnaire. The responses were used as dependent variable and the three dimensions of perceived service quality were used as independent variables.

On variable wise evaluation, it is concluded that *SQM* is the most significant dimension affecting overall satisfaction (p≤.001), and the second dimension of *Facility* was also found to be significant, although, at 5% significance level (p≤.05). However, the third dimension *Tangible* was found to be non-significant (p>.05).

5.4 IMPLICATIONS OF THE STUDY

The university as predictor of service quality is meaningful because the students expect high level of service quality from well-established universities. In the study, out of three universities, the

DU and GSU are fifty years old universities and are well established and well known for their academic environment. The third university considered for analysis is less than a decade old and is propagated by a well-known business house of region and is claimed to be having best infrastructure facility. Three universities had different structure and philosophy to run organization. Therefore, it was justified to have university as one of the predictor variable.

The PG students of both DU and PSU had positive and significant coefficients, concluding that the students from these two universities have significantly more mean satisfaction score than that demonstrated by the students of GSU.

The age of the students was found to be a non-significant predictor of overall satisfaction from services provided by the university, whereas, as earlier also concluded, gender was observed to be a significant predictor of overall satisfaction with services provided ($p \leq .05$). The sign of the regression coefficient was observed to be negative which means femaleS are less likely to be satisfied with the service provided by the university as compared to males.

The students with academic performance lying between 60% to 75% and 75% to 80% had regression coefficients of 0.238 and 0.237, respectively, and were significant which indicates that the students with academic performance of 60% to 75% and 75% to 85% were expected to be significantly more satisfied with the services provided by their universities as compared to students with academic performance below 60%, keeping other things constant. However, students with academic performance of 85% and above were not significantly different from the students with academic performance of below 60%, as the regression coefficient was non-significant ($p > .05$).

The course of study also proved to be a significant predictor of satisfaction with the service provided by the universities. A student of M.Sc. was expected to have mean overall satisfaction

score of 0.265 higher than mean overall satisfaction score of a student from MBA course, keeping other variables constant. Also, a student of M. Tech was expected to have mean overall satisfaction score of 0.327 units higher than the mean overall satisfaction score of MBA students.

5.5 CONTRIBUTIONS OF THE RESEARCH

The major contributions of the research carried out to study the service quality of HEI's as perceived by the PG students are highlighted as below:

- HEI's should devise specific service policies based upon the demographic factors, academic streams and performance.
- The HEIs need to place emphasis on all the dimensions of service quality and take into account, more importantly the gender aspect of the demographic factor while maintaining adequate standards of service.
- The service to be offered to the engineering, management and science students has to be outlined differently by the HEI's.
- HEIs must look into providing different services to the students with outstanding academic performance and to those who are relatively average in their studies.
- The major factors identified for maintaining adequate service quality in HEI's include Service Quality Commitment (SQM), Tangible and Facilities.

5.6 LIMITATIONS AND SCOPE FOR FURTHER WORK

The study undertaken herein is limited to only the post graduate students of the three universities of Punjab, a state in India. The response of the under-graduate students and the doctoral students may vary from what has been recorded for the PG students.

The study is limited with regards to the fact that only students who are studying in the state of Punjab (although they may have representation from other states as well) have been included in the study. The results may vary for different states, as the cultural and social background is different in different states. Thus, the future scope of work may include to undertake the study with regards to the following:

a) Study the perception of UG and Doctoral students towards service quality;
b) Study the variation in service quality being offered by Higher Education Institutes of other Indian states;
c) Extend the study to evaluate the service quality dimensions, which could be relevant to primary and higher secondary schools and colleges.

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APPENDIX – I

SURVEY QUESTIONNAIRE

(For Distribution to PG students)

Topic for PhD

Service Quality Management in Selected Universities of Punjab - Students' Perspective

Dear Students,

This study attempts to measure service quality in selected Universities of Punjab. Information given is confidential and will be used only for academic purposes.

Please cooperate and provide true and honest information, which will be appreciated.

The questionnaire will take no longer than 10 minutes to complete.

NAME OF UNIVERSITY _____

Researcher : Gurbinder Singh
School of Behavioral Sciences and Business Studies
Thapar University
Patiala - Punjab

<table>
<tr><td>Name of the University</td><td colspan="8"></td></tr>
<tr><td>Name of student</td><td colspan="8"></td></tr>
<tr><td>Nationality</td><td colspan="8"></td></tr>
<tr><td>Age (in years): Please tick the relevant box</td><td>> 25</td><td></td><td colspan="2">< 25</td><td colspan="4"></td></tr>
<tr><td>Gender: Please tick the relevant box</td><td>MALE</td><td></td><td colspan="2">FEMALE</td><td colspan="4"></td></tr>
<tr><td>Course of study pursuing (Post-Graduate Final Year)</td><td colspan="8"></td></tr>
<tr><td rowspan="2">Academic Performance up to last semester: enter your CGPA or Percentage, as the case may be, in the relevant box</td><td colspan="4">CGPA</td><td colspan="4">PERCENTAGE</td></tr>
<tr><td>< 6.00 (1)</td><td>6.00 to 7.50 (2)</td><td>7.5 to 8.5 (3)</td><td>> 8.5 (4)</td><td>< 60 (1)</td><td>60-75 (2)</td><td>75 to 85 (3)</td><td>>85 (4)</td></tr>
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<tr><td>Name of the University from where under-graduation done</td><td colspan="8"></td></tr>
<tr><td rowspan="3">%age of Marks/CGPA in UG Degree</td><td colspan="4">CGPA</td><td colspan="4">PERCENTAGE</td></tr>
<tr><td>< 6.00 (1)</td><td>6.00 to 7.50 (2)</td><td>7.5 to 8.5 (3)</td><td>> 8.5 (4)</td><td>< 60 (1)</td><td>60-75 (2)</td><td>75 to 85 (3)</td><td>>85 (4)</td></tr>
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</table>

PART A

Q1. Please indicate your degree of SATISFACTION with regards to the **overall services** provided by your University, by placing a check mark X in the relevant box below**.**

Excellent	Very good	Good	Satisfactory	Poor
5	4	3	2	1

Q.2 Please indicate your degree of SATISFACTION with regards to the **Academic services** provided by your University, by placing a check mark X in the relevant box below.

Excellent	Very good	Good	Satisfactory	Poor
5	4	3	2	1

Q.3 Please indicate your degree of SATISFACTION with regards to the **Academic infrastructure** (like laboratories and classrooms etc.) provided by your University, by placing a check mark X in the relevant box below.

Excellent	Very good	Good	Satisfactory	Poor
5	4	3	2	1

Q.4 Please indicate your degree of SATISFACTION with regards to the **Stay-on-campus services** provided by your University, by placing a check mark X in the relevant box below.

Excellent	Very good	Good	Satisfactory	Poor
5	4	3	2	1

Q.5 Please indicate your degree of SATISFACTION with regards to the **Sports and Leisure services** provided by your University, by placing a check mark X in the relevant box below.

Excellent	Very good	Good	Satisfactory	Poor
5	4	3	2	1

PART B ASSESSMENT OF SERVICE QUALITY DELIVERY

This section of the questionnaire contains 55 statements relating to the quality of service delivery of your university.

Considering an excellent university would be scored as "Strongly Agree", **please indicate your degree of agreement with the following 55 statements, on your university's performance on the service feature described.**

Please tick at the appropriate box to show your level of agreement (on the Scale 1-5 Points) for every statement given:

Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree
1	2	3	4	5

PART B ASSESSMENT OF SERVICE QUALITY DELIVERY (I-SERVQUAL)

Dimension I : Faculty		**1**	**2**	**3**	**4**	**5**
1.	University faculty shows interest to solve students problems					
2.	University faculty is well qualified and knowledgeable					
3.	University faculty gives confidence and motivation to students.					
4.	Faculty provides correct answers to student's questions.					
5.	Faculty is never too busy to attend to student's problems and is available beyond office timings i.e. easily accessible.					
6.	University faculty inculcates interest in the subject among students.					
7.	Faculty is immaculately dressed befitting their status.					
8.	Faculty provide prompt and timely service to you					
9.	Faculty communicates in a language that you understand.					
10.	Examination papers are evaluated without bias and in time					
Dimension II : Facilities		**1**	**2**	**3**	**4**	**5**
1.	University library is easily accessible to students					
2.	University library is modern and well stocked with access to print and e - journals					
3.	University Hostels are comfortable to stay in with modern and appealing facilities					
4.	Food/Beverages served in Hostels are as per students liking					
5.	University hostels have internet connectivity and other facilities like Gymnasium, common room etc.					
6.	University has proper arrangement to give medical aid to students in emergency					
7.	University canteens are hygienic and have a wide range of servings of food and beverages.					
8.	University genuinely helps students in placements and has a dedicated placement cell.					
9.	University arranges recreational activities (co and extra-curricular) for students around the year					

10.	University arranges sports activities for students around the year					
11.	University has sufficient transportation facilities					
12.	Accurate and secure student records are maintained					
13.	Specific opportunities and support for you to attain your personal goals are provided in the form of finishing schools etc.					
14.	Complete and accurate information is provided to you in good time.					
15.	University has a student counseling cell to cater to the needs of weak students					
Dimension III : Tangibles		**1**	**2**	**3**	**4**	**5**
1.	University has excellent infrastructure like buildings roads etc.					
2.	University has excellent infrastructure for sports and games					
3.	University has excellent infrastructure for organizing cultural and technical festivals					
4.	University class rooms are well lit and are modern with appealing fixtures					
5.	University Class rooms are well equipped with projection systems					
6.	University laboratories are well lit and are modern and well equipped to handle classes					
7.	University has well equipped computer labs with requisite and licensed software					
8.	A full range of up-to-date physical facilities and equipment are provided in the laboratories					
Dimension IV : Attitude		**1**	**2**	**3**	**4**	**5**
1.	University academic staff is easily available to students for guidance					
2.	Administrative staff is courteous to students and willing to solve their problems					
3.	University maintains cleanliness at the campus					
4.	Teachers and students communicate well in classroom					
5.	Your complaints are constructively handled					

6.	A flexible service is provided to meet your individual needs.					
7.	Faculty/Staff reassure you in terms of your personal anxieties, concerns and problems.					
8.	Staff are sympathetic to your individual needs, while respecting your privacy					
9.	You feel safe under the care of the staff					
10.	Staff respect your confidences and feelings					
11.	The behavior of staff makes you feel that you can trust them and have confidence in them.					
Dimension V : Reliability		**1**	**2**	**3**	**4**	**5**
1.	The teaching and learning process is up-to-date as promised by the university					
2.	Students feel safe and secure in the university					
3.	University curriculum is need based and useful for future job					
4.	The behavior of staff makes you feel that you can trust them and have confidence in them					
5.	University shows interest in solving problem					
Dimension VI : Delivery		**1**	**2**	**3**	**4**	**5**
1.	The required level of service is delivered, with clearly stated terms and conditions					
2.	The full range of services is delivered to meet your changing needs.					
3.	Appropriate services are delivered as promised					
4.	A dependable service which does not vary over time is provided					
5.	An equitable service is delivered to individual students, as well as groups of students					
6.	The interpersonal skills are adequately addressed in the curriculum					

APPENDIX – II

DESCRIPTIVE STATISTICS

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Univ_UG	598	6.04	4.040	.321	.100	-1.264	.200
Overall_Sat	598	3.34	.881	.125	.100	-.374	.200
Sat_AcadServ	598	3.25	.995	-.052	.100	-.612	.200
Sat_Acad_Infra	598	3.45	1.031	-.261	.100	-.512	.200
Sat_Campus	598	3.32	1.021	-.006	.100	-.785	.200
Sat_Sports	598	3.31	1.104	-.230	.100	-.622	.200
faculty1	598	3.41	1.038	-.569	.100	-.080	.200
faculty2	598	3.65	.977	-.583	.100	.051	.200
faculty3	598	3.50	.978	-.211	.100	-.539	.200
faculty4	598	3.55	.944	-.466	.100	-.084	.200
faculty5	598	3.48	1.045	-.368	.100	-.330	.200
faculty6	598	3.46	.940	-.173	.100	-.350	.200
faculty7	598	3.64	.877	-.246	.100	-.261	.200
faculty8	598	3.60	.936	-.445	.100	.025	.200
faculty9	598	4.00	.875	-.755	.100	.321	.200
faculty10	598	3.56	1.072	-.561	.100	-.186	.200
facility1	598	3.97	1.065	-1.006	.100	.434	.200
facility2	598	3.78	1.041	-.541	.100	-.408	.200
facility3	598	3.38	1.152	-.449	.100	-.540	.200
facility4	598	3.04	1.182	-.085	.100	-.839	.200
facility5	598	3.54	1.174	-.495	.100	-.540	.200
facility6	598	3.62	1.029	-.546	.100	-.094	.200
facility7	598	3.42	1.014	-.346	.100	-.344	.200

facility8	598	3.22	1.172	-.283	.100	-.651	.200
facility9	598	3.63	1.024	-.534	.100	-.178	.200
facility10	598	3.67	1.023	-.514	.100	-.251	.200
facility11	598	3.39	1.200	-.502	.100	-.625	.200
facility12	598	3.70	1.004	-.624	.100	.081	.200
facility13	598	3.39	.965	-.268	.100	-.104	.200
facility14	598	3.45	.921	-.398	.100	.042	.200
facility15	598	3.15	1.152	-.176	.100	-.740	.200
tangible1	598	3.95	1.000	-1.020	.100	.883	.200
tangible2	598	3.82	1.001	-.737	.100	.201	.200
tangible3	598	4.02	.895	-.837	.100	.622	.200
tangible4	598	3.66	1.022	-.591	.100	-.020	.200
tangible5	598	3.90	.962	-.765	.100	.242	.200
tangible6	598	3.66	1.022	-.629	.100	.009	.200
tangible7	598	3.68	1.024	-.654	.100	.075	.200
tangible8	598	3.58	.998	-.535	.100	.075	.200
attitude1	598	3.52	.999	-.502	.100	-.046	.200
attitude2	598	3.48	.936	-.412	.100	-.007	.200
attitude3	598	3.93	.927	-.859	.100	.695	.200
attitude4	598	3.84	.895	-.687	.100	.498	.200
attitude5	598	3.48	.976	-.430	.100	-.162	.200
attitude6	598	3.38	.988	-.308	.100	-.113	.200
attitude7	598	3.44	1.015	-.340	.100	-.245	.200
attitude8	598	3.50	1.012	-.385	.100	-.319	.200
attitude9	598	3.48	1.094	-.416	.100	-.348	.200
atitude10	598	3.52	1.001	-.355	.100	-.423	.200
attitude11	598	3.56	1.031	-.388	.100	-.344	.200
reliability1	598	3.58	.934	-.479	.100	.023	.200
reliability2	598	3.91	.928	-.751	.100	.432	.200
reliability3	598	3.54	1.031	-.379	.100	-.401	.200
reliability4	598	3.54	1.000	-.404	.100	-.231	.200

reliability5	598	3.48	1.033	-.390	.100	-.339	.200
delivery1	598	3.43	.971	-.474	.100	.057	.200
delivery2	598	3.39	.985	-.150	.100	-.445	.200
delivery3	598	3.45	.944	-.251	.100	-.189	.200
delivery4	598	3.44	.921	-.212	.100	-.051	.200
delivery5	598	3.52	.952	-.298	.100	-.308	.200
delivery6	598	3.56	.997	-.487	.100	-.034	.200
Valid N (list wise)	598						