Examining the structural relationship between quality of mobile services and customer intention to stay: A study of mediation and moderation analysis in India

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IN

MANAGEMENT STUDIES

By

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DECLARATION

I, SURESH KANDULAPATI, hereby declare that this thesis entitled "**Examining the structural relationship between quality of mobile services and customer intention to stay: A study of mediation and moderation analysis in India**" submitted by me under the guidance and supervision of **Prof. B. Raja Shekhar** is a bonafide research work which is also free from plagiarism. I also declare that it has not been submitted previously in part or in full to this University or any other University or Institute for the award of any degree or diploma. I hereby agree that my thesis can be deposited in Shodganga/INFLIBNET.

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Signature of the Supervisor **DEAN**

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ABSTRACT

Purpose of the study: The purpose of the study is to examine the relationship between Quality of Mobile Services (QMS) and Customer Intention to Stay (CIS) by developing a measurement scale – mTelQual for assessing the quality of mobile services in India. Also, the study examines the mediation effect of subscriber value and subscriber satisfaction and moderation effect of demographic and usage characteristics on the relationship between QMS and CIS. Also, the study evaluate quality, satisfaction, value and intention to stay in united AP and India.

Methodology of the study: An online and an offline survey were conducted across India (sample size $n_1 = 547$) and united AP (sample size $n_2 = 1061$) respectively by administering a structured questionnaire to mobile subscribers. The study adopted quota and purposive sampling methods to collect the data. The study explored the attributes of quality, value, satisfaction, price, expectations and intention to stay in mobile service setting in India by semi-structured interviews, focus group discussions and literature review. Exploratory factor analysis, confirmatory factor analysis, structural equation modeling, multi-group analysis, correlation analysis, multiple regression analysis (including hierarchical), independent sample t-test and ANOVA were performed for the data analysis through SPSS 21 and AMOS 21.

Findings of the study: The study revealed that mTelQual is a robust measurement scale for assessing quality of mobile services in India. Also, the study revealed that mSV and mSS have partial serial mediation effect, and there is no parallel mediation effect on the relationship between QMS and CIS. Further, the relationship between QMS and CIS is strongly moderated by price, expectations of mobile subscribers, age, occupation, purpose of mobile usage, length of mobile usage and user group. Finally, QMS significantly differ in terms of age, type of mobile phone, mobile connection, mobile usage experience, mobile data, education, and service provider.

Implications: The study which captures the view point of subscribers can open up new avenues for practitioners to improve quality of mobile services which can help them to formulate subscriber retention strategies in India.

Key words: mTelQual, quality of mobile service, customer intention to stay, mediation, moderation.

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ABBREVIATIONS

2G	Second Generation
3G	Third Generation
4G	Fourth Generation
Acc	Accessibility
ACSI	American Customer Satisfaction Index
AGFI	Adjusted Goodness-of-Fit Index
Amos	Analysis of Moment Structures
ANOVA	Analysis of Variance
AP	Andhra Pradesh
APPSC	Andhra Pradesh Public Service Commission
ARPU	Average Revenue Per User
AVE	Average Variance Extracted
B2B	Business-To-Business
BCSQ	Behavioural Consequences of Service Quality
BFSI	Banking, Financial Services and Insurance
CCS	Customer Care Service
CDMA	Code Division Multiple Access
CE	Customer Expectations
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CIS	Customer Intention to Stay
COAI	Cellular Operators Association of India
CR	Customer Retention
CS	Customer Satisfaction
DS	Data Service
EFA	Exploratory Factor Analysis
EMI	Equated Monthly Instalment
FBI	Favourable Behavioural Intentions
GDP	Gross Domestic Product
GFI	Goodness-of-Fit Index
GPRS	General Packet Radio Service

GSM	Global System for Mobile Communications
HCL	Hindustan Computers Limited
mExp	Expectations of mobile subscriber
MMCS	Mediator Model of Customer Satisfaction
MNP	Mobile Number Portability
MS-Qual	Mobile Service Quality
mSS	Mobile Subscriber Satisfaction
mSV	Mobile Subscriber Value
mTelQual	Mobile Telephone Quality
MVAS	Mobile Value-Added Services
NFI	Normed Fit Index
NNFI	Non-Normed Fit Index
NS	Network Service
OQMS	Overall Quality of Mobile Services
OSS	Overall Subscriber Satisfaction
PC	Personal Computer
PGFI	Parsimonious Goodness-of-Fit Index
PNFI	Parsimonious Normed Fit Index
QMS	Quality of Mobile Services
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SERVPERF	Service Performance
SERVQUAL	Service Quality
SIM	Subscriber Identity Module
SPSS	Statistical Package for Social Sciences
SQ	Service Quality
TLI	Tucker-Lewis Index
TRAI	Telecom Regulatory Authority of India
VAS	Value-Added Service
VIF	Variance Inflation Factor

NOTATIONS

%	Percentage
H	Hypothesis
α	Cronbach's Alpha
p	Probability value of significance level
df	Degrees of freedom
χ^2	Chi-Square
$\Delta\chi^2$	Change in Chi-square
SE	Standard Error
N	Number of observations
M	Mean
B	Unstandardized Beta Coefficient
SD / σ	Standard Deviation
β	Standardized Beta Coefficient
t	t-statistic
R^2	Coefficient of determination

CHAPTER I

INTRODUCTION

CHAPTER I
INTRODUCTION

Customer retention is a key concern for any service setting when the sector is highly dynamic, operating with high regulations, and having tough competition. The best example of such service sector is mobile telephone services particularly in India. The characteristics of services are industry-specific in nature. The service delivery differs from customer to customer because standardization of service delivery is highly impractical. Therefore, service providers need to develop innovative strategies by improving key service attributes to retain their customers.

The use of mobile services accounts for the phenomenal growth of telecommunications in India. People initially started with a purpose of calling and messaging through mobile communication device; slowly they were habituated to ringtones, hello tunes, listening to music, etc. In the present scenario, mobile technology plays a major role in terms of changing behavioural patterns of consumers in any sector. The penetration of mobile services has been influencing the consumers' lifestyle, preferences, and buying behaviour. Further, the current trends of mobile ecosystem strongly boost the ease of availing various services like banking, ticket booking, shopping, education, social media etc. with the support of mobile data. The advancement of mobile technology and internet based applications have boosted the growth rate of usage of mobile data. Now, people are more inclined to use latest advanced mobile applications to make their life simpler than ever before.

As per the performance indicators report October and December 2014, 92.77 percent of internet users are accessing the internet by wireless technology (both dongle and mobile phone) followed by fixed wireline 7.05 percent (TRAI, 2015) in India. Thus, it indicates clearly that there is a huge opportunity for the mobile operators to increase their market share by offering strong mobile data services to support advanced mobile applications in India.

1.1 Telecom sector in India: An overview

Telecommunication sector was liberalized in early 1990s which had an exponential growth rate over a period of time. Indian telecom is the second largest telecom sector in terms of subscriber base after China (COAI, 2015). The sector witnessed

tremendous technological changes, high customer expectations, and continuous challenges. Today, India is one of the fastest growing telecom markets in the world. The unprecedented increase in teledensity and sharp decline in tariffs in the Indian telecom sector have contributed significantly to the country's economic growth. Besides contributing about 3% to India's GDP, Telecommunications, along with Information Technology, has greatly accelerated the growth of the economic and social sectors. The National Telecom Policy 2012 aimed to transform the country into an empowered and inclusive knowledge-based society, using telecommunications as a platform. The summary of telecom data related to subscribers and teledensity in rural and urban areas, market share, GSM and CDMA subscribers are shown in the Table 1. According to TRAI report, it can be observed that urban teledensity is more than 100 percent, on the other hand rural teledensity is still standing at 44.96 and it is expected to reach 100 percent by 2020 (TRAI, 2013). The service providers have more growth opportunities in rural areas in terms of subscriptions of mobile services.

Table 1
Summary of Telecom sector in India (as on 31st December, 2014)

	Wireline + Wireless	Wireless	Wireline
Total subscribers (Million)	970.97	943.97	27.00
Urban subscribers (Million)	572.29	550.64	21.66
Rural subscribers (Million)	398.68	393.34	5.34
GSM subscribers (Million)	Not applicable	890.78	Not applicable
CDMA subscribers (Million)	Not applicable	53.19	Not applicable
Market share of Private operators (%)	89.16	91.01	24.24
Market share of PSU operators (%)	10.84	8.99	75.76
Teledensity	77.58	75.43	2.16
Urban Teledensity	148.06	142.46	5.60
Rural Teledensity	46.09	45.47	0.62

Source: www.trai.gov.in accessed on 23.05.2015

The telecom sector in India has undergone many challenges in the recent past, despite of these challenges the sector has grown at a pace of 7 percent compounded annual growth rate since 2009. The major trends and drivers of Indian telecom sector are as follows (Praveen, 2013):

1.1.1 Key trends of the telecom sector in India

- The telecom sector has reached saturation stage of its life cycle particularly in terms of prepaid subscriber base in metros, tier-I and tier-II cities. So, the growth rate of telecom service providers has reduced which in turn influenced profitability and average revenue per user (ARPU). Even though, the sector growth rate is visible, the low ARPU of the sector effects the service providers in India. India's ARPU is one of the lowest at $1.9 in the world (US $46, UK $32 and China $8.3).
- The enhancement of mobile data consumption is due to the increasing trends of adoption of smart devices and low cost accelerating the growth rate of mobile value-added services (MVAS). The growth rate of MVAS is at 20 percent per annum and it has reached $5 billion market in India. So, the shift of focus has been changed from voice to data.
- The telecom policies have focused on long term growth and delivery of quality services by reaching 100 percent penetration of telecom services in rural India by 2020. So, changing regulatory environment is another major trend of the sector.

1.1.2 Key drivers of the telecom sector in India

Smartphones, tablets and mobility are the three key drivers of the telecom sector in India. First, the rapid proliferation of smartphones boosted mobile data usage in the sector. The usage of mobile data, music and all other internet based applications, will lead to 15 to 20 percent of non-voice revenues in India by 2015. Second, tablets are another emerging category in India. Unlike PC markets, Tablet vendors are using retail channels extensively to push sales. Companies like Apple has increased its focus in India significantly by leveraging the distribution model, loans and EMI schemes. Finally, the mobile ecosystem is growing at a faster rate in India. Manufacturing, Banking, Financial Services and Insurance (BFSI), education, logistics and transportation enterprise developments have already taken place using mobile applications. The enterprise mobility market is estimated to reach more than $950 million by 2015. Samsung, HCL and Apple are focusing more on this B2B enterprise mobility and new players are getting attracted to the same opportunity.

The trends and key drivers of the telecom sectors can provide ample opportunities and stiff competition to the service providers in India. In addition, mobile number portability, free national roaming, and regulatory environment etc., further increase the competition in the sector. The service providers necessarily gain competitive advantage to overcome the competition as well as to fulfil the objectives and requirements of national telecom policy 2012.

1.1.3 Challenges of telecom sector in India

Even though the mobile operators have huge business growth opportunities, the sector is highly competitive, thirteen mobile operators are playing in Indian mobile telecom sector. The market share of wireless subscriber base for each service provider is comparatively very less and the highest market share of the leading operator is 22.74 percent (TRAI, 2014) as shown in Figure 1. As per the Indian telecom regulations, the mobile subscribers have no switching barrier, suggesting that operators have no control over the market. As a result, the subscribers have high flexibility to switch from one operator to another. It is highly complex to understand the behaviour of mobile subscribers. The regulations are very particular about quality of services, consistent network irrespective of devices and location and 100 percent rural penetration. The growth potential of a mobile operator is huge, at the same time it has a very big challenge in terms of retaining existing customers and attracting the new from the rural areas by fulfilling the telecom regulations. Therefore, the service providers are facing more challenges in terms of maintaining market share, attracting new customers, gaining customer loyalty, maintaining profitability, and government regulations (Eshghi, Roy, & Ganguli, 2008).

Therefore, as the market growth rate slows down or when a high competitive environment exists, the mobile network operators should focus more on retaining the existing customers and attracting the new by offering superior service quality (Chandra, & Deepa, 2009) especially for Indian mobile telephone services. In light of the above challenges, the mobile operators should focus more on improving service performance which in turn leads to customer satisfaction and financial performance (Eshghi, Roy, & Ganguli, 2008). In addition, the literature shows that there is a high probability of satisfied customers to stay with the present service providers (Cronin Brady, & Hult, 2000). Also, the studies indicated that network aspects and customer

care aspects have significat positive impact on mobile service performance, satisfaction, and loyalty (Wang, Lo, & Yang, 2004; Kim, Park, & Jeong, 2004; Lai, Griffin, & Babin, 2009; Santouridis, & Trivellas, 2010).

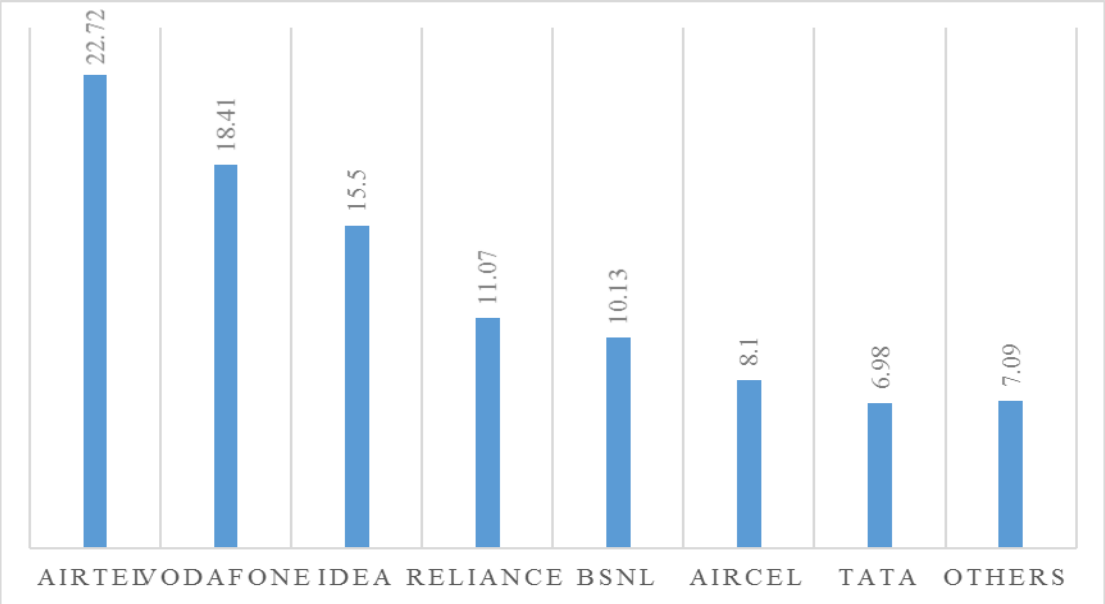

Figure 1: Market share of mobile operators as on 31.12.2014 (source: TRAI, 2015)

Thus, the complex nature of the telecom services demands quality driven service delivery and customer retention. Accordingly, the service providers should support consistent and reliable mobile network services with a strong customer care support system for delivering the best quality of mobile services. Further, it is highly important for mobile operators to align mobile service offerings with subscribers' behavioural patterns to formulate competitive strategies. Therefore, the mobile operators should focus more on improving service quality as a key strategy to retain the existing customers and attract the new. Hence, it is inevitable to study quality of service, customer satisfaction and customer retention in Indian mobile telephone service setting.

1.2 Theoretical justification of the study

From the academic perspective, "*Behavioural Consequences of Service Quality*" (BCSQ) revealed that behavioural intentions are strongly influenced by quality of service, and customer retention is one of the outcome of favourable behavioural intentions (Zeithaml, Berry, & Parasuraman, 1996). Also, the authors indicated that unfavourable behavioural intentions leads to switching from present service provider to a competitor. The "*Mediator Model of Customer Satisfaction*" (MMCS) proved that

customer satisfaction mediates the relationship between service quality and behavioural intentions (Dabholkar, Shepherd, and Thorpe, 2000). It indicates that service quality has indirect effect on behavioural intentions. Thus, it implied that quality of service has indirect effect on customer retention through customer satisfaction. Fornell, Johnson, Anderson, Cha, & Bryant (1996) in their study indicated that "*customer expectations*", "*perceived quality*" and "*perceived value*" are the antecedents; and "*customer complaints*" and "*customer loyalty*" are the consequences of "*overall customer satisfaction*". Authors developed a model, *American Customer Satisfaction Index* (ACSI), and proved that satisfied customers will become loyal and those having dissatisfaction will complain. By combining all the three models discussed above, BCSQ, MMCS and ACSI, it is evident that expectations, quality and value are the antecedents; and customer retention and switching behaviour are consequences of customer satisfaction.

1.2.1 Service quality

The concept of Service Quality (SQ) is highly relevant in any service context. It is very complex in nature, the service delivery vary from employee to employee, and customer to customer due to industry specific characteristics such as "intangibility", "heterogeneity", and "inseparability" (Parasuraman, Zeithaml, & Berry, 1985). The conceptualization of SQ was based on disconfirmation theory and perceived quality in service marketing literature. Perceived quality can be viewed as "*the consumer's judgment about a product's overall excellence or superiority*" (Zeithaml, 1988, p. 3). Perceived SQ was conceptualized as "*global judgment, or attitude, relating to the superiority of the service*" (Parasuraman, Zeithaml, & Berry, 1988, p. 16). Therefore, SQ is a key differenciator for any service sector to gain competitive advantage in the saturated markets like mobile telecom services particularly in India.

1.2.2 Customer retention

One of the major challenges of researchers is to define and measure the concept of customer retention. Firms mainly focus on attracting the new customers and retaining existing customers particularly in the service sector. Customer retention is termed as "*preventing customers from defecting by learning from former customers, analysing complaints and service data, and identifying and raising barriers to customers' switching*" (Ahmad, & Buttle, 2002; DeSouza, 1992). It implies that service providers

control the market by offering rigid switching barriers. Accordingly, customer has no flexibility to switch and stay with the company for the specified contract period. On the other hand, customer retention can be seen as "*a function of a more complex relationship between the parties in which satisfaction and social bonding are only part of the total set of variables that lead to commitment to the relationship and customer retention*" (Wilson, Soni & O'Keeffe, 1995). According to the authors, customer retention can be achieved by business relationship. Higher customer satisfaction, building trust, quality of interaction, mutual benefits, commitment of the customers and performance of the service are key elements that lead to relationship based customer retention. In the literature, retention was conceptualized from company's point of view. It indicated that how a company tries to retain its customer by putting some switching barriers. The literature also indicates that retention was viewed from relationship perspective. But, this study tried to conceptualize retention from behavioural intentions perspective. It implies that how a customer gains an intention to stay with a mobile operator depends on the quality offerings delivered by the operators. Therefore, customer retention is conceptualized as customer intention to stay in this study.

1.3 Statement of the problem

The aim of National Telecom Policy 2012 was to improve quality of services. It implied that service quality is a key concern for the Indian telecom sector. From the operators' point of view, market is saturated and have a major challenge to attract the new customers as well as maintaining the market share due to high competition and government regulations. From the academic perspective, Indian mobile operators should focus more on customer retention by improving service quality as discussed in the previous sections.

1.4 Purpose of the study

Inline with the above background, this study seeks to examine the structural relationship between quality of mobile services and customer intention to stay with a mobile operator in India. The specific purpose of this study is to:

- Develop and validate a measurement scale mTelQual for quality of mobile services in India and re-examining the same in united AP.
- Conceptualization of customer intention to stay.

- Linking quality of mobile services and customer intention to stay.
- Examining the relationship between quality of mobile services and customer intention to stay, how the relationship is influenced by moderating and mediating variables.
- Measuring quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay in united Andhra Pradesh and India.

1.5 Operational definitions of the constructs

Quality of mobile services, mobile subscriber expectations, mobile subscriber value, mobile subscriber satisfaction, mobile subscriber switching behaviour, and customer intention to stay are the key constructs of the study. These constructs are defined as follows:

- **Service quality**

  According to Cronin and Tylor (1992), it is defined as the superiority of service performance of a firm as perceived by the customers.

  Quality of Mobile Services (QMS) refers to the subscribers' perceived performance of mobile operators in terms of accessibility, network, data, and customer care services.

- **Customer expectations**

  According to Johnson, Nader, & Fornell (1996, pp. 169), customer expectations can be defined as "*how a product or service has performed in the past as well as how it is likely to perform in the future*".

  Mobile Subscriber Expectations (mExp), in this study, refers to what subscribers believe mobile operators "should" offer.

- **Perceived value**

  Zeithaml, (1988, pp. 14) defined perceived value as "*the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given*".

  Mobile Subscriber Value (mSV), in this study, refers to the perceived value received by a subscriber from a mobile service provider at the cost of the subscriber's total efforts to fulfil his/her service requirements.

- **Customer satisfaction**

  According to Oliver (1980) customer satisfaction is an overall affective response to a perceived discrepancy between prior expectations and perceived performance after consumption.

  Mobile Subscriber Satisfaction (mSS), in this study, refers to a subscriber's positive response to mobile service requirements that are fulfilled by the mobile service provider.

- **Customer retention**

  According to Wilson, Soni & O'Keeffe, (1995), customer retention can be seen as "*a function of a more complex relationship between the parties in which satisfaction and social bonding are only part of the total set of variables that lead to commitment to the relationship and customer retention*". In this study, it is conceptualized as customer intention to stay.

  Customer Intention to Stay (CIS), in this study, refers to a customer's commitment to stay and maintain a business relationship with his/her present mobile operator in the future. The commitment is developed over a period of time based on overall satisfaction and superior performance of the service provider.

- **Price**

  According to Zeithaml, (1988, pp. 10) price can be defined as "*what is given up or sacrificed to obtain a product*". In this study, price referred as a tariff that is given up to avail mobile services.

- **Structural relationship** refers to a dependence relationship between two latent constructs (Hair, Black, Babin, & Anderson, 2010). In this relationship, one construct depends on other independent construct. For example, Customer Intention to Stay (CIS) depends on Quality of Mobile Services (QMS). Here, CIS is a dependent construct whereas QMS is an independent construct.

- **Mediator**

  According to Baron & Kenny (1986, pp. 1176) "*a given variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion*". Also, the authors specified that independent variable influences the dependent variable indirectly through mediating variable. Therefore, in this study, mobile subscriber value and subscriber

satisfaction are two mediating variables that influence the effect of quality of mobile services on customer intention to stay.

- **Moderator**

  Baron & Kenny (1986, pp. 1174) defined moderator is "*a qualitative (e.g., sex, race, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent or predictor variables and a dependent or criterion variable*". It implies that moderator can be any demographic or categorical or any metric variable which influences the relationship between the two variables. Thus, moderating variables, in this study, refer to *demographic* (a. gender, b. age, c. education, d. occupation), *technical* (a. mobile technology, b. mobile data, and c. type of mobile phone) and *functional* (a. type of mobile connection, b. multi-SIM, c. user group, d. purpose of mobile usage, e. experience of mobile usage, and f. usage level of mobile services) variables, expectations of mobile subscribers and price.

- **Mobile operator/mobile service provider,** in this study, refers to any licenced entity which is offering mobile services in India under the guidelines of telecom regulatory authority of India. The list of mobile operators are as follows (TRAI, 2015):

1	Bharati Airtel	8	Telewings
2	Vodafone	9	Sistema
3	Idea	10	Videocon
4	Reliance	11	MTNL
5	BSNL	12	Quadrant
6	Airtcel	13	Loop
7	Tata		

- **Mobile services**, in this study, refer to mobile telephone services.

1.6 Rationale of the study

Indian telecommunications sector is the second largest in the world after China (TRAI report, 2014) in terms of subscriber base. It is the right service setting to study quality of mobile services and customer intention to stay because of the following reasons (Lemmens and Croux 2006; Maicas, Polo, and Sese, 2009; and Polo, Sese, & Verhoef, 2011):

- Long-term relationship is very important for the success of any company in the competitive markets like mobile services because of homogeneity i.e., all the mobile service operators provide more or less same service (Gerpott et al., 2012; Chandra and Deepa 2009),
- Cost of gaining competitor's subscribers is much higher than the cost of retaining the existing subscribers (Ang, & Buttle, 2006), quality of service and overall service satisfaction are useful in improving customer retention (Liang, Ma, & Qi, 2013).
- Tiff competition, low profit margins, revenue leakage, poor customer service, churn rate, and high government regulations (Eshghi, Roy, & Ganguli, 2008).
- Mobile number portability provides the subscribers, more flexibility to switch network operator (TRAI 2013),
- Indian market is saturated, wireless tele-density is 75.43 (TRAI, 2015), therefore, no attractive subscriber additions (Lee, Lee, & Feick,2001),
- Declining trend of average minutes of usage per subscriber and average revenue per user (TRAI 2013).

Hence, mobile service providers should focus on customer retention and winning competitors' customers by improving service quality. There were no studies that focus on the conceptualization of customer retention as customer intention to stay and linking it with quality of mobile services. Further, no studies were found on quality of mobile services after implementation of mobile number portability service in India. Besides, no scale was developed and validated to measure the quality of mobile services in Indian context. Furthermore, there were no studies that examine the structural relationship between quality of mobile services and customer intention to stay by mediating and moderating variables. The rationale for the study is to understand the subscribers' view point at which attributes he/she will perceive more quality and develop an intention to stay with a mobile network operator. Accordingly, mobile network operators open their avenues for developing innovative strategies to retain their subscribers.

1.7 Research process and organization of the study

In general, any research process starts with review of literature to identify a research problem. Similarly, the study starts with review of literature on service quality. The study also reviewed concepts and theories of service quality and customer retention. Next, the study identified mobile service sector to carry out the research. The study explored key measures and dimensions of the quality, conceptualization of customer intention to stay, and mediating and moderating variables. A structured questionnaire was developed based on literature review, interviews, focused group discussions and two pilot studies. The data was collected across India (to develop and validate mTelQual, mediation and moderation models) and from both the states of Andhra Pradesh and Telangana (re-examining mTelQual, mediation and moderation models) through offline and online mode. Relevant statistical tools and techniques were used to analyse the data. Finally, a report has been written based on the results of the study.

The flow chart of the organization of the study is as follows:

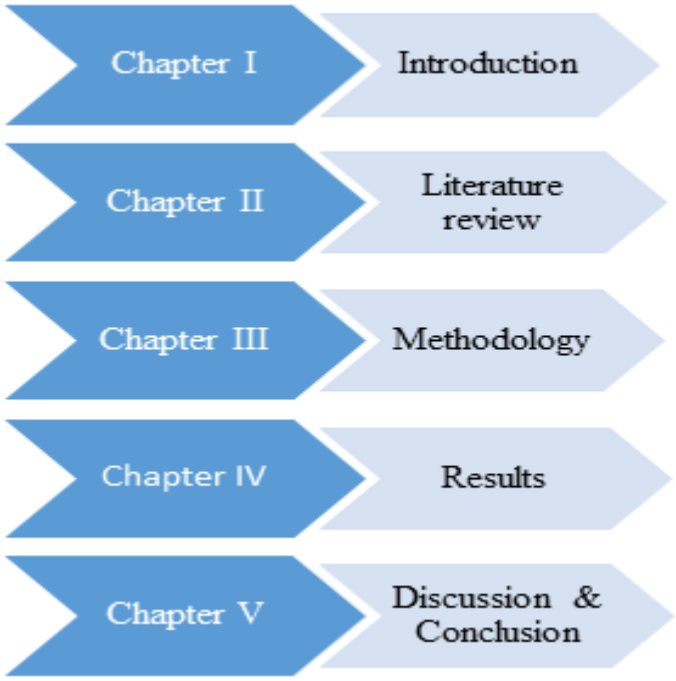

Figure 2 Organization of the study

In this study, Chapter I presents the background of the problem, purpose, justification, and operational definitions of the terms of the study.

In this study, Chapter II presents the extensive literature review. It discusses underlying theoretical concepts, models and empirical results of the previous studies on service quality, customer retention and other related constructs. This chapter provides support for formulating hypotheses and conceptual model of the study. It brings out a theoretical framework of the study.

Chapter III provides research methodology of the study. It includes population, target population, accessible population, sampling plan, sample size and its justification, and statistical tool and techniques used for the data analysis and its justification.

Chapter IV presents demographic profile of the respondents, descriptive statistics, scale development and validation, mediation analysis, moderation analysis, and results of hypotheses testing.

Finally, Chapter V provides interpretation of the results and discussion. In addition, it provides the practical and theoretical implications, limitations and direction for future research.

Background of the problem, purpose, justification, and operational definitions of the terms of the study were discussed in this chapter. The next chapter highlights the extensive review of underlying theoretical concepts, models and empirical results of the previous studies on service quality, customer retention and other related constructs. The next chapter provides the support for formulating research hypotheses and conceptual models, and it brings out a theoretical framework of the study.

CHAPTER II
LITERATURE REVIEW

CHAPTER II

LITERATURE REVIEW

The term "quality" is a very complex and multidimensional concept. It is difficult to communicate precisely what exactly meant by the term quality in many functional areas of business management (Garvin, 1984). The literature shows, many prominent authors who have given different views for quality as follows.

According to Juran, quality can be viewed as "*fitness for use*" which implies that how a product or service is appropriate to fulfil the needs of customers. Juran identified five dimensions for the fitness as follows: "*quality of design*" (specifications of a product), "*quality of conformance*" (match between actual product and design), "*availability*" (reliability and maintainability of product), "s*afety*" (risk of injury due to product hazards), and "*field use*" (condition of a product after reaching customers' hands) (Juran, 1992; March, 1996; Beckford, 2010). Crosby viewed quality as "*conformance to requirements*" meaning that if a product or service is consistently reproducing a design specifications, then it is said to be high quality (Crosby, 1979, 1985; March, 1996; Beckford, 2010). According to Deming, quality can be viewed as a top management responsibility to improve products and/or services continuously for fulfilling the requirements of customers' needs, and stay ahead of competition (Deming, & Edwards, 1982, March, 1996; Beckford, 2010). The term "quality" is also viewed as a measure of excellence and it has been used to measure the excellence of products and/or services (Madu, & Madu, 2002).

2.1 Dimensions of quality

The literature also shows that a product and/or service is said to be of high quality if the product or service has the following eight key attributes (Garvin, 1987; Madu, & Madu, 2002).

i. *Performance* – meeting the primary performance of a product and/or service.
ii. *Features* – additional value added benefits of a product and/or service
iii. *Reliability* – consistent performance of a product and/or service
iv. *Durability* – usefulness of a product repeatedly
v. *Serviceability* – resolves post-sales customer problems
vi. *Conformance* – product's and/or service's ability to satisfy a customer

vii. *Perceived quality* – customer's perceived performance of a product/service based on past experience.

viii. *Aesthetics* – sensory characteristics of a product/service such as feel, appearance, sound, etc.

The eight dimensions of quality proposed by Garvin, (1987) have been applied well in measuring the quality of products, but not quality of services. The characteristics of services vary customer to customer and employee to employee. It is very difficult to standardize quality of services. So, measuring quality of services is very complex and difficult in nature (Madu and Madu, 2002). The concept of service quality is explained in the following section.

2.2 Service quality

The concept of Service Quality (SQ) came into the prominence in the early 1980s, when practitioners realized that product quality alone is not enough to gain competitive advantage. The term "service quality" is very complex and difficult to measure. Many researchers, practitioners and academicians have explored the concept from different viewpoints. One major contribution to the concept was proposed and developed by Parasuraman, Zeithaml, & Berry, (1988) in the form of *SERVQUAL*, a comprehensive model used to measure a company's SQ. This model has been widely accepted and used by practitioners, managers and researchers, owing to its strong impact on business performance, lower costs, customer satisfaction, and profitability (Nitin, & Deshmukh, 2005). The *SERVQUAL* has been widely applied in various service industries (Ladhari, 2009), including healthcare (Carman, 1990; Headley, & Miller, 1993; Lam, 1997; Kilbourne, Duffy, Duffy, & Giarchi, 2004), banking (Lam, 2002; Zhou, Zhang, & Xu, 2002), fast food (Lee, & Ulgado, 1997), telecommunications (Van der Wal, Pampallis, & Bond, 2002; Lai, Hutchinson, Li, & Bai, 2007; Abu-El Samen, Akroush, & Abu-Lail, 2013), retailing (Parasuraman, Zeithaml, & Berry, 1994), Education (Rigotti & Pitt, 1992; McElwee, & Redman, 1993; Anderson, 1995; Ford, Joseph, & Joseph,1999; Alves, & Vieira, 2006), information systems (Jiang, Klein, & Crampton, 2000), and library services (Cook, & Thompson, 2001). The scale has also been applied in several different countries (Ladhari, 2008), including USA (Babakus, & Boller, 1992; Pitt, Watson, & Kavan, 1995; Ford, Joseph, & Joseph, 1999; Jiang, Klein, & Crampton, 2000; Kilbourne,

Duffy, Duffy, & Giarchi, 2004), New Zealand (Ford, Joseph, & Joseph, 1999) China (Lam, 2002; Zhou, Zhang, & Xu, 2002; Lai, Hutchinson, Li, & Bai, 2007), Jordan (Abu-El Samen, Akroush, & Abu-Lail, 2013), Australia (Baldwin, & Sohal, 2003), Cyprus (Arasli, Mehtap-Smadi, & Katircioglu, 2005), Hong Kong (Kettinger, Lee, & Lee, 1995; Lam, 1997), Korea (Kettinger, Lee, & Lee, 1995), South Africa (Pitt, Watson, & Kavan, 1995; Van der Wal, Pampallis, & Bond, 2002), the Netherlands (Kettinger, Lee, & Lee, 1995), and the UK (Pitt, Watson, & Kavan, 1995; Kilbourne, Duffy, Duffy, & Giarchi, 2004). Many authors have attempted to describe the quality of services. Some proponents of quality of service state that quality can be defined only by customers, and occurs when an organization supplies goods or services to a specification that satisfies customers' needs. Others simply define quality as the satisfaction of customer expectations (Richard, Linda, & Thomas, 2009). The meaning of SQ is very complex and more abstract in nature than the product quality due to the fact that service characteristics are intangible, perishable, simultaneously produced and consumed, and heterogeneous (Parasuraman, Zeithaml, & Berry, 1985, 1988 and Ladhari, 2009). Thus, delivering consistent SQ is also a major challenge for marketers (Zeithaml, & Bitner, 2000).

Against this background, SQ can be viewed as different perspectives as follows:

The literature shows, SQ can be viewed in two different perspectives (Prakash, & Mohanty, 2013). First, 'Nordic' view point (Groonroos, 1984), which defines SQ in terms of technical and functional quality. According to Groonroos, technical quality is termed as the process outcome, when a customer interacts with a service process of a firm, the outcome of the process is important to him/her to assess the quality of services of the firm. On the other hand, functional quality is termed as how the customer gets the outcome i.e., during the interaction, how is the performance of firm's employees (their responsiveness, willing to help, support etc.)? Therefore, technical quality addresses the question what customer receives, whereas functional quality addresses the question how he/she receives it. According to Gronroos (1984, p. 37) perceived SQ is defined as:

> [. . .] *the outcome of an evaluation process, where the consumer compares his expectations with the service he perceives he has received, i.e., he puts the perceived service against the expected service. The result of this process will be the perceived quality of the service.*

Second, 'American' view point (Parasuraman, Zeithaml, & Berry, 1985, 1988), which describes SQ in terms of customer's overall attitude towards service firm, and conceptualized based on disconfirmation theory. The authors viewed SQ as a gap between customer expectations and perceptions of service performance of a firm. The authors developed the *SERVQUAL* scale, which include service encounter characteristics (*tangibility, reliability, responsiveness, assurance, and empathy*), to measure SQ. According to Parasuraman, Zeithaml, & Berry, (1988, p. 17), SQ is defined as:

> [. . .] "*The degree and direction of discrepancy between customers' service perceptions and expectations*".

The operationalization of SQ construct is proposed by Parasuraman, Zeithaml, & Berry, (1988) in the form of *SERVQUAL* instrument. The instrument is a multi-item scale constituted 44-items for both measures of expectations and perceived performance. Based on disconfirmation theory, the concept of SQ is operationalized as follows:

$$SQ_i = \sum (P_{ij} - E_{ij})$$

Where, SQi = perceived SQ of individual 'i'; k = number of service attributes; P = perception of individual 'i' with respect to performance of a service firm attribute 'j' (j = 1 to k); and E = SQ expectation for attribute 'j' that is the relevant norm for individual 'i'.

The higher gap score (P minus E) indicates that high perceived SQ. Therefore, SQ can be defined as the difference between customer expectations and the company's actual performance (Parasuraman, Zeithaml, & Berry, 1985, 1988).

Although the SERVQUAL instrument developed by Parasuraman and his colleagues has been applied across the world, many researchers identified potential difficulties (Carman, 1990; Cronin, & Taylor, 1992; Asubonteng, McCleary, & Swan, 1996; Buttle, 1996; Lam, 1997; Van Dyke, Kappelman, & Prybutok, 1997; Arasli, Mehtap-Smadi, & Katircioglu, 2005; Badri, Abdulla, & Al-Madani, 2005; Jabnoun, & Khalifa, 2005; Landrum, Prybutok, & Zhang, 2007). Particularly, critics on applicability of *SERVQUAL* dimensions with psychometric properties in all service settings. In line with this view, Dabholkar, Thorpe, & Rentz, (1996, p. 14) stated as single SQ instrument is not feasible for all the services. Accordingly, the researchers suggested for industry-specific replacement of the instrument for measuring SQ

(Ladhari, 2008, 2009; Babakus, & Boller, 1992; Van Dyke, Kappelman, & Prybutok, 1997; Caro, & Garcia, 2007).

Many authors also questioned the conceptual basis for *SERVQUAL* scale mainly Cronin, & Tylor (1992). Afterwards, Cronin, & Tylor (1992) re-examined the measurement of SQ to overcome issues in measuring SQ based on performance-only model by proposing *SERVPERF* instrument. Authors argued that conceptual basis of *SERVQUAL* scale is confusing with service satisfaction, and expectations can be discarded in the measurement of SQ. Therefore, according to Cronin, &Tylor, SQ can be defined as the superiority of service performance of a firm as perceived by the customers. Based on performance-only model, the concept of SQ is operationalized as follows:

$$SQ_i = \sum P_{ij}$$

Where, SQi = perceived service quality of individual 'i'; k = number of service attributes; P = perception of individual 'i' with respect to performance of a service firm attribute 'j' (j = 1 to k).

The superiority of *SERVPERF* scale over *SERVQUAL* scale is tested empirically by conducting the survey in four service sectors such as banking, pest control, dry cleaning and fast food. Even though, *SERVQUAL* is widely used across the world, slowly the robustness of *SERVPERF* made an impact over a period of time in measuring the SQ with 22-items of perceived performance. Therefore, performance-only instrument not only reduced the number of items (44 items to 22 items), but also superior over disconfirmation based *SERVQUAL* instrument.

Hence, it can be observed that 'performance-only' instrument (*SERVPERF*) is more relevant in measuring SQ. The *SERVPERF* scale consists of original 22-items of *SERVQUAL* perceived performance, and has five dimensions as stated below.

2.3 Dimensions of "service quality"

Service Quality (SQ) is a reflective construct and it cannot be measured directly. The SQ perceptions depend on multiple attributes – for example, core service, physical facilities, interaction with service executives, etc. (Bitner, & Hubert, 1994). The main antecedents of the SQ are customer expectations and perceived performance of services (Chadha, & Kapoor, 2009). Based on this conceptualization, Parasuraman,

Zeithaml, & Berry, (1988) made the first attempt to measure the SQ and developed a comprehensive scale (SERVQUAL). The authors included human aspect to the eight dimensions of quality (Garvin, 1987), related those dimensions according to the nature of services by conducting exploratory study (Parasuraman, Zeithaml, & Berry, 1985, 1988) and proposed the following five dimensions:

i. *Tangibles* – deals with physical facilities, equipment, personnel and communication materials required for service delivery.
ii. *Reliability* – measures dependability and consistency of service over time.
iii. *Responsiveness* – deals with how promptly the service is delivered to the customers.
iv. *Assurance* – knowledge and courtesy of employees to build trust and confidence of the service provider.
v. *Empathy* – deals with individualized attention to the customers.

The concept of SQ is a multi-dimensional construct in the services literature. The SQ concept is a judgement of consumers about a firm's superiority (Zeithaml, 1987 and Parasuraman, Zeithaml, & Berry, 1988). It differs from product quality and it is viewed as a "*form of attitude, related but not equivalent to satisfaction, and results from a comparison of expectations with perceptions of performance*" (Parasuraman, Zeithaml, & Berry, 1988, p. 15). Therefore, SQ is a customers' perceived quality and a measure of how far the level of service delivery meets service expectations of the customers (Madu, & Madu, 2002).

Against this background, SQ can be defined as customers' attitude towards perceived performance of a firm (Cronin, & Tylor, 1992), which is different from service satisfaction (Parasuraman, Zeithaml, & Berry, 1988).

2.4 Conceptualizing Quality of Mobile Services (QMS)

The traditional *SERVQUAL* instrument measures the company's service according to five dimensions: *tangibles, reliability, assurance, responsiveness, and empathy*. Over the past four decades, a great deal of research has addressed various aspects of SQ. The concept SQ is generally recognized as a critical success factor in a firm's endeavours to differentiate itself from its competitors. Research has shown that good SQ leads to the retention of existing customers and the attraction of new ones,

reduced costs, an enhanced corporate image, positive word-of-mouth recommendation, and ultimately, enhanced profitability (Parasuraman, Zeithaml, & Berry, 1988; Reichheld, & Sasser, 1990; Rust, & Zahorik, 1993; Cronin, Brady, & Hult, 2000; Kang, & James, 2004).

In spite of large adoptability of SERVQUAL scale for measuring SQ in many sectors, there are many issues and critiques on the scale in terms of applicability due to the specific characteristics of services. The *SERVQUAL* scale is mainly based on the role of human element in service delivery. The applicability of the scale may not be fruitful to the sectors where technology plays a major role instead of humans particularly in mobile telephone services. Hence, it is imperative to develop and validate a measurement scale for mobile telephone services.

The literature shows that there were many studies carried out across the Globe in mobile telecommunications service sector. Van der Wal, Pampallis, & Bond (2002) conducted a study by adopting *SERVQUAL* scale to measure SQ at cellular outlets in South African mobile service setting. The study revealed that the scale is reliable, but it doesn't achieve discriminant validity. The study conducted by Kang, (2006) highlighted the conceptualization of SQ in terms of both technical and functional quality and it was tested empirically in Korea. The study revealed that the two-component model which constitutes both technical and functional quality aspects of SQ assessment yields better results than other models (i.e., a model which focus only on functional aspects such as "*SERVQUAL*"). Lai, Hutchinson, Li, & Bai, (2007) tested the validity and reliability of *SERVQUAL* (Parasuraman, Zeithaml, & Berry, 1988) by adding convenience dimensions in the context of China mobile service sector. Eshghi, Roy, & Ganguli, (2008) conducted a survey in Indian context and explored six major dimensions: rational quality, competitiveness, reliability, reputation, support features and transmission quality using exploratory factor analysis. Chandra and Deepa (2009) also conducted a survey in India by adopting *SERVQUAL*. The study added perceived network quality, price structure, value added services and convenience to *SERVQUAL* dimensions. The study conducted by Santouridis and Trivellas (2010) explored five dimensions of SQ in mobile service sector: network, value added services, mobile devices, customer service, pricing structure and billing system in Greece mobile services setting. A study conducted by Paulrajan, &

Rajkumar, (2011) pointed out that communication quality, call service, facilities, price, customer care and service provider's attributes play a major role for consumers' perception choice of selecting the service provider in India.

Nimako, (2012) conducted a survey in Ghana mobile service settings. The study adopted *SERVQUAL* and modified the scale to measure SQ. Technical quality, image, economy, reliability, assurance, responsiveness, empathy and tangibles were explored by the study. The study conducted by Malhotra, & Kubowicz, (2013) revealed that technical reliability, in-store responsiveness, phone responsiveness, online service affiliation and service flexibility are the key dimensions of SQ in US mobile service sector. Hosseini, Bahreini, & Ziaei Bideh, (2013) developed and validated a scale called MS-Qual in the context of Iranian mobile service sector. The authors explored seven dimensions of mobile telephone SQ: *network quality, value-added services, pricing plans, employee's competency, billing system, customer service and convenience*. The scale did not achieve minimum criteria for fit indices. The study reported GFI = .83 and .85 and RMSEA = .77 and .67, for first order and second order construct respectively. The sample size of the study was very less i.e., 363 and the data was collected form only two operators. Therefore, the reliability and validity of the MS-Qual is questioned. The study reviewed various scholarly research articles to conceptualize quality of mobile services (see Table 2).

The review of the literature shows that most of the previous studies have adopted and modified *SERVQUAL* scale developed by Parasuraman, Zeithaml, & Berry, (1988). The *SERVQUAL* scale is developed based on the human role in service delivery, but technology plays a major role in mobile service delivery as stated in the previous section. Few studies were focused on the network quality, call quality, transmission quality, customer service, value-added services, billing and pricing issues as applicable to the sector. It is clear that there is no consistency of the dimensions of quality of services in mobile telephone service in the exiting studies. Also, there was no difference of major dimensions of the quality of mobile services between global perspective and Indian perspective.

Table 2
Summary of previous studies in Telecom sector

Author (s)	Year	Dimensions	Country
Gerpott, Rams, & Schindler	2001	Retention, Image, satisfaction, loyalty - phone no., new terminal, personal benefits, assessment of prices, assessment of network quality, assessment of customer care,	Germany
Wang and Lo	2002	Behavioral intentions, value, network quality, satisfaction, *SERVQUAL*, sacrifice, SQ	China
Shin	2006	Switching cost, MNP, subscriber lock-in, competition, price and service	US
Kang	2006	Functional quality (reliability, responsiveness, assurance, empathy, tangibles) Technical Quality (success in calling, interference during call, completeness)	Korea
Lee, Kim, Lee, & Park	2006	MNP and switching cost	Korea
Kassim	2006	Service Coverage, billing integrity, quality of line, customer service, and customer service outlet	Malaysia
Buehler, Dewenter, & Haucap	2006	MNP, switching cost, termination charges, market share, investment, entry,	Europe
Rahman	2006	*SERVQUAL* dimensions	India
Lai, Hutchinson, Li, & Bai	2007	*SERVQUAL* dimensions	China
Seo, Ranganathan, & Babad	2008	Length of association, service plan complexity, handset sophistication and the quality of connectivity; demographics, switching cost, customer satisfaction and retention	US
Eshghi, Roy, & Ganguli	2008	Rational quality, competitiveness, reliability, reputation, support features, and transmission quality.	India
Chadha and Kapoor	2009	*SERVQUAL* dimensions and Network quality, price structure, value added services, and convenience.	India
Lai, Griffin, & Babin	2009	Service quality, value, satisfaction, image and loyalty	China
Maicas, Polo, & Javier Sese	2009	Mobile number portability and switching cost	Spain
Lu, Zhang, & Wang	2009	Service quality, interaction quality, environment quality outcome quality and corporate image	China

Shi, Wu, & Liu	2010	Call quality, mobile device, switching costs, attractiveness of alternatives and customer satisfaction	China
Abu-ELSamen, Akroush, Al-Khawaldeh, & Al-Shibly	2011	customer service skills components - reputation building skills, nonverbal communication skills, and customer service culture; customer service satisfaction dimensions (overall, functional, and technical customer satisfaction); loyalty	Jordan
Gautam and Kumar	2011	*SERVQUAL*, price, product quality, and promotion.	India
Paulrajan and Rajkumar	2011	Communication, call service, facility, price and customer care.	India
Geetha and Kumari	2011	Extent of local calls to other networks, extent of STD calls to other networks, VAS Usage, and overall usage revenue per minute slab	India
Narayan and Jain	2011	service charges and plan, network quality, service quality and brand image	India
Jeng and Bailey	2012	service price, switching cost, phone SQ, phone plan quality, complaint management, customer service quality, brand image and social norms. Cost, product qualityc and ustomer experience	Canada
Karjaluoto, Jayawardhena, Leppäniemi, & Pihlström	2012	Relationship age, loyalty, trust and value	Finland
Liang, Ma, & Qi	2013	Service encounter failure, competition, inconvenience, core service failure, ethical problems, family/friends/group impact and price	China
Nikou and Mezei	2013	Communication, entertainment, information web 2.0, and transaction	Europe/ Finland
Otsuka and Mitomo	2013	User benefits after MNP, switching pattern and switching cost	Japan

2.4.1 Dimensions of quality of mobile services

The mobile subscribers look at various aspects to perceive Quality of Mobile Services (QMS) in terms of network availability, signal strength, voice clarity, coverage of the network, customer care aspects, tariff, promotional offers, responsiveness of customer care executives, speedy resolution of customer complaints, knowledge and courtesy of customer care executives, reliability of mobile services, range of service package offerings, availability of latest mobile service applications, etc. The subscribers' requirement can be achieved by improving the above all aspects. Therefore, mobile operators should focus the same. The literature shows there are numerous studies on focusing on the dimensions of mobile service quality as shown in see Table 2. The

study synthesized the dimensions of QMS based on the extensive literature since 2001 in both global and Indian perspectives. The study synthesized the above dimensions as given below:

- **Network aspects –** deals with signal strength, reliability of signal, and coverage, evaluates voice clarity, disturbance in call duration, call drop, call connectivity, receiving calls and messages.
- **Mobile data services** – focus on connectivity of added services such as 3G, GPRS, internet, and other data services, reliability of VAS services, service availability of advanced mobile applications such as 3G, internet/mobile data, m-banking, m-shopping etc., accuracy and dependability of advanced mobile services.
- **Customer care aspects** – include connectivity of customer care number, availability of executives, prompt service of executives, knowledge and courtesy of executives to resolve customer complaints, speed of resolving complaints, technical support for advanced mobile services and relationship aspects of service provider.
- **Accessibility** – includes convenience, ease of subscribing and changing service, ease of bill payment/recharge, flexibility to lodge a complaint, mobile number portability, mobile number portability, tariffs (basic as well as advance mobile services) and transparency of service tariffs.

Therefore, the dimensions of SQ for technology based services vary in particular mobile telephone services.

Based on the extensive literature review on quality in mobile services, the study conceptualized SQ in mobile telephone services as Quality of Mobile Services (QMS). It is a reflective multi-dimensional construct which includes four dimensions: network service, data service, customer care service and accessibility. QMS is the perception of mobile service subscribers on the services delivered by mobile network operators i.e., subscribers' perceived performance of mobile service providers. The subscribers evaluate the services based on their prior experience of usage of mobile services. Thus, quality of mobile services can be defined as "the subscribers' perceived performance of mobile service provider in terms of accessibility, network, data, and customer care services".

2.5 Conceptualizing Customer Intention to Stay (CIS)

Customer Retention (CR) is a key concern and firms mainly focus on retaining existing customers and attracting the new, particularly in the any service sector. Customer retention is often referred in terms of customer loyalty. There were many empirical studies which indicated that if customers are loyal then it is said to be customer retention (Reichheld, 1992; Hennig-Thurau, & Klee, 1997; Mittal, & Lassar, 1998; Bloemer, De Ruyter, & Wetzels, 1999; Homburg, & Giering, 2001; Keiningham, Aksoy, Wallin, Cooil, & Wahren, 2006; Asiah Omar, Aniza Che Wel, Abd Aziz, & Shah Alam, 2013; Izogo, & Ogba, 2015).

Defining and measuring customer retention is a major challenge for the researchers in marketing. Customer retention can be defined as managing the business relationship with company and its customers (Gerpott, Rams, & Schindler, 2001). The authors indicated that CR can be achieved in two ways: (a) when the customer extends his/her contract with the supplier for subsequent purchases, and (b) when the customer intends to go for future purchases from the same service provider. On the other hand, CR can be viewed as "preventing customers from defecting by learning from former customers, analysing complaints and service data, and identifying and raising barriers to customers' switching" (Ahmad, and Buttle, 2002; DeSouza, 1992). In this situation, company controls the customers to prevent them to switch by raising switching barrier. Further, CR can be viewed as a relationship problem where company tries to maintain relationship with the customers by building social and structural bonds (Wilson, Soni & O'Keeffe, 1995). The authors indicated that social bonds include gaining trust and interaction quality. Company has to gain customer trust by offering value driven services and maintaining healthy relationship. The structural bonds include service performance, shared goals and commitment. The authors argued that company has to provide superior services while focusing on fulfilling the mutual benefits, and accordingly customer will have commitment to stay with the same company. Thus, customer care executives play a major role in building social bonds and mobile network build a structural bond to achieve customer commitment to continue the relationship with the network operator in the context of mobile services.

According to "*Behavioural Consequences of Service Quality*" developed by Zeithaml, Berry & Parasuraman (1996) CR can be viewed as Favourable Behavioural Intentions

(FBI) i.e., the customer's decision about the consumption of services. According the authors, the customers show behaviourally that they are bonding with the company. The "*theory of reasoned action*" suggests that intentions are the key predictors of corresponding behaviour (Ajzen, & Fishbein, 1977; Ajzen, & Fishbein, 1980) and those intentions are the measures of social behaviour in most of the cases (Baker, & Crompton, 2000). Based on the above argument, this study reflects that CR can be viewed as FBI perspective and conceptualized as Customer Intention to Stay (CIS) in the context of mobile telephone services. Thus, customer intention to stay can be defined as "a customer's commitment to stay and maintain a business relationship with his/her present mobile operator in the future. The commitment is developed over a period of time based on overall satisfaction and superior performance of the service provider".

2.6 Linking quality of mobile services and customer intention to stay

The literature shows that there were many empirical studies which indicated that SQ strongly influences CR. From the theoretical perspective, *behavioural consequences of SQ* indicated that higher SQ leads to favourable behavioural intentions. The FBI further leads to retention of the customer. Therefore, the study argues that there is a direct link between service quality and customer retention (Cronin &Taylor, 1992; Zeithaml, Berry & Parasuraman, 1996; Cronin, Brady, & Hult, 2000; Choi, Cho, Lee, Lee, & Kim, 2004; Eshghi, Roy, & Ganguli, 2008; De Pessemier, Stevens, De Marez, Martens, & Joseph, 2015; Hsu, Chang, & Chuang, 2015; Izogo, & Ogba, 2015). Thus, it implies that theoretically there is a direct link between quality of mobile services and customer intention to stay.

According to the model *American customer satisfaction index*, "*customer expectations*", "*perceived quality*" and "*perceived value*" are the antecedents; and "*customer complaints*" and "*customer loyalty*" are the consequences of "*overall customer satisfaction*" (Fornell, Johnson, Anderson, Cha, and Bryant, 1996). The "*mediator model of customer satisfaction*" proved that customer satisfaction mediates the relationship between service quality and behavioural intentions (Dabholkar, Shepherd, & Thorpe, 2000). There were many empirical studies which implies that service quality leads to value (Zeithaml, 1988; Cronin, Brady, & Hult, 2000; Lai, Griffin, & Babin, 2009; Munthiu, Velicu, Tuţă, & Zara, 2014; Hsu, Chang, &

Chuang, 2015) and satisfaction (Spreng, & Mackoy, 1996; Woo, & Fock, 1999; Cronin, Brady, & Hult, 2000; Fullerton, & Taylor, 2002; Sureshchandar, Rajendran, & Anantharaman, 2002; Eshghi, Roy, & Ganguli, 2008; Hsu, Chang, & Chuang, 2015; Izogo, & Ogba, 2015), value leads to satisfaction (Cronin, Brady, & Hult, 2000; Yang, & Peterson, 2004; Lai, Griffin, & Babin, 2009; Hsu, Chang, & Chuang, 2015) and retention (Sirohi, McLaughlin, & Wittink, 1998; Sweeney, Soutar, & Johnson, 1999; Cronin, Brady, & Hult, 2000; Lai, Griffin, & Babin, 2009; Munthiu, Velicu, Tuţă, & Zara, 2014; Hsu, Chang, & Chuang, 2015) and satisfaction to retention (Homburg, & Giering, 2001; Gerpott, Rams, & Schindler, 2001; Yang, & Peterson, 2004; Lai, Griffin, & Babin, 2009; Munthiu, Velicu, Tuţă, & Zara, 2014; Hsu, Chang, & Chuang, 2015; Izogo, & Ogba, 2015). Thus, it is very clear that SQ leads to value to satisfaction to retention and satisfaction mediates the relationship between SQ and CR. At the same time, SQ influences value, value further influences satisfaction and satisfaction further influences CR. It is evident that theoretically all these constructs have hierarchical relationship (Fornell, Johnson, Anderson, Cha, and Bryant, 1996) and at the same time, value mediates the relationship between SQ and satisfaction, satisfaction mediates the relationships between value and CR, both value and satisfaction mediates the relationship between SQ and CR. Therefore, the study argues that value and satisfaction may have serial mediation effect between the relationship SQ and CR or both value and satisfaction simultaneously have mediating effect parallelly between SQ and CR or both the situations (serial mediation or parallel mediation) at a time. This theoretical gap is not clear in the literature. Thus, the study examine these mediation effects between the relationship QMS and CIS.

2.6.1 Mobile Subscriber Value (mSV)

Customer value plays a major role in understanding customers' purchasing patterns, which in turn leads to competitive advantage (Santouridis, Trivellas, & Tsimonis, 2012). Perceived value is conceptualized based on equity theory (Hatfield, Walster, Walster, & Berscheid, 1978). Equity implies that customer's sacrifices (price and/or efforts) to avail an offering (Yang, 2001). Customer pay money for getting a product/service and also put many efforts in terms of time and other costs to get information. Therefore, the value can be viewed as trade-off between benefits and efforts. Customer value can be defined as "the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given"

(Zeithaml, 1988, pp.14). Customer value can also be seen as the difference between customer efforts to obtain a value, and the total benefits from the service or product (Day, 1990). Thus, perceived value was conceptualized as mobile subscriber value (mSV) and it can be defined as Mobile Subscriber Value (mSV) can be defined as the perceived value received by a subscriber from a mobile service provider at the cost of the subscriber's total efforts to fulfil his/her service requirements. Based on the literature which was discussed above, QMS has a significant positive direct effect on mSV (Zeithaml, 1988; Cronin, Brady, & Hult, 2000; Lai, Griffin, & Babin, 2009; Hsu, Chang, & Chuang, 2015).

2.6.2 Mobile Subscriber Satisfaction (mSS)

Customer Satisfaction (CS) is conceptualized based on expectancy-disconfirmation theory (Anderson, 1973). The literature shows that CS is mostly influenced by Customer Expectations (CE), price, perceived quality (Fornell, Johnson, Anderson, Cha, and Bryant, 1996; Zeithaml, 1988; Parasuraman, Zeithaml, and Berry, 1985). The disconfirmation implies the situation where CE exactly meets the perceived performance. If CE exceeds performance then it is said to be negative disconfirmation and it is positive disconfirmation if CE is less than the performance. Therefore, CS is an overall affective response to a perceived discrepancy between prior expectations and perceived performance after consumption (Oliver, 1980). There are two general conceptualizations of satisfaction in the literature: transaction-specific satisfaction (individual level) and cumulative satisfaction (customers' total consumption experience) (Johnson, Anderson, & Fornell, 1995) . Scholars also indicated that companies that strive for customer retention should focus primarily on satisfaction and perceived value (Gerpott, Rams, & Schindler, 2001; Zeithaml, 1988). Overall satisfaction is the cumulative evaluation after a service delivery experience, and acts as a consequence of satisfaction with individual attributes (i.e., service quality) (Yang, & Peterson, 2004).

Thus, customer satisfaction can be conceptualized as Mobile Subscriber Satisfaction (mSS) and it can be defined as "a subscriber's positive response to a mobile service requirements fulfilled by the mobile service provider". Therefore, QMS and mSV have a significant positive direct effect on mSS respectively (Spreng, & Mackoy, 1996; Woo, & Fock, 1999; Cronin, Brady, & Hult, 2000; Fullerton, & Taylor, 2002;

Sureshchandar, Rajendran, & Anantharaman, 2002; Yang, & Peterson, 2004; Lai, Griffin, & Babin, 2009; Eshghi, Roy, & Ganguli, 2008; Hsu, Chang, & Chuang, 2015).

2.6.3 Expectations of mobile subscribers and Price

As discussed above, both CE and price influences quality, value, satisfaction and retention (Fornell, Johnson, Anderson, Cha, and Bryant, 1996; Zeithaml, 1988; Parasuraman, Zeithaml, and Berry, 1985). According to Johnson, Nader, & Fornell (1996, pp. 169), customer expectations can be defined as "to how a product or service has performed in the past as well as how it is likely to perform in the future". It implies that based on the past experience, customer gains the knowledge of a product and/or service performance. The customer believes that the performance should be according to his/her hope. The literature shows that higher the expectations, lower the perceived quality, lower the perceived value and less likely to purchase repeatedly (Cronin &Taylor, 1992; Zeithaml, Berry & Parasuraman, 1996; Cronin, Brady, & Hult, 2000; Pleger Bebko, 2000; Kassim, 2006). Thus, customer expectations can be conceptualized as Mobile Subscriber Expectations (mExp) in this study and it can be defined as "what subscribers believe mobile operators "should" offer".

According to Zeithaml, (1988, pp. 10) "price is what is given up or sacrificed to obtain a product". In this study, price referred as "a tariff that is given up to avail mobile services". The literature shows that customer decision to choose a mobile operator depends on tariffs and discounted offers (Gautam, & Kumar, 2011; Haque, Rahman, & Rahman, 2010). The customer intention to stay with service provider depends on competitive pricing offers (Polo, Sese, & Verhoef, 2011). Also, demographics of the customers influences the SQ and CR (Kassim, 2006). Therefore, it implies that customer expectations and price influences the relationship between quality and retention.

Based on the above conceptual discussion on the interrelationships among QMS, mSV, mSS, CIS, mExp and price, the study observed that quality of mobile services and customer intention to stay have a direct structural relationship (see Figure 3). The structural relationship implies that the relationship between two latent constructs (Hair, Black, Babin, & Anderson, 2010). The structural relationship is mediated by mSV and mSS either in serial or parallel or both (Hayes, 2013) as shown in Figure 4

and Figure 5. According to Baron & Kenny (1986, pp. 1176) "*a given variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion*". Also, the authors specified that independent variable influences the dependent variable indirectly through mediating variable. Therefore, in this study, mobile subscriber value and subscriber satisfaction are two mediating variables that influences the effect of quality of mobile services on customer intention to stay.

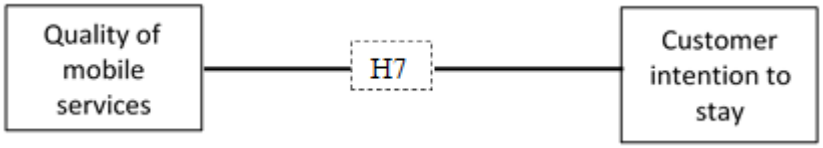

Figure 3 Link between QMS and CIS

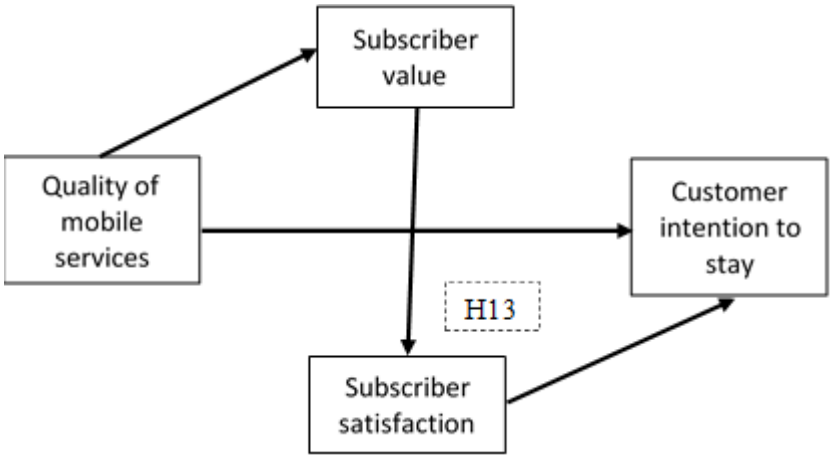

Figure 4 Hypothesized serial mediation model

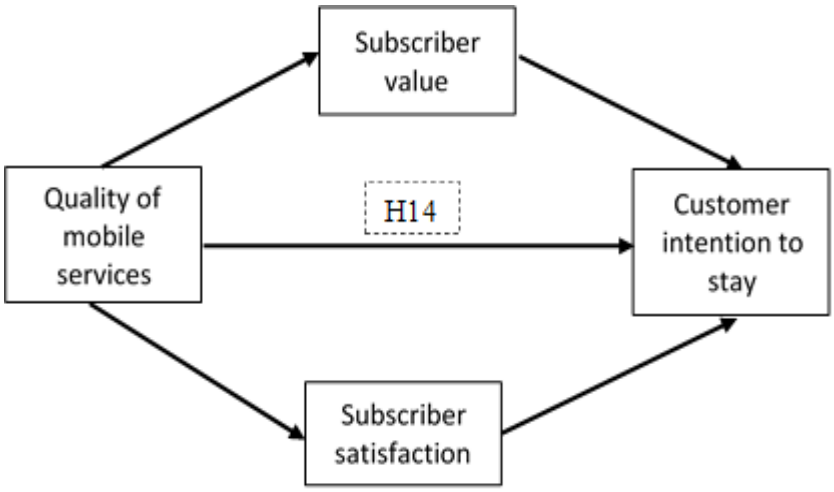

Figure 5 Hypothesized parallel mediation model

The study also observed that the structural relationship between QMS and CIS is influenced by price, expectations of mobile subscribers. According to Baron & Kenny (1986, pp. 1174) defined moderator is "*a qualitative (e.g., sex, race, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent or predictor variables and a dependent or criterion variable*". It implies that moderator can be any demographic or categorical or any metric variable which influences the relationship between two variables. Thus, moderating variables, in this study, refers to price, mobile subscriber expectations, *demographic* (a. gender, b. age, c. education, d. occupation), *technical* (a. mobile technology, b. mobile data, and c. type of mobile phone) and *functional* (a. type of mobile connection, b. multi-SIM, c. user group, d. purpose of mobile usage, e. experience of mobile usage, and f. usage level of mobile services) variables, price and expectations of mobile subscribers. The usage characteristics of mobile subscribers includes both technical and functional variables. Therefore, usage characteristics moderate the structural relationship between QMS and CIS.

2.7 Research gap

Based on the above discussion on various theoretical concepts and empirical studies, the study identified the following research gap.

- There is a gap in terms of measurement of customer intention to stay and quality of mobile services, and their structural relationship.
- There is no standardized existing measurement scale for mobile telephone service sector particularly in India which is unique in terms of competition, government regulations and retaining mobile subscribers.
- Previous studies examined the indirect effect of satisfaction and value between service quality and customer retention. But there is a gap that needs to be addressed to clear the mediation is serial or parallel or both.
- There exists a gap that what variables moderate the relationship between quality of mobile services and customer intention to stay.
- The studies carried out in the mobile service sector prior to Mobile Number Portability (MNP) particularly in India. Therefore, there is a need to study for understanding the flexibility of mobile subscribers.

2.8 Research questions

Based on the gap as indicated above, the following questions were raised to carry out this study.

- What is the relative effect of quality dimensions on customer intention to stay and other related constructs in the context of mobile services?
- What are the major factors that moderate the relationship between quality of mobile services and customer intention to stay?
- How the mediation effect of inter-related constructs, exists between quality of mobile services and customer intention to stay? Is there exist serial mediation or parallel mediation or both?
- How are the quality perceptions of mobile services, customer intention to stay and inter-related constructs in the context of mobile services in India and united AP?

2.9 Research objectives

Based on the research problem, literature review, research gap and research questions, the study framed the following objectives. The broad objective of the study is to examine the structural relationship between Quality of Mobile Services (QMS) and customer intention to stay by developing a scale mTelQual for assessing QMS in India. The specific objectives of the study are as follows.

1. To study relative effect of mTelQual dimensions on overall quality, value, satisfaction, overall satisfaction and customer intention to stay.
2. To test the moderation effect of demographic, technical, and functional variables on the relationship between quality of mobile services and customer intention to stay.
3. To examine the mediation effect of subscriber value and subscriber satisfaction on the relationship between quality of mobile services and customer intention to stay and
4. To evaluate quality of mobile services (using mTelQual), subscriber satisfaction, subscriber value and customer intention to stay in context of Andhra Pradesh and India.

2.10 Theoretical framework and research hypotheses

The study has proposed two models (mobile telephone service quality model i.e., mTelQual and integrated model of QMS and CIS), based on the discussion and extensive literature review of conceptual and empirical studies, for mobile telephone services. The mobile telephone service quality model is a second-order reflective construct (see Figure 6). A measurement scale named mTelQual was developed for the assessment of mobile telephone services in India. The integrated model of QMS and CIS refers to the structural relationship between quality of mobile services and customer intention to stay in the presence of mediation and moderation variables as shown in Figure 7. The integrated model helps to understand the structural relationship between QMS and CIS, also how it is influenced by mediating and moderating variables.

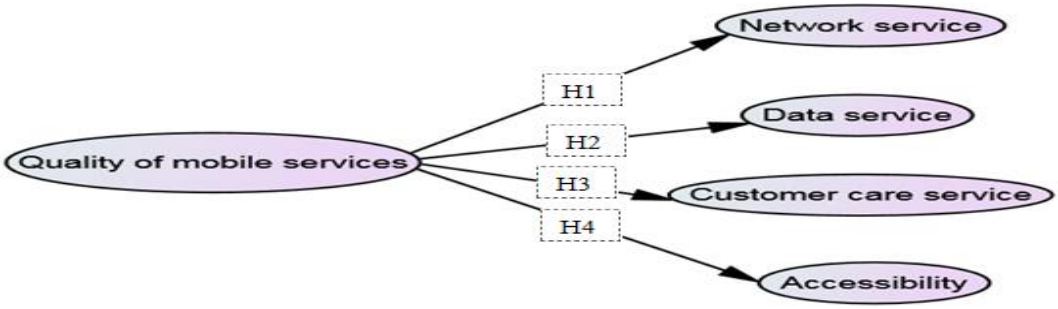

Figure 6 Hypothesized model of mTelQual

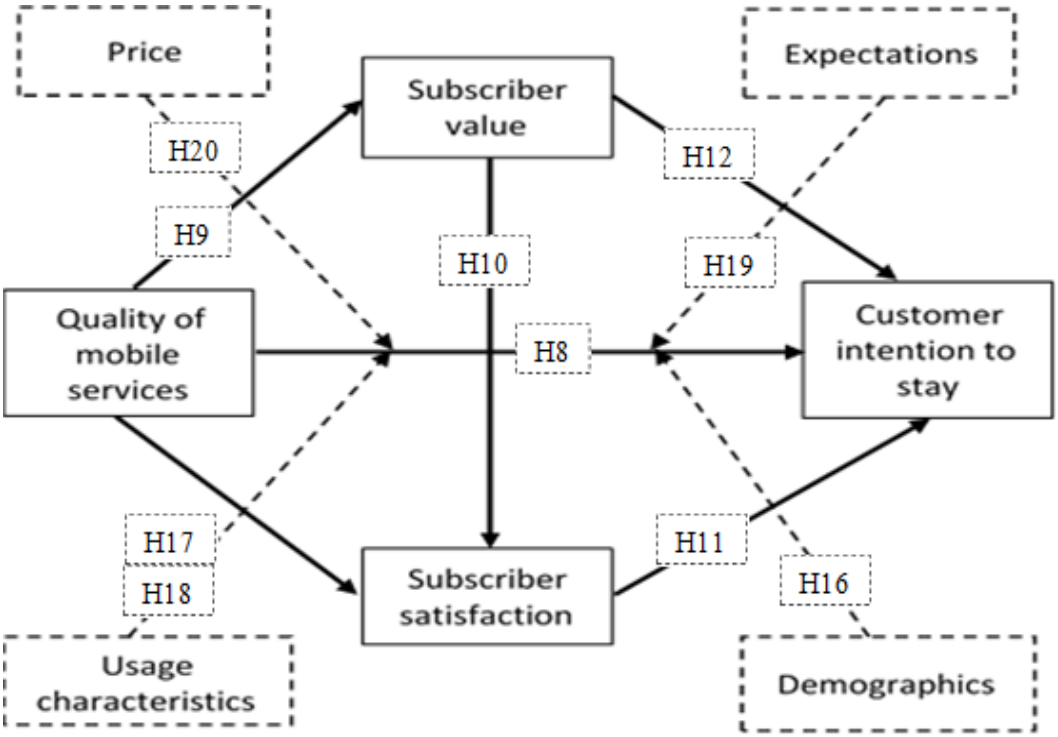

Figure 7 Hypothesized integrated model of QMS and CIS

2.10.1 Research hypotheses

The study formulated the following hypotheses based on the objectives and theoretical framework.

1. Each dimension of mTelQual has a significant positive relationship with Quality of Mobile Services (QMS).
    a. Network Service (NS) has a significant positive relationship with QMS.
    b. Data Service (DS) has a significant positive relationship with QMS.
    c. Customer Care Service (CCS) has a significant positive relationship QMS.
    d. Accessibility (Acc) has a significant positive relationship with QMS.
2. Each dimension of mTelQual has a significant positive effect on Overall Quality of Mobile Services (OQMS).
    a. NS has a significant positive effect on OQMS.
    b. DS has a significant positive effect on OQMS.
    c. CCS has a significant positive effect on OQMS.
    d. Acc has a significant positive effect on OQMS.
3. Each dimension of mTelQual has a significant positive effect on mobile Subscriber Value (mSV)
    a. NS has a significant positive effect on mSV.
    b. DS has a significant positive effect on mSV.
    c. CCS has a significant positive effect on mSV.
    d. Acc has a significant positive effect on mSV.
4. Each dimension of mTelQual has a significant positive effect on mobile Subscriber Satisfaction (mSS).
    a. NS has a significant positive effect on mSS.
    b. DS has a significant positive effect on mSS.
    c. CCS has a significant positive effect on mSS.
    d. Acc has a significant positive effect on mSS.
5. Each dimension of mTelQual has a significant positive effect on Overall mobile Subscriber Satisfaction (OmSS)
    a. NS has a significant positive effect on OmSS.
    b. DS has a significant positive effect on OmSS.
    c. CCS has a significant positive effect on OmSS.
    d. Acc has a significant positive effect on OmSS.
6. Each dimension of mTelQual has a significant positive effect on Customer Intention to Stay (CIS).
    a. NS has a significant positive effect on CIS.
    b. DS has a significant positive effect on CIS.

c. CCS has a significant positive effect on CIS.
d. Acc has a significant positive effect on CIS.

7. Quality of mobile services has a significant positive structural relationship with customer intention to stay.
8. Quality of mobile services has a significant direct positive effect on CIS.
9. There is a significant positive direct effect of quality of mobile services on mobile subscriber value.
10. Mobile subscriber value has a significant positive direct effect on mobile subscriber satisfaction.
11. There is a significant positive direct effect of mobile subscriber satisfaction on customer intention to stay
12. Mobile subscriber value has a significant positive direct effect on customer intention to stay.
13. Mobile service value and subscriber satisfaction have serial mediation effect on the relationship between quality of mobile services and customer intention to stay.
14. Mobile service value and subscriber satisfaction have parallel mediation effect on the relationship between quality of mobile services and customer intention to stay.
15. Mobile service value and subscriber satisfaction have both serial and parallel mediation effect on the relationship between quality of mobile services and customer intention to stay.
16. The relationship between quality of mobile services and customer intention to stay is moderated by demographic variables of mobile subscribers (a. gender, b. age, c. education, d. occupation).
17. The relationship between quality of mobile services and customer intention to stay is moderated by technical variables of mobile services (a. mobile technology, b. mobile data, and c. type of mobile phone).
18. The relationship between quality of mobile services and customer intention to stay is moderated by functional variables of mobile services (a. type of mobile connection, b. multi-SIM, c. user group, d. purpose of mobile usage, e. experience of mobile usage, and f. usage level of mobile services).

19. Mobile subscriber expectations moderate the relationship between quality of mobile services and customer intention to stay.
20. Price of mobile services moderates the relationship between quality of mobile services and customer intention to stay.
21. Quality of mobile services significantly differ in terms of demographic variables of mobile subscribers (a. gender, b. age, c. education, d. occupation, e. state, f. regional area, g. mobile technology, h. mobile data, i. type of mobile phone, j. type of mobile connection, k. multi-SIM, l. user group, m. purpose of mobile usage, n. experience of mobile usage, o. usage level of mobile services and p. service provider).
22. Mobile subscriber value significantly differ in terms of technical variable of mobile services (a. gender, b. age, c. education, d. occupation, e. state, f. regional area, g. mobile technology, h. mobile data, i. type of mobile phone, j. type of mobile connection, k. multi-SIM, l. user group, m. purpose of mobile usage, n. experience of mobile usage, o. usage level of mobile services and p. service provider).
23. Mobile subscriber satisfaction significantly differ in terms of functional variables of mobile services (a. gender, b. age, c. education, d. occupation, e. state, f. regional area, g. mobile technology, h. mobile data, i. type of mobile phone, j. type of mobile connection, k. multi-SIM, l. user group, m. purpose of mobile usage, n. experience of mobile usage, o. usage level of mobile services and p. service provider).
24. Customer intention to stay significantly differ in terms of functional variables of mobile services (a. gender, b. age, c. education, d. occupation, e. state, f. regional area, g. mobile technology, h. mobile data, i. type of mobile phone, j. type of mobile connection, k. multi-SIM, l. user group, m. purpose of mobile usage, n. experience of mobile usage, o. usage level of mobile services and p. service provider).

This chapter highlighted the theoretical background and extensive literature review. Based on the review, the study came out with a research gap, research questions, objectives of the study and formulation of research hypotheses. Methodology of the study will be discussed in the next chapter.

CHAPTER III
METHODOLOGY

CHAPTER III

METHODOLOGY

This chapter presents the methodology for the study. It includes research design, target population, accessible population, justification for the target population, sampling technique, sample size, data collection methods and procedures, justification for sample size, profile of the respondents, survey instrument, and methods of data analysis. Sampling design section includes sampling method, sampling technique, sample size and justification for the sample size and techniques. The questionnaire section discusses the scales utilized in the study to measure quality of mobile services, customer intention to stay as well as other related constructs of the study. Data collection procedure section discusses the steps followed to collect the data. Finally, data analysis section presents statistical tools and techniques used in the study and justification for the same.

3.1 Research design

The approach of the study was mixed methods (i.e., both qualitative and quantitative), a non-experimental survey about the exploration of key drivers of Customer Intention to Stay (CIS) by developing a measurement scale (mTelQual) for assessing Quality of Mobile Services (QMS) in India. The study also evaluates the inter-relationships among QMS, value, satisfaction, and CIS. Further, the study explored mediating and moderating variables that influence the relationship between QMS and CIS. Thus, the study was a descriptive, explorative and correlational in nature. The study collected both qualitative and quantitative data for better understanding of the research problem. The main advantage of mixed methods approach is to generalize the results of the study to a population by "collecting diverse types of data that best provides an understanding of a research problem" (Creswell, 2013). The purpose of exploratory research design is to discover the different aspects of the study (Kothari, 2011). In this study, the research explored and conceptualized critical dimensions of QMS and CIS for understanding specified problem of the study. The advantage of correlational study is to examine the dependence relationships and the degree of the relationships among various number of constructs particularly in social science research (Gall, & Gall, 2003). Finally, the study describes the state of QMS, subscriber perceived value,

subscriber satisfaction and CIS in the context of united Andhra Pradesh. Therefore, the study is descriptive in nature (Kothari, 2011).

Twenty four research hypotheses (excluding sub hypotheses) were proposed. The number of latent constructs of the study is six i.e., mobile subscriber expectations, quality of mobile services, mobile subscriber value, mobile subscriber satisfaction, perceived price and customer intention to stay. The sub-latent constructs are network service, customer care service, data service and accessibility.

3.2 Target population of the study

The target population of the study comprised total subscribers of mobile telephone services in India. The size of the target population is 933.01 million and 69.19 million as on 31st March 2014 in India and undivided Andhra Pradesh (TRAI report, 2014) respectively. The size of the population includes multi-SIM users also. The sampling unit of the study constituted an individual subscriber of mobile services. Some of the subscribers were using multi-SIMs i.e., he/she is a customer for more than one mobile operator. Telecom Regulatory Authority of India (TRAI) regularly collects data from each mobile operator and maintain a quarterly report. The reports include number of mobile subscribers in India as well as state wide. The total number of subscribers listed in the reports is a summation of number of subscribers for each mobile operator. But, the report doesn't include the number of subscribers who are the customers for more than one mobile operator. There are 13 mobile operators in India. The combination of mobile service subscriptions are $13C_2$ (i.e., 78 combinations). There is no proper record for the same. Even though, the TRAI report has size of mobile subscribers, it cannot be considered for the study due to duplication of data and it is not clear. Hence, the universe of the study was considered as infinite universe and the size of the population is unknown.

3.3 Accessible population

The accessible population was a part of target population which depends on researcher's "geographic", "time", or "cultural characteristics" (Wu, 2006). In this study, the accessible population of the study was limited to the wireless subscribers of telephone services who can be reached by e-mail and personally in India and district

headquarters of undivided Andhra Pradesh respectively. The size of the assessable population is unknown because of usage of multi SIMs and it cannot be calculated.

3.4 Justification for the target population

- The subscriber base of Indian wireless telecom services were increased from 48 million in 2004 to 930.2 million as of September, 2014 (1837.91 times). Therefore, the growth rate is exponential in nature (TRAI report and COAI annual report).
- Rural wireless subscriber base is still at 39.94 percent and the national telecom policy aimed to reach 100 percent penetration by 2020.
- The average revenue per user is increasing at 14.3 percent annually in India.
- The penetration of mobile data services is still at initial stage, so there is a huge growth opportunity for the same in the near future.
- United AP is the largest service area in the telecom circle A with the total telecom wireless subscriber base of 68.86 million and an annual growth rate of 6.14 percent.
- United AP stands fourth position in terms of subscriber base after U.P. East (79.28), followed by Tamil Nadu (78.02 million) and Maharashtra (74.79 million) as of September, 2014.
- Telecom circle A is the second highest in terms of monthly average revenue per user (Rs. 124) after metros circle (Rs. 156).

3.5 Sampling technique

As mentioned earlier, the size of the population was considered as unknown infinite universe because of multi-SIM usage. It is impractical to adopt random sampling technique due to unavailability of the entire subscribers list clearly. Thus, the study adopted non-probability sampling techniques such as quota and purposive sampling.

3.6 Sample size

Initially, the study selected quota based on the proportion of market characteristics of mobile services in India, is as follows (as shown in Table 3 and Table 4):

Quota for study I (India): quota was based on the subscriber base of the telecom circles.

Table 3
Sample proportion of the telecom circle

State	Telecom circle	Quota (%)
Andhra Pradesh, Gujarat, Karnataka, Maharashtra and Tamil Nadu	A	36
Haryana, Kerala, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh, West Bengal and Andaman and Nicobar	B	40
Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, North East states, Odisha	C	14
Delhi, Mumbai, Kolkata and Chennai	Metro	10

Quota for study II (united Andhra Pradesh):

Table 4
Sample proportion of the operator, area and mobile connection as on 31.03.2014

S.No.	Operator	Quota (%)	Area	Quota (%)	Mobile connection	Quota (%)
1	Airtel	22.71	Rural	30	Prepaid	90
2	Vodafone	18.41	Semi-urban	20	Postpaid	10
3	Idea	15.01	Urban	50		
4	Reliance	12.26				
5	BSNL	10.46				
6	Aircel	7.76				
7	Tata	6.97				
8	Others	6.42				

By fulfilling the above quota for the collection of samples from the target population, the valid size of the samples was 547 for the study one i.e., across India (as shown in Table 5 as on 31.03.2014, TRAI report 2014). This sample was used to develop and validate mTelQual, mediation and moderation measurement models. The valid size of the sample in united AP (study two) was 1061(as shown in Table 6). This sample was used to re-examine the mTelQual, mediation and moderation measurement models and study the stated objectives of the study. The total valid sample size of the study was 1608.

3.7 Data collection methods and procedures

The study used online survey and offline survey methods to collect the data. Online survey method was carried out across India (study one) and offline survey method for the united AP (study two) by adopting quota and purposive sampling techniques.

The study carried out 25 semi-structured interviews and five focus group discussions with the mobile subscribers in Hyderabad in the initial stage of the research to explore the attributes of quality of mobile services. Later, two pilot studies were carried out to purify the scale items and to check the feasibility of the research. Pilot study one was conducted in Hyderabad with a sample size of 63. The second pilot study was carried out across India with a sample size of 132.

Table 5
Sample size for the study I (across India)

State	Telecom circle	Original sample	Valid sample
Andhra Pradesh, Gujarat, Karnataka, Maharashtra and Tamil Nadu	A	200	191
Haryana, Kerala, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh, West Bengal and Andaman and Nicobar	B	225	213
Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, North East states, Odisha	C	83	77
Delhi, Mumbai, Kolkata and Chennai	Metro	78	66
Total		586	547

An online survey was conducted for the study I (across India). A structured online questionnaire was e-mailed to the targeted list of mail ids in India. The online questionnaire link was also posted on social media websites like facebook and Linkedin. As a result, 586 online responses were received. The samples were further validated for the consideration to be included in the study and 39 responses were discarded due to improper responses. The total number of valid samples size was 547 (as shown in Table 5). The samples were classified based on the Indian telecom circles (i.e., Circle A, B, C and Metro). The valid samples from Circle A, B, C and Metro were 191, 213, 77 and 66 respectively. The samples were also approximately in proportion to the subscriber base of each telecom circle (35%, 40%, 15% and 10%).

For the study II (in united AP), the researcher classified the state in to six zones based on geographic region of the state (according to Andhra Pradesh Public Service Commission APPSC). The zones consists of districts varying from three to five. The

researcher selected 50% of the districts from each zone. Accordingly, 2 districts from each zone (1 to 5) and 3 districts from zone 6 (as shown in Table 6) were selected. A quota of 200 samples was assigned to each zone initially, therefore, total number of samples was 1200. The researcher personally visited headquarters of the selected districts and collected data by adopting purposive sampling technique. As a result, 1200 samples were collected. After validating the questionnaires for the consistency of the responses, 139 responses were discarded. Therefore, the total valid sample size was 1061 for the study II (as shown in Table 6).

Table 6
Simple size for the study II (united AP)

Zone	**Districts**	**Headquarters selected**	**Original sample**	**Valid sample**
Zone 1	Srikakulam, Visakha, Viziangaram	Srikakulam, Vizag	200	178
Zone 2	East Godavari, West Godavari, Krishna	Kakinada, Vijayawada	200	174
Zone 3	Guntur, Prakasam, Nellore	Guntur, Ongole	200	180
Zone 4	Anantpur, Chittoor, Kadapa, Kurnool	Kurnool, Chittoor	200	169
Zone 5	Adilabad, Karimnagar, Warangal, Khammam	Karimnagar, Warangal	200	170
Zone 6	Hyderabad, Ranga Reddy, Nizamabad, Mahabubnagar, Nalgonda	Hyderabad, Nalgonda Mahbubnagar	200	190
	Total	13	1200	1061

3.8 Justification for the sample size

In general, sample size should be representative of the target population and large in number to minimize the sampling error (Grossnickle & Raskin, 2000). Since the study has used structural equation modeling for the data analysis, the size of the sample should be large enough to estimate the model fit indices (Hair, Black, Babin, & Anderson, 2010). There should be at least 200 subjects for performing structural equation modeling (Kelloway, 1998).

Justification 1

The size of the sample was determined by the following formula (Beri, 2005):

$$n = (Z * \sigma / E)^2$$

Where, n = sample size, α = significant level i.e., .05, σ = sample standard deviation, E = standard error of the mean and critical value of the Z score at 5% level is 1.96.

The size of the sample size was estimated based on the pilot study result. The second pilot study was conducted with a sample size 132. Since the study's major focus is on Quality of Mobile Services (QMS), the results of the same variable was considered to estimate the sample size. The mean value of QMS was 13.18, standard deviation (σ) is 2.34 and standard error of the mean (E) is .203. Therefore, by substituting these values in the above formula the n value is 510.45. Thus, the size of the sample for the study should be targeted at more than or equal to 511.

Justification 2

According to Hair, Black, Babin, & Anderson, (2010), the size of the sample should be determined based on the number of attributes of the study, and suggested that five subjects for each attribute. In this study, there were 70 observed variables. Thus, there should be at least 350 subjects to meet the specified criteria.

In both the cases, the size of the samples were more than the required criteria. Thus, the sample size was justified.

3.9 Profile of the respondents

Gender, age, education, occupation, technology, monthly spending, connection, data, mobile type and regional area were presented in Table 7 and Table 8 for both the samples (i.e., united AP and India).

Table 7
Profile of the respondents

United Andhra Pradesh				India		
Variable	**Category**	**Frequency**	**%**	**Category**	**Frequency**	**%**
Gender	Female	458	43	Female	146	27
	Male	603	57	Male	401	73
Age (in years)	Under 20	256	24	Under 20	08	02
	21 to 30	611	58	21 to 30	219	40
	31 - 45	162	15	31 - 45	238	43
	46 above	42	3	46 above	82	15
Education	10^{th} / +2	124	12	10^{th} / +2	4	1
	Graduate	400	37	Graduate	46	8
	PG	498	47	PG	226	41
	Post-PG	39	4	Post-PG	271	50
Occupation	Student	571	53	Student	149	27
	Employee	410	39	Employee	347	63
	Self-employee	63	6	Self-employee	26	5
	Others	17	2	Others	25	5
Regional area	Rural	314	30	Rural	60	11
	Semi-urban	208	19	Semi-urban	79	14
	Urban	539	51	Urban	408	75

Table 8
Mobile usage characteristics of the respondents

United Andhra Pradesh				India		
Variable	**Category**	**Frequency**	**%**	**Category**	**Frequency**	**%**
Technology	CDMA	26	3	CDMA	60	11
	GSM	1035	97	GSM	487	89
Monthly spending (₹.)	<= 300	635	60	<= 300	207	38
	301 to 600	292	27	301 to 600	199	36
	601 to 900	48	5	601 to 900	44	8
	900 above	86	8	900 above	97	18
Mobile Connection	Prepaid	962	91	Prepaid	376	69
	Postpaid	99	9	Postpaid	171	31
Mobile data	2G	451	42	2G	176	32
	3G	317	30	3G	122	23
	Both	263	25	Both	121	22
	Not-using	30	3	Not-using	128	23
Mobile type	Smartphone	702	66	Smartphone	358	65
	Normal phone	359	34	Normal phone	189	35

3.10 Survey instrument

The survey instrument constitutes 70 items divided into four sections: A, B, C and D. The section A included 34 items which measures the quality of mobile services. One item was used to measure overall quality of mobile services. The section B covered 11 items related to price, mobile subscriber value and mobile subscriber satisfaction. The section C included 24 items pertaining to customer intention to stay, and mobile subscriber expectations. All the items were measured on Likert five point format. The section D covered demographic profile of the respondents (a. gender, b. age, c. education, d. occupation), technical (a. mobile technology, b. mobile data, and c. type of mobile phone) and functional (a. type of mobile connection, b. multi-SIM, c. user group, d. purpose of mobile usage, e. experience of mobile usage, and f. usage level of mobile services) variables of the study. Also, there were nine open ended questions included at the end of the section D. The questions are as follows: using mobile phone since, first mobile network, present mobile network, using present network since, reason for changing the network, like to change the present network? If yes reasons, in what circumstances change the network, write possible reasons, what are the possible reasons for staying with the present network and any suggestions for improving quality of mobile services.

The latent variable Quality of Mobile Services (QMS) had 35 items which covered network, data, accessibility and customer care aspects of the services offered to the mobile subscribers. All the items were measured on Likert five point format. The format ranged from 1 – strongly disagree to 5 – strongly agree for 34 items and one item overall quality of mobile services ranged from 1 – very poor to 10 – excellent. The QMS scale, dimension wise, is presented in Table 9, Table 10 and Table 11.

Mobile Subscriber Value (mSV) was measured with four items as follows: mobile operator delivers superior service, economical to use the operator's services, value is worth time, money and efforts and overall operator's service is valuable, compared with others. All the four items were measured with Likert five point format ranged from 1 – strongly disagree to 5 – strongly agree. The mSV scale is presented in Table 12.

The latent construct Mobile Subscriber Satisfaction (mSS) was measured with five observed variables. It measured the satisfaction with mobile network services,

operator's tariffs, customer care services and complaint handling. All the four items were measured with Likert five point format ranged from 1 – very dissatisfied to 5 – very satisfied. One item measured overall subscriber satisfaction on 10 point format ranged from 1 – very dissatisfied to 10 – very satisfied. The mSS scale is presented in Table 13.

Mobile Subscriber Expectations (mExp) included 10 items. The items were up-to-date technology, support for modern mobile applications, speed of mobile data, social media with multi-media internet based applications, consistent network across all geographical locations, speedy customer care services, special packages for unlimited mobile data at a reasonable tariffs, superior mobile services, value for money and quality vs price priority. All the items were measured with Likert five point format ranged from 1 – not at all important to 5 – very important. The mExp scale is presented in Table 14.

Customer Intention to Stay (CIS) was measured with 14 manifest variables. The variables were as follows: regularly use the same operator, say positive things, recommend the operator, the operator is the first preference, strengthen the relationship, pay a higher price, operator has strong network coverage, the operator earned my trust, the operator takes best care, pays off economically, continue to use even price increases, pleasure being a customer, real cost associated to stop using services, and probability to switch to another operator is low after 5 years. All the items were measured with Likert five point format ranged from 1 – strongly disagree to 5 – strongly agree. The CIS scale is presented in Table 15.

Perceived price of mobile services was measured with two items as follows: operator offers reasonable price schedules and transparent price structure. All the items were measured with Likert five point format ranged from 1 – strongly disagree to 5 – strongly agree. The price scale is presented in Table 16.

Table 9

Measures for network & data service dimension of QMS

Item	Description	Source(s)
N1	My mobile network provides sufficient coverage in the locations required for me	Eshghi, Roy & Ganguli (2008); Chadha & Kapoor, (2009); Wang, Lo, & Yang, (2004); Nimako, Azumah, Donkor & Adu-Brobbey (2012); Santouridis, & Trivellas, (2010); Kang, (2006); Shi, Wu, & Liu, (2010); Lim, Widdows & Park, (2006); Sweeney, & Soutar, (2001); Interview (N6 and D1)
N2	My mobile network provides consistent signal strength	
N3	Call connectivity is good for my mobile network	
N4	My mobile network offers undisturbed voice clarity during my calls.	
N5	My mobile network is always dependable (reliable network)	
N6	My mobile network coverage is good in other states (in Roaming)	
N7	My mobile network provides good message services	
N8	Premature termination of calls (sudden call drop) is low for my mobile network.	
D1	Mobile network speed is comparatively good (for 2G Internet based applications).	
D2	Mobile network speed is comparatively good (for 3G Internet based applications).	
D3	My mobile network is up-to date to access latest advanced mobile applications	
ON12	Overall, the performance of my mobile network is comparatively good.	

Note: N – Network service; D – Data service; ON – Overall Network service

Table 10

Measures for accessibility dimension of QMS

Item	Description	Source (s)
A1	My network operator provides easy ways to recharge my mobile (*Prepaid users*) /to pay bills (postpaid users). (e.g., Online recharge, online payment)	Eshghi, Roy & Ganguli (2008); Chadha & Kapoor, (2009); Negi, (2009); Kim, Park & Jeong, (2004); Lai, Hutchinson, Li, & Bai, (2007)
A2	My network service provider has different customer support systems (toll free numbers, outlets, websites, etc.).	
A3	My network operator provides easy ways to active or deactivate any service when I need.	
A4	My network operator is flexible enough for lodging complaints/queries.	
OA5	Overall, my network operator provides flexibility to access any mobile services that I require.	

Note: A – Accessibility, OA – Overall Accessibility

Table 11

Measures for customer care service dimension of QMS

Item	Description	Source (s)
C1	Customer care executives are attentive to listen me.	Eshghi, Roy & Ganguli (2008); Chadha & Kapoor, (2009); Negi, 2009); Kassim, (2006); Wang, Lo, & Yang, (2004); Nimako, Azumah, Donkor & Adu-Brobbey (2012); Santouridis, & Trivellas, (2010); Lim, Widdows & Park, (2006); Interview (C5, C10, C16, C33)
C2	Customer care executives are very helpful to provide me necessary services.	
C3	Customer care executives offer quick services to me	
C4	Customer care executives are knowledgeable to answer my queries.	
C5	Customer care executives give clear information to me.	
C6	Most of my complaints are resolved by the customer executives.	
C7	Customer care executives are very eager to help me.	
C8	I feel assured that service requests are duly follow-up by the mobile network operator.	
C9	My mobile network operator provides accurate billing (for *POSTPAID users*) or My mobile network operator deducts amount accurately (for PREPAID users)**.**	
C10	My mobile network operator says apology for the inconvenience caused to me and pay compensation. (e.g., Extra talk time/discount on bill/free minutes, free SMS offer etc.)	
C11	Customer care executives are attentive to my calls at my mobile network operator's call center.	
C12	Customer care executives continually attempt to understand what I say.	
C13	Customer care executives offer relevant information to the questions I ask.	
C14	Customer care executives are consistently friendly and polite with me.	
C15	The waiting time to get a service is very low when I need service from the executives.	
C16	Waiting time on call on hold is low when calling customer care number.	
OC17	Overall, my experience with customer care services of my mobile network operator is pleasant.	

Note: C – Customer care service; OC – Overall customer care service

Table 12

Measures for mobile subscriber value

Item	Description	Source(s)
V1	My mobile network operator always delivers superior service.	Wang, Lo, & Yang, (2004); Lai, Griffin & Babin, (2009); Kuo, Wu & Deng, (2009); Nimako, Azumah, Donkor & Adu-Brobbey (2012);
V2	It is economical to use the services of my mobile network operator.	
V3	The overall value I receive from the network operator is worth my time, money, and efforts.	
V4	Overall, the service I receive from the network operator is valuable compared with other operators.	

Note: V - Value

Table 13

Measures for mobile subscriber satisfaction

Item	Description	Source(s)
S1	I am satisfied with my mobile network (e.g., coverage)	Eshghi, Roy & Ganguli (2008); Chadha & Kapoor, (2009)
S2	I am satisfied with my operator's tariffs (price structure)	
S3	I am satisfied with my operator's customer care services	
S4	I am satisfied with my operator's complaint handling	
OS5	Overall, I am satisfied with my mobile network operator	

Note: S – Satisfaction; OS – Overall Satisfaction

Table 14

Measures for mobile subscriber expectations

Item	Description	Source(s)
Ex1	Speed of mobile data/internet/VAS and other services	Focus Group Discussions and Interviews
Ex2	Social media/internet based applications (with free voice calls, video calls/Multimedia files)	
Ex3	Consistent Network across all geographical locations (rural /urban areas, Indoor/outdoor etc.)	
Ex4	Customer care services (e.g., Speed of resolving technical problems, customer complaints)	
Ex5	Special packages for unlimited internet/mobile data at a reasonable price	
Ex6	Quality of mobile services (superior services than any other competitor)	
Ex7	Value for money	
Ex8	How far quality of mobile services is more important to me than price/tariffs	
Ex9	Up-to-date mobile technology (e.g., 4G)	
Ex10	Modern mobile applications (M-Banking, M-Shopping, Booking tickets, etc.)	

Note: Ex – Expectations of mobile subscribers

Table 15

Measures for Customer intention to stay

Item	Description	Source (s)
CIS1	My present mobile network operator has earned my trust—I feel that I can trust the operator completely.	Zeithaml, Berry & Parasuraman, (1996); David, Soni & Keeffee, (1995); Lai, Griffin & Babin, (2009); Kim, Park & Jeong, (2004); Liu, Guo, & Lee, (2011); Lim, Widdows & Park, (2006); Interview (CIS8)
CIS2	I say positive things about my network operator to other people	
CIS3	I recommend my present network operator to those who seek my advice about such matters.	
CIS4	My present network operator is my first preference when I need mobile services	
CIS5	I would like to strengthen my relationship with the present mobile network operator.	
CIS6	Pay a higher price than competitors charge for the benefits I currently receive from my network operator.	
CIS7	My present network has a strong network coverage compared to other network operators.	
CIS8	My network operator is the operator that takes the best care of its customers.	
CIS9	I use my present network operator's services as regularly as I do now	
CIS10	It pays off economically to be a customer of my present network operator.	
CIS11	Continue to use my present mobile network operator if its prices increase somewhat.	
CIS12	I take pleasure in being a customer of the present mobile operator	
CIS13	There would be some real costs for me to stop using my present mobile network operator as a marketing option (economic loss/monetary cost/psychological burden etc.).	
CIS14	The probability to switch to another mobile network in the long-run (after 5 years) is low.	

Note: CIS – Customer Intention to Stay

Table 16

Measures for perceived price of mobile services

Item	Description	Source (s)
P1	Mobile network operator offers reasonable price schedules that meets my needs	Eshghi, Roy & Ganguli (2008); Chadha & Kapoor, (2009); Santouridis, & Trivellas, (2010); Kim, Park & Jeong, (2004); Hutchinson, Li, & Bai, (2007)
P2	Mobile network operator has transparent price structure	

Note: P - Price

3.11 Method of data analysis

The data were analysed using statistical packages such as MS Excel, Statistical Package for Social Sciences (SPSS 21) and Analysis of Moment Structures (Amos 21). Descriptive statistics, factor analysis (both exploratory and confirmatory), multi-group analysis, structural equation modeling (SEM), multiple regression analysis (including hierarchical) and comparing means were included in the methods of data analysis.

The total valid sample size of the study was 1608. The samples which were collected online across India and offline in united AP were 547 and 1061 respectively.

Descriptive statistics

This method was used to examine the respondents' profile in terms of demographic, technical and functional characteristics of mobile services. The study reported measures of central tendency and frequency distributions.

Exploratory Factor Analysis (EFA)

EFA attempts to bring inter-correlated variables together under more general, underlying variables. The goal of factor analysis is to "reduce the dimensionality of the original space and to give an interpretation to the new space, spanned by a reduced number of new dimensions which are supported to underlie the old ones" (Rietveld and Van Hout, 1993; pp. 254). Thus, it offers not only the possibility of gaining a clear view of the data, but also the possibility of using the output in subsequent analysis (Field, 2000). Principal component analysis, which is one of the most commonly used extraction methods has been used for this study, as it seeks to summarize most of the original information in a minimum number of factors for prediction purposes. Some other criterion as, Eigen value > 1 as a criteria for determining the number of extracted factor, VARIMAX rotation, anti-image correlation for diagonal entries > .5 have been set to extract the factors. The following criteria were used to determine the factor structure as suggested by Hair, Black, Babin, Anderson, & Tatham, (2008): (a) the loading for each item on a factor should be more than or equal to ±0.40; and (b) the items which are having cross loadings should be excluded if the difference between the loadings is less than 0.20. The first

sample (547) was used for EFA to develop "mTelQual" theoretical model to explore underlying pattern of quality of mobile services.

Confirmatory Factor Analysis (CFA)

CFA was used to examine the relationships between the manifest variables and the latent variables (Byrne, 2001). The second sample (1061) was used for CFA to confirm the underlying pattern of quality of mobile services and validated the measurement models (both first order and second order) "mTelQual". Also, the CFA was used for validating the conceptual and the structural models which included the latent construct as follows: quality of mobile services, subscriber expectations, mobile subscriber value, subscriber satisfaction, customer intention to stay and price.

Multi-group analysis

It was used to cross validate a model across different groups like age, gender etc. (Byrne, 2010). The "mTelQual" measurement model was cross validated between male and female; rural, semi-urban, and urban areas; and Andhra Pradesh and Telangana state using the multi-group analysis. Furthermore, it was also used to test the moderation effect of moderating variables (demographic, technical and functional) on the relationship between quality of mobile services and customer intention to stay. The results of CFA between groups were tested for significance by using Chi-square difference test.

Structural Equation Modeling (SEM)

In general, SEM has two stages to test the theoretical models. First, the measurement model which identifies the relationship between manifest and latent variables by CFA approach. Second, structural model tests the causal relationships among the specified constructs. The relationship specifies either direct or indirect or both between one latent construct to the other latent constructs (Byrne, 2001). In this study, SEM was used to test the causal relationships among mobile subscriber expectations, quality of mobile services, mobile subscriber value, mobile subscriber satisfaction, customer intention to stay and price. The seven-steps (see Figure 8) suggested by Hair, Anderson, Tatham, & Black, (1998) were followed to perform the SEM and these steps were also used as a guidelines for testing the hypotheses in the study.

Based on the extensive review of literature, the theoretical model was developed, specified causal path diagram and the number of indicators of the measurement and structural models were discussed in the previous section. Maximum Likelihood estimation method was used, to estimate the covariance matrix, since the multivariate data were under the assumption of normal distribution.

The following goodness of fit criteria was used to evaluate the models.

It is very difficult to specify the intensity of a model's prediction. There are many fit indices that were developed by the researchers from three major perspectives: absolute, incremental and parsimonious fit measures (Hair, Anderson, Tatham, & Black, 1998).

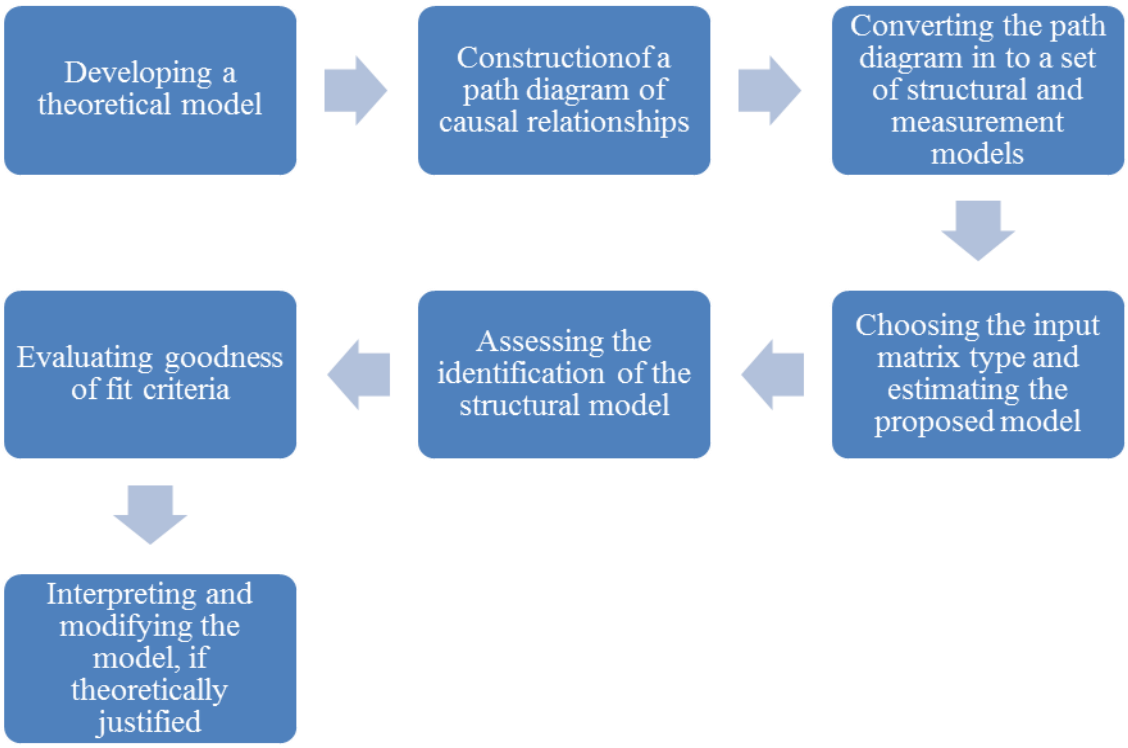

Figure 8 The application process of SEM (Hair et al., 1998)

Absolute fit measures

These fit measures were used to determine how well the model fits the sample data for measurement and structural models. The overall fit was determined by following standard criteria (Hair, Anderson, Tatham, & Black, 1998; Byrne, 2001; Chang, & Chen, 2008; Kelloway, 1998):

- The ratio of χ^2 to degrees of freedom (χ^2 /df) 2 to 5
- Goodness-of-Fit Index (GFI) > .90
- Root Mean Square Error of Approximation (RMSEA) ≤ .08

Incremental fit measures

These measures are helpful to compare the proposed and baseline models. The incremental fit was determined by the following standard criteria (Byrne, 2010; Chang, & Chen, 2008; Hair, Black, Babin, Anderson, & Tatham, 2008).

- Adjusted Goodness-of-Fit Index (AGFI) > .9
- Tucker-Lewis Index (TLI)/NonNormed Fit Index (NNFI) > .9
- Normed Fit Index (NFI) > .9
- Comparative Fit Index (CFI) > .9

Parsimonious fit measures

These measures were applied to analyse the model fit when the data is over fitting with large number of coefficients. In general, Parsimonious Normed Fit Index (PNFI) and Parsimonious Goodness-of-Fit Index (PGFI) are used for fit criteria. The values for both PNFI and PGFI ranges from 0 to 1 and the more value indicates that parsimonious fit is achieved.

In this study, based on the model fit index the results of measurement and structural models were interpreted. Finally, reliability and validity of a model was tested as presented below:

- Construct reliability should be greater than or equal to .7 (Churchill, 1992; Fornell & Lacker, 1981; Hair, Black, Babin, Anderson, & Tatham, 2008)
- Face (content) validity (Churchill, 1992) ensured with experts at the time of developing a questionnaire (Kaplan & Sacuzzo, 1993; Saraph, Benson, & Schroeder, 1989)
- Convergent validity ensured with average variance extracted (AVE) ≥ .5, factor loadings ≥ .7 and Construct reliability (Fornell & Lacker, 1981; Hair, Black, Babin, Anderson, & Tatham, 2008),
- Nomological validity (Churchill, 1992) ensured with significant correlations between the constructs.

- Predictive validity (Churchill, 1992) ensured by regression analysis for each construct (e.g., all mTelQual dimensions should be significant with overall quality of mobile services).
- Discriminant validity (Fornell & Lacker, 1981; Hair, Black, Babin, Anderson, & Tatham, 2008) ensured by checking AVE > squared inter-construct correlations and
- Construct validity (Churchill, 1992) ensured with convergent, discriminant and nomological validity.

Comparing means

In this study, t-test and Analysis of Variance (ANOVA) were used to compare means of different groups. To compare means between two independent samples, independent sample t-test was performed. If the groups are more than two independent groups, then analysis of variance was performed. The results of t-test and analysis of variance were interpreted based on the homogeneity test of equality of variances (Levene's test). Tukey test and Donnett's T3 post hoc test were conducted for multiple comparisons when ANOVA results shows means are significant. These tests were performed for comparing means of quality of mobile services, mobile subscriber satisfaction and customer intention to stay in terms of demographic, technical and functional variables.

Multiple regression analysis (hierarchical)

Multiple regression analysis was used to test the predictive validity of mTelQual and relative effect of mTelQual dimensions on overall quality of mobile services, subscriber value, subscriber satisfaction, overall satisfaction and customer intention to stay. And hierarchical multiple regression analysis was used to test the relative effect of mTelQual dimensions, overall QMS, mobile subscriber value, mobile subscriber satisfaction, and overall mobile subscriber satisfaction on customer intention to stay.

Moderation analysis

In this study, multi-group causal analysis (Jöreskog and Sörbom 1993) was performed to test the moderation effect of demographic, technical and functional variables of mobile services on the relationship between quality of mobile services and customer

intention to stay. The analysis was done using Amos software and chi-square difference test.

Mediation analysis

In the study, mediation analysis was also done using structural equation modeling by Amos software. After testing the significance of indirect effect of quality of mobile services on customer intention to stay through subscriber value and satisfaction, bootstrap was, further, performed for a random sample of 5000 to test the power of the mediation effect.

This chapter presented the methodology for the study. Research design, target population, accessible population, justification for the target population, sampling technique, sample size, data collection methods and procedures, justification for sample size, profile of the respondents, survey instrument, and methods of data analysis were discussed. The next chapter presents the results of the study.

CHAPTER IV
RESULTS

CHAPTER IV
RESULTS

This chapter presents the results of data analysis. Descriptive statistics, exploratory factor analysis, confirmatory factor analysis, structural equation modeling, chi-square difference test, hierarchical multiple regression analysis were performed to develop and validate a measurement scale i.e., mTelQual for assessing quality of mobile services and to examine the structural relationship between quality of mobile services and customer intention to stay in the presence of mediating and moderating variables. The results of reliability and validity of the scales were also tested and reported in this chapter. Demographic characteristics, mobile usage characteristics and proportion of mobile operators of the samples, developing and validating a measurement scale mTelQual in India and re-examining the same in the context of united AP with larger sample size, results of mediation and moderation models and assessment of quality, value, satisfaction and stay were presented in this chapter as follows.

4.1 Demographic characteristics of the samples

The descriptive statistics of demographic characteristics are presented in Table 17. The final valid sample of online survey was 547, which was used to develop and validate mTelQual and measurement models in the study. Similarly, the valid sample of offline survey was 1061 in united AP which was used for re-examining the mTelQual and the measurement models developed in Indian context.

4.1.1 Demographic characteristics of the sample (India)

The sample consisted of 27 % female and 73 % male. Most of the respondents were in the age group of 31 to 45 years (43%) followed by 21 to 30 years (40%) and 46 years and above (15%). The lowest age group of the respondents was under 20 years (02 percent). Majority of the respondents were qualified post-PG (50%) followed by PG (41%) and Graduation (8%). Employees were the major respondents (63%) in the sample followed by students (27%). The majority of the respondents were from urban region (75%) followed by semi-urban (14%) and rural (11%) regions.

Table 17

Demographic characteristics of the samples

United Andhra Pradesh				India		
Variable	**Category**	**Count**	**%**	**Category**	**Count**	**%**
Gender	Female	458	43	Female	146	27
	Male	603	57	Male	401	73
Age (in years)	Under 20	256	24	Under 20	08	02
	21 to 30	611	58	21 to 30	219	40
	31 - 45	162	15	31 - 45	238	43
	46 above	42	3	46 above	82	15
Education	10^{th} / +2	124	12	10^{th} / +2	4	1
	Graduate	400	37	Graduate	46	8
	PG	498	47	PG	226	41
	Post-PG	39	4	Post-PG	271	50
Occupation	Student	571	53	Student	149	27
	Employee	410	39	Employee	347	63
	Self-employee	63	6	Self-employee	26	5
	Others	17	2	Others	25	5
Regional area	Rural	314	30	Rural	60	11
	Semi-urban	208	19	Semi-urban	79	14
	Urban	539	51	Urban	408	75

4.1.2 Demographic characteristics of the sample (united Andhra Pradesh)

The sample consisted of 43 % female and 57 % male. Most of the respondents were in the age group 21 to 30 years (58%) followed by age under 20 years (24%). The lowest among the sample were age group of the respondents 46 years and above (3%). Majority of the respondents were qualified PG (47%) followed by Graduation (37%). Students were the major respondents (53%) in the sample followed by employees (39%). The majority of the respondents were from urban region (51%) followed by rural (30%) and semi-urban (19%).

4.2 Mobile usage characteristics of the samples

The descriptive statistics of mobile usage characteristics are presented in Table 18. The table presents the characteristics such as technology, monthly spending, connection, mobile data, and mobile type.

4.2.1 Mobile usage characteristics of the sample (India)

The sample consisted of 11 % CDMA and 89 % GSM users. Most of the respondents were spending a monthly expenditure on mobile services less than or equal to Rs. 300 (68%) followed by an expenditure between ₹. 301 to ₹. 600 (36%). Majority of the respondents were prepaid subscribers (69%) followed postpaid (31%). The mobile data usage of the sample was more for 2G (32%) followed by 3G (23%) and both 2G and 3G (22%). There were 23% of the respondents who were not using the data service. Majority of the respondents were using smartphone (65%) followed normal phone (35%) in the chosen sample.

Table 18
Mobile usage characteristics of the samples

	United Andhra Pradesh			India		
Variable	**Category**	**Frequency**	**%**	**Category**	**Frequency**	**%**
Technology	CDMA	26	3	CDMA	60	11
	GSM	1035	97	GSM	487	89
Monthly spending (₹.)	<= 300	635	60	<= 300	207	38
	301 to 600	292	27	301 to 600	199	36
	601 to 900	48	5	601 to 900	44	8
	900 above	86	8	900 above	97	18
Mobile Connection	Prepaid	962	91	Prepaid	376	69
	Postpaid	99	9	Postpaid	171	31
Mobile data	2G	451	42	2G	176	32
	3G	317	30	3G	122	23
	Both	263	25	Both	121	22
	Not-using	30	3	Not-using	128	23
Mobile type	Smartphone	702	66	Smartphone	358	65
	Normal phone	359	34	Normal phone	189	35

4.2.2 Mobile usage characteristics of the sample (united Andhra Pradesh)

The sample consisted of 3% CDMA and 97% GSM users. Most of the respondents were spending a monthly expenditure on mobile services less than or equal to Rs. 300 (60%) followed by an expenditure between ₹. 301 to ₹. 600 (27%). Majority of the respondents were prepaid subscribers (91%) followed by postpaid (9%). The mobile data usage of the sample was more for 2G (42%) followed by 3G (30%) and both 2G and 3G (25%). There were only 3 percent of the respondents who were not using the

data service. Majority of the respondents were using smartphone (66%) followed a normal phone (34%) in the chosen sample.

4.2.3 Proportion of mobile operators in the samples

The descriptive statistics of proportion of mobile operators in the samples are presented in Table 19. The table presents the proportion of Airtel, Vodafone, Idea, Reliance, BSNL, Aircel, Tata and others of both the samples i.e., India and united AP.

4.3.1 Proportion of mobile operators in the sample (India)

The sample consisted of highest proportion of Airtel subscribers (31%) followed by Vodafone (18%), Idea (14%) and BSNL (19%). The sample included lowest proportion of Aircel (03 percent) subscribers. Also, the sample consisted of highest proportion of mobile subscribers from the telecom circle B (40%) followed by circle A (36%). The lowest proportion of the respondents was form metro circle (10%). The operator proportions were slightly higher than the market share proportion for Airtel and BSNL. The samples were proportionate to the subscriber base in terms of telecom circle. The operator proportion was slightly differ from the initial quota and circle wise quota was similar to the initial quota specified in the methodology chapter.

Table 19
Proportion of mobile operators in the samples

	India		**United Andhra Pradesh**	
Operator	Frequency	Percent	Frequency	Percent
Airtel	167	31	255	24
Vodafone	100	18	212	20
Idea	76	14	170	16
Reliance	26	05	109	10
BSNL	106	19	92	9
Aircel	16	03	79	7
Tata	31	06	85	8
Others	25	05	59	6
Total	547	100	1061	100

4.3.2 Proportion of mobile operators in the sample (united Andhra Pradesh)

The sample consisted of highest proportion of Airtel subscribers (24%) followed by Vodafone (20%), Idea (16%) and Reliance (10%). The sample included lowest proportion of other mobile subscribers (06 percent). The other operators included Loop, Videocon, Telewings, Sistema, MTNL, and Quadrant. The sample proportion was in proportion to the market share of the mobile operators. The sample proportion

was highest for urban area (51%) followed by rural area (30%) and semi-urban (19%). The proportion of operator and regions were similar to the initial quota specified in the methodology chapter.

4.4 Assumptions of the data

The data collected for the study was tested for normality, linearity and outliers. Table 20 presents the results of descriptive statistics for the constructs Network Service (NS), Data Service (DS), Customer Care Service (CCS), Accessibility (Acc), Quality of Mobile Services (QMS), Mobile Subscriber Value (mSV), Mobile Subscriber Satisfaction (mSS), Customer Intention to Stay (CIS), Mobile Subscribers Expectations (mExp) and Price of mobile services (Price).

Table 20
Descriptive statistics for the constructs of the study

	Minimum	Maximum	Mean	SD	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	S.E.	Statistic	S.E.
NS	1.00	5.00	3.71	.75	-.73	.08	.76	.15
DS	1.00	5.00	3.55	.91	-.61	.08	.19	.15
CCS	1.14	5.00	3.08	.69	-.01	.08	-.04	.15
Acc	1.00	5.00	3.70	.80	-.48	.08	.07	.15
QMS	1.47	5.00	3.51	.58	-.39	.08	.23	.15
mSV	1.00	5.00	3.51	.86	-.56	.08	.13	.15
mSS	1.00	5.00	3.12	.75	-.14	.08	-.25	.15
CIS	1.00	5.00	3.51	.82	-.68	.08	.33	.15
Price	1.00	5.00	3.24	1.00	-.42	.08	-.39	.15
mExp	1.00	5.00	4.26	.65	-.91	.08	.68	.15

Note: NS – Network service; DS – Data service; CCS – Customer Care Service; Acc – Accessibility; QMS – Quality of Mobile Services, mSV – mobile Subscriber Value, mSS – mobile Subscriber Satisfaction, CIS – Customer Intention to Stay; mExp – expectations of mobile subscribers; S.E. – Standard Error; SD – Standard Deviation.

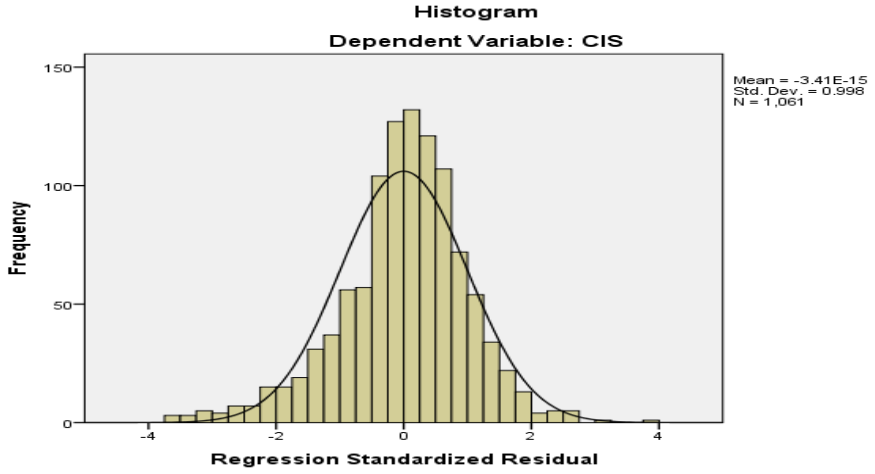

Figure 9 Normal probability curve

Figure 9 represents the normal probability curve for the construct CIS as dependent variable and all the above constructs as an independent variables. The results of descriptive statistics and normal probability curve indicated that the data was assumed to be normal to conduct parametric tests.

The multivariate statistical techniques such as multiple regression analysis, factor analysis and structural equation modeling have the basic assumption of linearity of relationships among the constructs (Hair, Black, Anderson, & Tatham, 2008). The study examined the relationship between QMS and CIS with mediation and moderation effects. The relationships were tested with Pearson's correlation and found that the measures have significant positive correlations with each other. Thus, the study assumed that the relationships are linear (Field, 2005; Tabachnick & Fidell, 2001; Hair, Black, Anderson, & Tatham, 2008). The outliers of the data were examined in the Amos output and found that there was no multivariate outliers present (Kline, 2005).

Thus, the assumption of the study was that the data is normal with linear relationships among the constructs and it is free form outliers.

4.5 Development of the scale (mTelQual)

Scale development is a concept based on the idea that several items or statements all together help to measure a latent structure or construct. It is a process where a set of methodologies with many statistical tools are used to develop and validate the scale. The subject matter of this section highlights as the main body of this paper, where the discussion related to development of measurement scale for measuring quality of mobile services is mentioned in detail. This study has identified four steps for development and validation of the measurement scale, the description is as follows:

Step 1: Generation of the scale items

The study reviewed many scholarly articles published in international journals for identifying the items pool on the subject related to quality of mobile services. The study also used various regulatory reports such as Telecom Regulatory Authority of India (TRAI) and Department of Telecom (DoT) for modifying the identified items pool from the literature. For classifying and validating the items, expert discussions

was carried out. Thus, with this exercise total 40 items have been identified for four constructs.

Step 2: Pre-testing of the scale

The pre-testing of the pool of items was carried out to ensure that the items elicit appropriate responses, uncover ambiguous wording or errors or redundancy in the items, before the survey is conducted with a large sample size. For conducting pre-testing, 6 experts from telecom, 63 telecom subscribers and 4 experts from academia were contacted. They were requested to read the items in terms of clarity of wording of the statements, some repetition in items or any other errors. With the help of pre-testing, some of the items have been removed, which were not appropriate according to experts' views. This helped to develop the face or content validity of the questionnaire, 5 items (such as customer personal interaction with employees, showroom equipment, employee dress code, SIM information and convenient working hours) have been removed, and some other required corrections were made.

Step 3: Factor structure of mTelQual

After first pilot testing, the survey instrument had 35 items, where the respondents have to provide their opinion on a five-point Likert-type scale from strongly disagree to strongly agree. The non-random sampling method have been adopted to choose the respondents. For second pre-test survey, 132 responses have been collected through personal contact approach. The respondents were also asked to look for wordings, problems with statements to again recheck the content or face validity.

Sample: The universe for this study constituted all the people who use mobile telecom operator services, and the valid sample of 586 was selected from the universe purposively. The questionnaire was selected for final analysis, some responses which consisted response bias, were removed from the analysis. For determining construct validity and exploratory factor analysis, a sample of 547 was finalized.

Purification of Measurement Scale: The reliability test was run to determine the internal consistency of the scale, SPSS 21.0 software package was used for the data analysis. The value of Cronbach's alpha came out to be .95 which showed good internal consistency, as the minimum alpha value of .70 is acceptable for using the scale for further analysis (Hair, Black, Babin, Anderson, & Tatham, 2006). The value

of Cronbach's alpha has also been examined if an item is deleted to know the impact of the items on overall alpha value (see Table 21). The results showed that the deletion of the items doesn't increase overall scale alpha value.

Table 21
Item-total statistics of mTelQual

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
N1	105.93	403.56	.59	.95
N2	106.08	405.30	.59	.95
N3	105.95	404.52	.62	.95
N4	106.09	404.80	.58	.95
N5	106.10	402.89	.62	.95
N6	106.11	404.37	.57	.95
N7	105.90	407.46	.53	.95
N8	106.25	410.96	.37	.95
D1	106.26	408.12	.51	.95
D2	106.26	406.61	.53	.95
D3	106.17	406.91	.54	.95
A1	105.72	408.74	.55	.95
A2	106.12	401.11	.65	.95
A3	106.31	400.37	.64	.95
A4	106.42	396.44	.72	.95
C1	106.27	401.37	.72	.95
C2	106.42	402.60	.70	.95
C3	106.47	403.17	.67	.95
C4	106.52	402.55	.67	.95
C5	106.28	403.81	.67	.95
C6	106.20	402.36	.67	.95
C7	106.29	402.37	.69	.95
C8	106.25	398.88	.74	.95
C9	106.08	402.47	.62	.95
C10	106.84	403.01	.51	.95
C11	106.44	398.31	.70	.95
C12	106.38	399.51	.71	.95
C13	106.30	399.41	.71	.95
C14	106.12	401.16	.71	.95
C15	106.74	404.60	.54	.95
C16	106.86	405.91	.49	.95

Note: N – Network, D - Data, A - Accessibility, C – Customer Care

For establishing the construct validity of the measurement scale, exploratory factor analysis was performed. Exploratory factor analysis attempts to bring inter-correlated variables together under more general, underlying variables. The goal of factor analysis is to "reduce the dimensionality of the original space and to give an

interpretation to the new space, spanned by a reduced number of new dimensions which are supported to underlie the old ones" (Rietveld and Van Hout, 1993; pp. 254). Thus it offers not only the possibility of gaining a clear view of the data, but also the possibility of using the output in subsequent analysis (Field, 2000). Principal component analysis, which is one of the most commonly used extraction methods was used for this study, as it seeks to summarize most of the original information in a minimum number of factors for prediction purposes.

Some other criterion as, Eigen value >1 as a criteria for determining the number of extracted factor, VARIMAX rotation, anti-image correlation for diagonal entries >.5 were set to extract the factors. The following criteria were used to determine the factor structure as suggested by Hair et al. (2008): (a) the loading for each item on a factor should be more than or equal to ±0.40; and (b) the items which are having cross loadings should be excluded if the difference between the loadings is less than 0.20. Eight items (i.e., A4, C8, C9, C10, C12, C13, C14, C15 and C16) didn't not fall on the above mentioned criteria, accordingly those items are dropped from further analysis.

The item flexibility to lodge a complaint (A4) was considered to be important for the study, but the item's variance was explained by all other accessibility items in terms of different customer support systems, easy ways to recharge/pay bills and access the mobile services. The items related to customer care services such as request follow-up (C8), accuracy of billing/amount deductions (C9), saying apology for inconvenience (C10), attempt to understanding customer requests (C12), providing relevant information (C13), politeness of customer care executives (C14), waiting for the service (C15) and call on hold when calling customer care number (C16) were considered important for the study. But, customers were perceived to be similar with other customer care services such as customer care executive's attentiveness to listen the customer (C1), helpfulness of the customer care executives (C2), quick service (C3), knowledge of the executive (C4), giving clear information to the customer (C5), number of complaints resolved (C6), the executive's eagerness to help (C7) and executives are attentive to my calls (C11), accordingly the items were dropped. The factor analysis was performed again, which demonstrated the following results:

KMO and Bartlett"s test of Sphericity: KMO value which varies between 0 to 1 and the value 0 indicates that the sum of partial correlations is large, relatively to the sum of correlations, indicating factor analysis was likely to be inappropriate. Kaiser (1974) recommends the value above .5 as acceptable, here the results show KMO value as .95, which can be considered as a good value. Bartlett's measure tests the null hypothesis that the original correlation matrix is an identity matrix, thus there are as many factors as the items, and thus for doing the factor analysis, the test should be significant (Hair, Anderson, Tatham, & Black, 1998). For this data, Bartlett's test is highly significant (p = .000), and therefore factor analysis is appropriate. The results for KMO and Bartlett's test has been exhibited in Table 22.

Table 22
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.95
Bartlett's Test of Sphericity	Approx. Chi-Square	7814.99
	df	231
	Sig.	***

Note: ***Significant at .001 level

(ii) Factors extraction: Principal component analysis with VARIMAX rotation has resulted in four factors, which were the four constructs taken initially at the time of scale development, thus it helped to establish the construct validity. As there are four factors, so the scale should be considered as multi-dimensional scale. Total cumulative variance explained by these four factors was 67.58 per cent. Thus after the exploratory factor analysis, the final scale comprised of 22 items which were grouped under four constructs, include, 'network service' (eight items), customer care service (eight items), 'accessibility' (there items), and 'data service' (three items).

The results related to factor loading which demonstrated the correlation between the item and the factor, and the values .50 or greater are considered practically significant; Eigen Value which represented the amount of variance accounted for by a factor, and the value more than 1 is considered significant; percent of variance explained represents how much variance is explained by factor 1, here factor 1 explained 26.24 percent of total variance. Communality values represent the amount of variance shared by any item with all other items, here 76.3 percent variance

associated with N1 is common or shared variance. The values related to factor loading, Eigen value, percent of variance and communality values can be considered highly significant for factor analysis which are demonstrated in Table 23. Following an examination of the items' loadings on each factor, the four distinct factors labelled as are: network Service (NS), Customer Care Service (CCS), Data Service (DS), and Accessibility (Acc).

Table 23
Factor structure of mTelQual

	Factor loading	Communality	Eigenvalues	% of total variance	Cumulative %
N1	.83	.76	9.34	26.24	26.24
N2	.83	.75			
N3	.85	.76			
N4	.81	.72			
N5	.84	.74			
N6	.84	.74			
N7	.85	.77			
N8	.59	.50			
C1	.82	.74	3.31	22.08	48.32
C2	.82	.73			
C3	.82	.75			
C4	.69	.59			
C5	.74	.67			
C6	.61	.55			
C7	.64	.48			
C11	.57	.35			
D1	.76	.71	1.11	9.93	58.25
D2	.79	.75			
D3	.69	.65			
A1	.70	.66	1.07	9.32	67.58
A2	.74	.76			
A3	.73	.72			

Note: N – Network, D - Data, A - Accessibility, C – Customer Care

Step 4: Reliability and Validity of the scale mTelQual

This step exclusively exhibits the reliability and validity analysis of the measurement scale developed in the study. Internal consistency reliability test, content validity, convergent validity, discriminant validity, nomological validity, construct validity and predictive validity analysis are as follows. The results of confirmatory factor analysis are shown in Figure 10, Table 25, and Table 26. The model fit summary indicates the

overall fit (see Table 26). The result showed that the measurement model is reliable and valid for further analysis (χ^2 / df – 1.63; GFI - .96; RMSEA - .03; NFI - .97; TLI - .98; CFI - .99; RFI - .96; AGFI - .94; PNFI - .79).

Reliability Analysis: Reliability which refers to the extent to which a scale produces consistent results if repeated measurements are made (Malhotra, 2007). The internal consistency of scale have been examined through Cronbach's alpha, which has a high value of .930, thus showing a high reliability value of the scale. The value of Cronbach's alpha if an item is deleted has also been examined to know the impact of the items on overall alpha value. The results showed that the deletion of the items doesn't increase overall scale alpha value (see Table 24).

Table 24
Item-total statistics of mTelQual

	Mean	Std. Deviation	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
N1	3.53	.96	.69	.925
N2	3.39	.95	.66	.925
N3	3.33	.97	.62	.926
N4	3.28	.99	.64	.926
N5	3.53	.94	.65	.926
N6	3.60	.99	.64	.926
N7	3.51	.97	.67	.925
D1	3.55	1.01	.53	.928
D2	3.55	1.05	.55	.928
D3	3.63	1.01	.56	.927
C1	3.87	1.07	.62	.926
C2	3.72	1.01	.62	.926
C3	3.85	.98	.64	.926
C4	3.71	1.03	.61	.926
C5	3.70	1.05	.66	.925
C6	3.70	1.07	.61	.926
A1	4.08	.93	.56	.927
A2	3.68	1.06	.63	.926
A3	3.50	1.11	.59	.927

Note: Cronbach alpha - .930; No. of items – 19; N=547. N – Network, D - Data, A - Accessibility, C – Customer Care;

Cronbach's alpha (Cronbach, 1960) value was calculated for each construct. The alpha values ranged from 0.79 to 0.94, and exceeded the minimum acceptable criteria (Nunnally, 1967). Further, the Construct Reliability (CR) values ranges from .80 to .95 and these values were more than minimum (CR ≥ .7) required criteria (Churchill,

1992; Fornell & Lacker, 1981; Hair, Black, Anderson, & Tatham, 2008). Thus, the scale mTelQual is reliable (see Table 25).

Table 25
Reliability and Validity of mTelQual in India

Factor	EFA Loadings	CFA Loadings[a]	t-value	AVE	CR	Inter-construct correlations			
						NS	CCS	DS	Acc
Network service (NS)			(Cronbach α = .945)						
N1	.83	.86	26.62***						
N2	.83	.85	26.01***						
N3	.85	.85	25.98***						
N4	.81	.82	24.43***	.71	.95	1	.17[c]	.17[c]	.39[c]
N5	.83	.84	25.69***						
N6	.84	.84	25.73***						
N7	.85	.86	#						
Customer care service (CCS)			(Cronbach α = .904)						
C1	.84	.83	18.28***						
C2	.85	.83	18.35***						
C3	.82	.83	18.3***	.62	0.91	.41***	1	.51[c]	.37[c]
C4	.67	.72	15.85***						
C5	.75	.79	17.50***						
C6	.63	.71	#						
Data service (DS)			(Cronbach α = .795)						
D1	.78	.74	15.32***			.42***	.72***	1	.32[c]
D2	.80	.78	15.90***	.57	.80				
D3	.68	.73	#						
Accessibility (Acc)			(Cronbach α = 0.790)						
A1	.72	.67	14.63***			.63***	.61***	.57***	1
A2	.75	.82	17.2***	.57	.80				
A3	.74	.76	#						

Note 1: # t-value is not estimated, because its value is fixed at 1; ***significant at .001; EFA-Exploratory factor analysis; CFA-Confirmatory factor analysis; AVE-Average variance extracted; CR-Construct Reliability; *significant at .001; a - standardized estimates of Amos output; c- square of inter-construct correlations.
Note 2: N8, C7 and C11 are discarded for low factor loading at the stage of CFA.

Table 26
Model fit summary of mTelQual in India

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
230.35	141	1.63	.96	.03	.97	.98	.99	.96	.94	.79

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; CFI - Comparative Fit Index; RFI-Relative fit index, TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

Validity Analysis: Validity of a scale may be defined as the extent to which differences in observed scale scores reflect true differences among objects on the characteristics being measured (Malhotra, 2007). Validity of the scale items is examined for content validity, convergent validity, discriminant validity, nomological validity, construct validity and predictive validity.

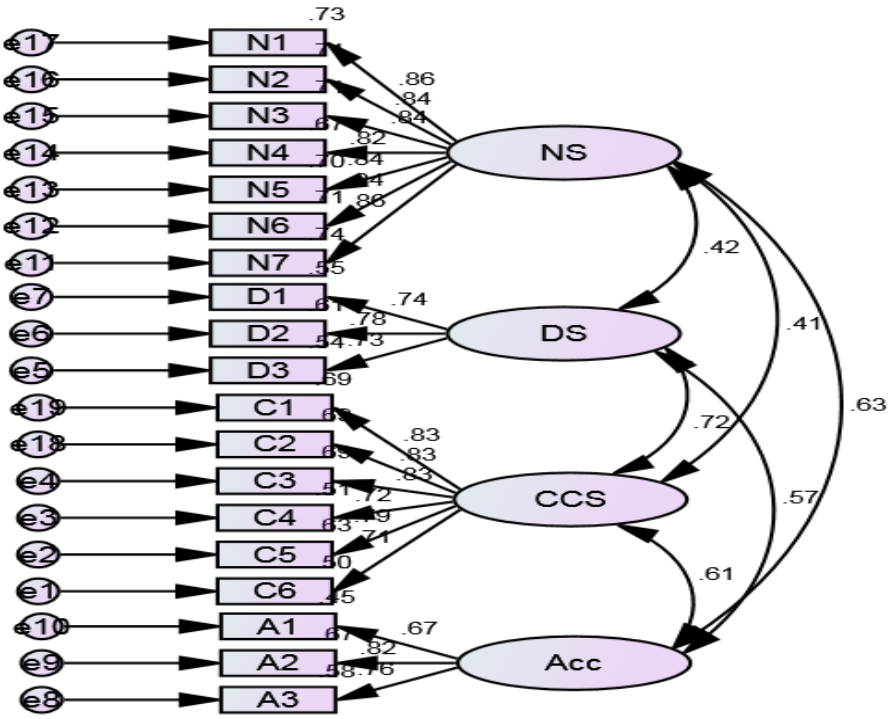

Figure 10 mTelQual first-order CFA model in India

Note: NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility.

Content validity

The content validity of the scale was duly assessed through the pilot testing with the subject experts, practitioners, and subscribers of mobile services. Later, the items were modified to make statements conceivable to respondents that further checked the face or content validity (Kaplan & Sacuzzo, 1993; Churchill, 1992; Saraph, Benson, & Schroeder, 1989).

Convergent validity

The estimates of the standardized loading were more than 0.7 thresholds (Hair, Black, Babin, Anderson, & Tatham, 2006) for all the scale items (ranges from .70 to .86; except for the item A1 - .67) and Average Variance Extracted (AVE ≥ .5) was ranging from .57 to .71 (Fornell & Lacker, 1981; Hair, Black, Anderson, & Tatham, 2008). Therefore, the scale mTelQual has convergent validity.

Discriminant validity

The results in Table 25 showed that the Average Variance Extracted (AVE) values are greater than the squared correlations for each pair of the constructs. It shows the scale mTelQual has discriminant validity (Fornell and Larcker, 1981).

Nomological validity

The correlations between each pair of constructs were significant ($p < .01$) and it indicated that the scale mTelQual has nomological validity (Churchill, 1992).

Construct validity

The scale mTelQual has construct reliability, convergent validity, discriminant validity and nomological validity. Therefore, the scale mTelQual has construct validity too (Churchill, 1992; Gerbing and Anderson, 1988; Hair et al., 2006).

Predictive validity

The result of multiple regression analysis is presented in Table 27. The dimension of mTelQual (network service, data service, customer care service, and accessibility) were taken as independent variables and overall quality of mobile services was taken as dependent variable.

Table 27
Predictive validity of mTelQual in India

mTelQual dimension	t	Sig.	Collinearity Statistics	
			Tolerance	VIF
(Constant)	118.09	***		
NS	21.64	***	1.000	1.000
DS	10.79	***	1.000	1.000
CCS	6.37	***	1.000	1.000
Acc	5.54	***	1.000	1.000

Note: Dependent variable: Overall quality of mobile services; ***significant at .001; VIF – Variance Inflation Factor; NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility.

The model has good fit ($R^2 = .55$, $F(4, 542) = 164.01$, $p < .01$). Network service ($t = 21.64$, $p < .01$), data service ($t = 10.79$, $p < .01$), customer care service ($t = 6.37$, $p < .01$) and Accessibility ($t = 5.54$, $p < .01$) have significant contribution to predict overall quality of mobile services. The Collinearity Statistics (Tolerance > .2 and variance inflation factor < 5) indicated that the model is free from multicollinearity

(Gaur & Gaur, 2006). Therefore, the scale mTelQual has predictive validity (Churchill, 1992).

Overall, the results of confirmatory factor analysis supported the adequate fit, reliability and validity of mTelQual. Thus, mTelQual is robust scale for measuring quality of mobile services in Indian context.

mTelQual second-order CFA model in India

Based on the theoretical concept of service quality (Parasuraman, Zeithaml, & Berry, 1988) and the results of first-order CFA of mTelQual scale, the second-order CFA model of mTelQual was specified in Indian context. There were four first-order constructs (network service, data service, customer care service and accessibility) one second-order construct (quality of mobile services) in the model. The second-order model of mTelQual was developed to test the hypotheses that quality of mobile services is a multidimensional construct which consists of four sub-dimensions (network service, data service, customer care service and accessibility) and each dimension has a significant positive relationship with quality of mobile services (as shown in Figure 11). The results of second-order CFA model of mTelQual are presented in Table 28 and Table 29. The model fit summary indicated the overall fit (see Table 28). The result showed that the measurement model is reliable and valid for further analysis (χ^2 / df – 2.94; GFI - .92; RMSEA - .06; NFI - .934; TLI - .948; CFI - .92; RFI - .92; AGFI - .91; PNFI - .81). The construct reliability (CR) was .84 and AVE was .57. The results indicated that the construct "quality of mobile services" is reliable and valid. Each dimension of mTelQual was significant ($p < .01$). Therefore, each dimension of mTelQual has a significant positive relationship with quality of mobile services (support for H1).

Table 28
Goodness-of-fit results of mTelQual second-order model in India

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
434.92	148	2.94	.921	.06	.93	.94	.96	.92	.91	.81

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index, CFI - Comparative Fit Index; TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

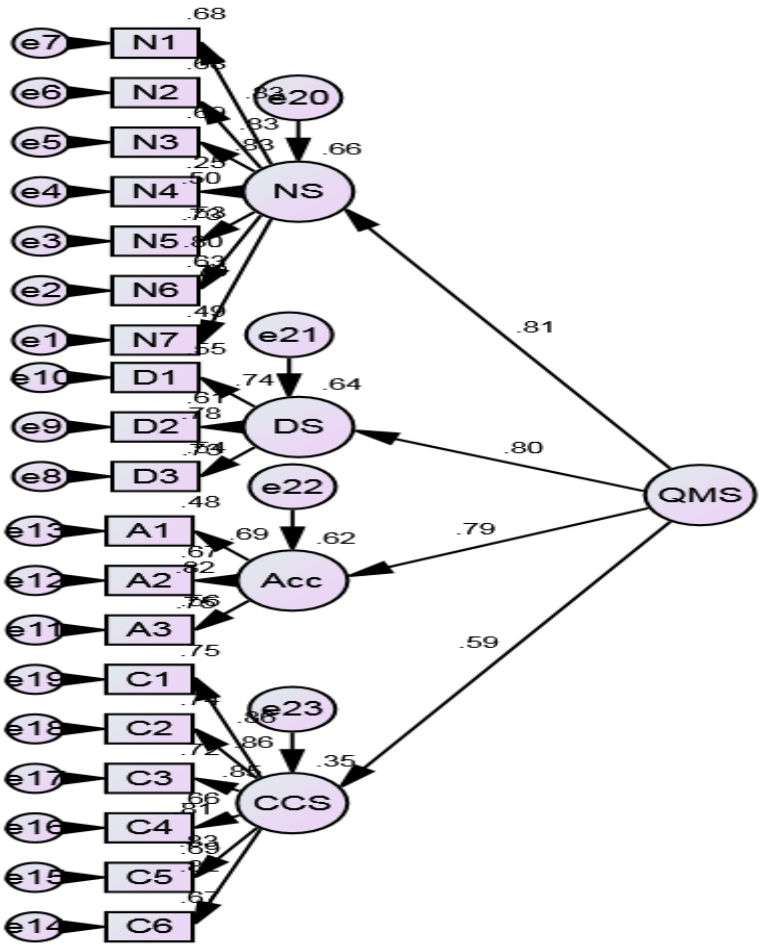

Figure 11 mTelQual second-order CFA model in India

Note: QMS – Quality of Mobile Services; NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility.

Table 29

Reliability and validity of mTelQual second-order model in India

Second-order Factor	First-order factors	Standard loadings	R^2	t	p	AVE	CR
Quality of mobile services (QMS)	NS	.813	0.66	10.92	***	.57	.84
	DS	.802	0.64	10.89	***		
	CCS	.593	0.35	10.01	***		
	Acc	.79	0.62	#			

Note: # t-value is not estimated, because its value is fixed at 1; ***significant at 0.001; R^2 - Coefficient of determination p - probability value of significance level; AVE – Average Variance Extracted; CR – Construct Reliability.

4.6 Re-examining the reliability and validity of mTelQual

This step exclusively exhibits the reliability and validity analysis of the measurement scale mTelQual in the state of undivided Andhra Pradesh. Internal consistency, reliability test, content validity, convergent validity, discriminant validity,

nomological validity, construct validity, and predictive validity analysis were re-examined as follows.

Reliability Analysis: The internal consistency of scale have been examined through Cronbach's alpha, which has a high value of .93, thus showing a high reliability value of the scale. The value of Cronbach's alpha if an item is deleted has also been examined to know the impact of the items on overall alpha value. The results showed that the deletion of the items doesn't increase alpha value for overall scale (see Table 30). Cronbach's alpha (Cronbach, 1960) value was calculated for each construct. The alpha values ranged from 0.79 to 0.95, and exceeded the minimum acceptable criteria (Nunnally, 1967). Further, the Construct Reliability (CR) values ranging from .79 to .94 and these values were more than minimum (CR ≥ .7) required criteria (Churchill, 1992; Fornell & Lacker, 1981; Hair et al., 2008). Thus, the scale mTelQual is reliable (see Table 31) in the state of united Andhra Pradesh also.

Table 30
Item-total statistics of mTelQual in united AP

Item	Mean	Std. Deviation	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
N1	3.52	.96	.70	.926
N2	3.38	.95	.67	.926
N3	3.33	.97	.64	.927
N4	3.28	.99	.64	.927
N5	3.52	.93	.65	.927
N6	3.59	.99	.65	.927
N7	3.5	.96	.67	.926
C1	3.88	1.07	.61	.928
C2	3.72	1.01	.61	.927
C3	3.86	.98	.64	.927
C4	3.71	1.03	.59	.928
C5	3.71	1.05	.65	.927
C6	3.7	1.06	.60	.928
D1	3.54	1.01	.53	.929
D2	3.54	1.05	.54	.929
D3	3.63	1.00	.56	.929
A1	3.38	1.12	.67	.926
A2	3.67	1.06	.62	.927
A3	3.49	1.10	.58	.928

Note: Cronbach alpha - .93; No. of items – 19; N=1061. N – Network, D - Data, A - Accessibility, C – Customer Care;

Table 31
Reliability and Validity of mTelQual (re-examining in AP)

Factor	CFA Loadings[a]	t-value	AVE	CR	Inter-construct correlations			
					NS	CCS	DS	Acc
Network service (NS)		(α = .95)						
N1	.86	36.97***						
N2	.84	35.99***						
N3	.85	36.59***						
N4	.81	33.86***	.71	.94	1	.18[c]	.17[c]	.47[c]
N5	.84	35.48***						
N6	.84	35.54***						
N7	.86	#						
Customer care service (CCS) (α = .90)								
C1	.82	25.01***						
C2	.84	25.32***						
C3	.83	25.26***			.43***	1	.51[c]	.39[c]
C4	.71	21.58***	.61	.90				
C5	.79	23.91***						
C6	.70	#						
Data service (DS)		(α = .79)						
D1	.74	21.34***						
D2	.77	22.01***	.56	.79	.41***	.71***	1	.36[c]
D3	.74	#						
Accessibility (Acc)		(α = 0.80)						
A1	.77	23.65***						
A2	.77	#	.57	.80	.69***	.63***	.60***	1
A3	.74	22.77***						

Note: # t-value is not estimated, because its value is fixed at 1; ***significant at 0.001; CFA-Confirmatory factor analysis; AVE-Average variance extracted; CR-Construct Reliability; *significant at .001; a - standardized estimates of Amos output; c- square of inter-construct correlations.

Table 32
Model fit summary of mTelQual (re-examining in AP)

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
355.74	141	2.76	.97	.04	.97	.98	.98	.97	.95	.74

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index, CFI - Comparative Fit Index; TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

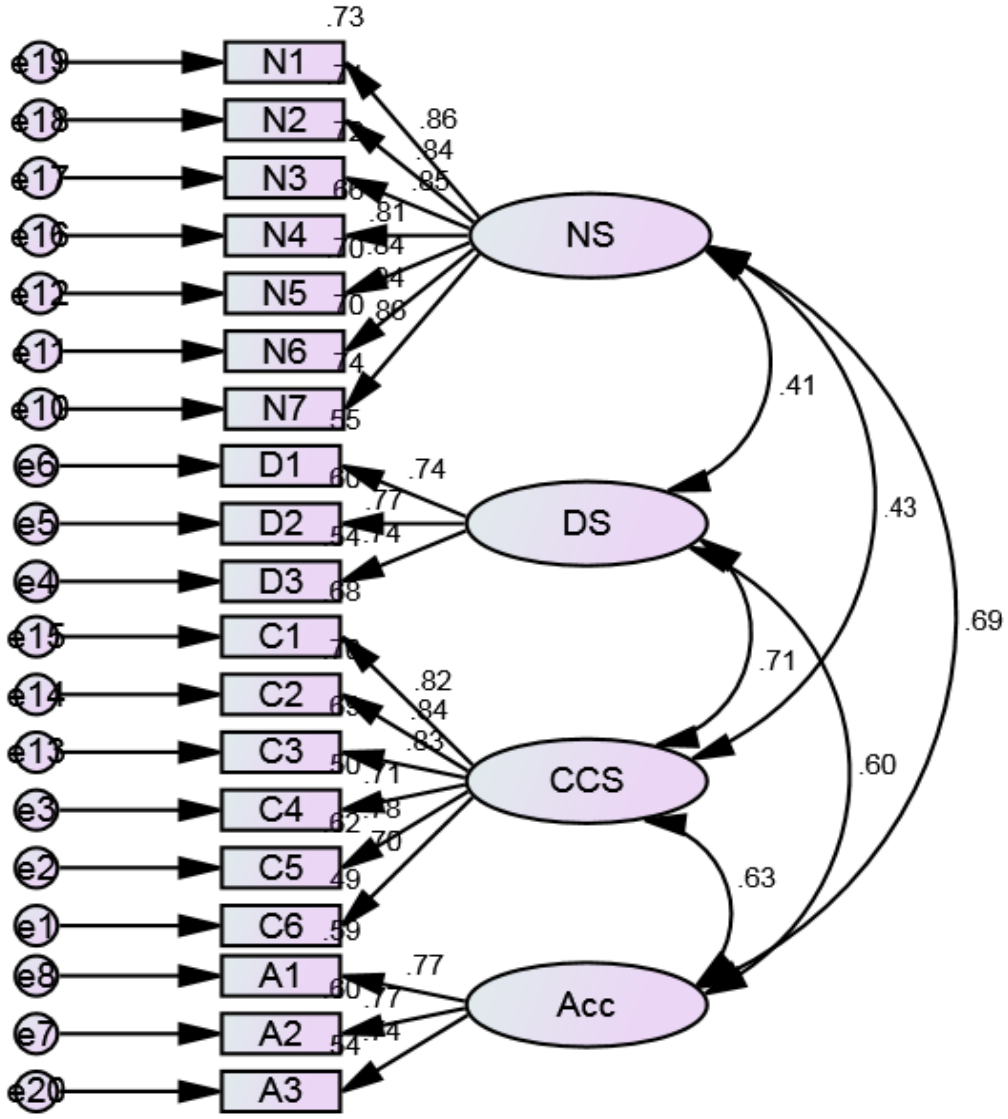

Figure 12 Model fit result for mTelQual (re-examining in AP)

Note: NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility.

Validity Analysis: Validity of scale items was re-examined for content validity, convergent validity, discriminant validity, nomological validity, construct validity and predictive validity in the context of united AP. The results of confirmatory factor analysis are shown in Figure 12, Table 31, and Table 32. The model fit summary indicates the overall fit (see Table 32). The result showed that the measurement model is reliable and valid for further analysis (χ^2 / df – 2.76; GFI - .97; RMSEA - .04; NFI - .97; TLI - .98; CFI - .98; RFI - .97; AGFI - .95; PNFI - .74).

Content validity

The content validity of the scale was duly assessed through the pilot testing with the subject experts, practitioners, and subscribers of mobile services in united AP. Later,

the items were modified to make statements conceivable to respondents that further checked the face or content validity (Kaplan & Sacuzzo, 1993; Churchill, 1992; Saraph, Benson, & Schroeder, 1989).

Convergent validity

The estimates of the standardized loading were more than 0.7 thresholds (Hair et al., 2006) for all the scale items (ranges from .70 to .86) and average variance extracted (AVE ≥ .5) was ranging from .56 to .71 (Fornell & Lacker, 1981; Hair et al., 2008). Therefore, the scale mTelQual has convergent validity.

Discriminant validity

The results in Table 31 showed that the Average Variance Extracted (AVE) values are greater than the squared correlations for each pair of the constructs. It shows the scale mTelQual has discriminant validity (Fornell and Larcker, 1981).

Nomological validity

The correlations between each pair of constructs are significant ($p < .01$) and it indicated that the scale mTelQual has nomological validity (Churchill, 1992).

Construct validity

The scale mTelQual has construct reliability, convergent validity, discriminant validity and nomological validity. Therefore, the scale mTelQual has construct validity too (Churchill, 1992; Gerbing and Anderson, 1988; Hair et al., 2006).

Predictive validity

The result of multiple regression analysis is presented in Table 33. The dimension of mTelQual (network service, data service, customer care service, and accessibility) were taken as independent variables and overall quality of mobile services was taken as dependent variable. The model was good fit ($R^2 = .401$, $F(4, 1056) = 177.03$, $p < .01$). Network service ($t = 19.36$, $p < .01$), data service ($t = 14.58$, $p < .01$), customer care service ($t = 8.11$, $p < .01$) and Accessibility ($t = 7.40$, $p < .01$) have significant contribution to predict overall quality of mobile services. The Collinearity Statistics (Tolerance > .2 and variance inflation factor < 5) indicated that the model is free from multicollinearity (Gaur & Gaur, 2006). Therefore, the scale mTelQual has predictive validity (Churchill, 1992).

Table 33
Predictive validity of mTelQual in united AP

mTelQual dimension	t	Sig.	Collinearity Statistics	
			Tolerance	VIF
(Constant)	152.866	***		
NS	19.364	***	1.000	1.000
DS	14.580	***	1.000	1.000
CCS	8.112	***	1.000	1.000
Acc	7.403	***	1.000	1.000

Note: Dependent variable: Overall quality of mobile services; ***significant at .001level; VIF – Variance Inflation Factor; NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility.

Cross validity of mTelQual across different groups

The mTelQual scale was further examined for cross validity. The scale was tested its validity in terms of gender (male and female), regional area (rural, semi-urban and urban) and state (AP and Telangana). Multi-group analysis and chi-square difference tests were performed for the same. The results of cross validity across gender, regional area, and state were shown in Table 34, Table 35 and Table 36. The results indicated that mTelQual was not significantly different across gender (χ^2 difference = 12.09, p = .67, χ^2 / df = 1.72, GFI = .94, AGFI = .91, CFI = .96 and RMSEA = .03), regional area (χ^2 difference = 32.88, p = .33, χ^2 / df = 1.64, GFI = .94, AGFI = .92, CFI = .96 and RMSEA = .03), and state (χ^2 difference = 18.36, p = .22, χ^2 / df = 1.72, GFI = .96, AGFI = .94, CFI = .97 and RMSEA = .03).

Table 34
Gender wise cross validity of mTelQual

	Chi-square	df	p	Invariant
Overall Model				
Unconstrained	443.21	258		
Fully constrained	455.31	273		
Number of groups		2		
Difference	12.09	15	0.67	YES

Note: df – degrees of freedom; p - probability value of significance level

Table 35
Regional area wise cross validity of mTelQual

	Chi-square	df	p	Invariant
Overall Model				
Unconstrained	650.26	387		
Fully constrained	683.14	417		
Number of groups		3		
Difference	32.882	30	0.328	YES

Note: df – degrees of freedom; p - probability value of significance level

Table 36
State wise cross validity of mTelQual

	Chi-square	df	p	Invariant
Overall Model				
Unconstrained	444.39	258		
Fully constrained	462.75	273		
Number of groups		2		
Difference	18.36	15	0.24	YES

Note: df – degrees of freedom; p - probability value of significance level

The results of re-examining mTelQual indicated that the scale is reliable and valid in the context of united AP. Further, the results of cross validity of mTelQual scale showed that the scale is valid for measuring QMS across different groups.

Re-examining the mTelQual second-order CFA model in united Andhra Pradesh

Based on the theoretical concept of service quality (Parasuraman, Zeithaml, & Berry, 1988) and the results of first-order CFA of mTelQual scale, the second-order CFA model of mTelQual was specified in the context of united AP also. The model is similar to the second-order CFA of mTelQual in Indian context (as shown in Figure 13). The results of second-order CFA model of mTelQual are presented in Table 37 and Table 38. The model fit summary indicated the overall fit (see Table 37). The result showed that the measurement model is reliable and valid for further analysis (χ^2 / df – 3.23; GFI - .92; RMSEA - .07; NFI - .93; TLI - .93; CFI - .94; RFI - .92; AGFI - .90; PNFI - .81). The construct reliability (CR) was .84 and AVE was .58. The re-examination results indicated that the construct "quality of mobile services" is reliable and valid in united AP context also. Each dimension of mTelQual was significant ($p < .01$). Therefore, each dimension of mTelQual has a significant positive relationship with quality of mobile services (support for H1).

Table 37
Goodness-of-fit results of mTelQual second-order model

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
477.81	148	3.23	.92	.07	.93	.93	.94	.92	.90	.81

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index, CFI - Comparative Fit Index; TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

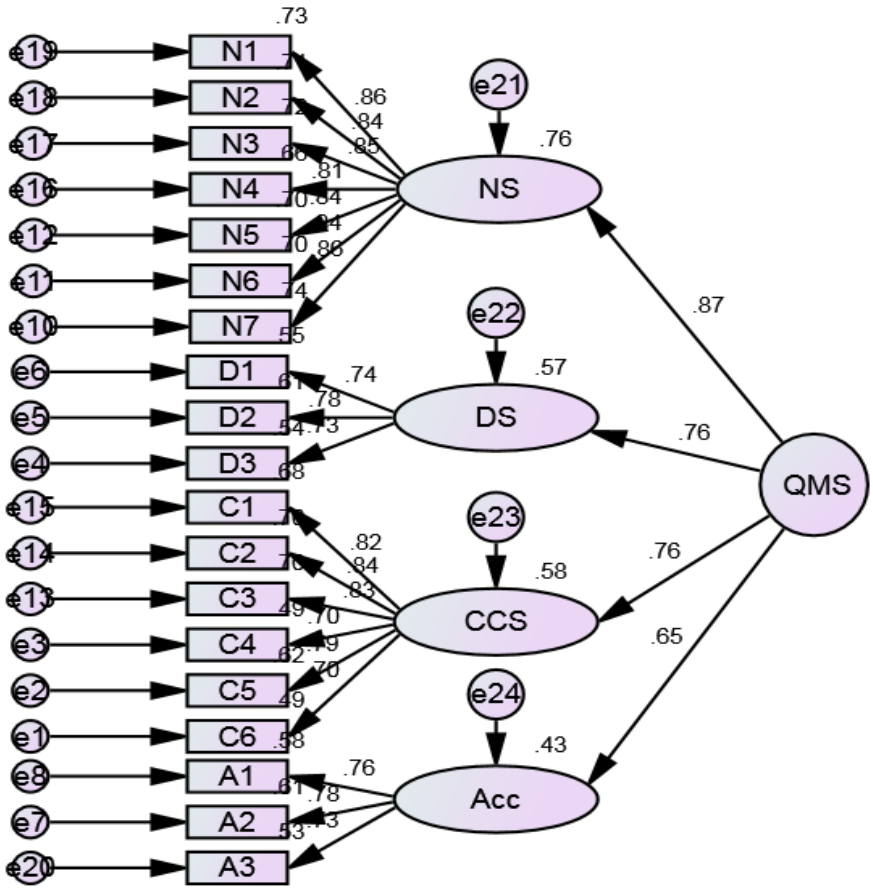

Figure 13 mTelQual second-order CFA model in united AP

Note: QMS – Quality of Mobile Services; NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility.

Table 38

Reliability and validity of mTelQual second-order model in united AP

Second-order Factor	First-order factors	Standard loadings	R^2	t	p	AVE	CR
Quality of mobile services (QMS)	Network service	.87	0.76	16.2	***	.58	.84
	Data service	.76	0.57	15.74	***		
	Customer care service	.76	0.58	15.92	***		
	Accessibility	.65	0.43	#			

Note: # t-value is not estimated, because its value is fixed at 1; ***significant at 0.001; R^2 - Coefficient of determination p - probability value of significance level; AVE – Average Variance Extracted; CR – Construct Reliability.

Overall, the results supported for the adequate fit, reliability and validity of mTelQual. Thus, mTelQual is a robust scale to measure the quality of mobile services in India.

Use the following scoring scale to assess the level of quality of mobile services that may currently exist in the market based on the results of the mTelQual items (19 questions):

Scoring Scale for the mTelQual

77-95 points – the service delivery of mobile operator is very good. Subscribers' perceived quality of mobile services is excellent. The operator has to maintain and improve same level of performance to meet the future expectations of the subscribers.

58-76 points – the service delivery of mobile operator is good. Subscribers' perceived quality of mobile services is very good. The operator has to improve the performance to some extent to meet the subscribers' expectations.

39-57 points – the service delivery of mobile operator is moderate. Subscribers' perceived quality of mobile services is moderate. There exists negative attitudes concerning quality issues as well as depending on the area of concern for the subscribers. The operator has to focus on improving the quality of mobile services.

20-38 points – the service delivery is very poor. Subscribers' perceived quality of services is low. There is a great deal of service quality issues. The operator has to focus on transmission quality and increasing number of towers in the targeted locations.

0-19 points – Certainly there is a problem in the delivery of mobile services. The mobile subscribers' perceived quality of mobile services is negative. The mobile operator has to redesign the service delivery process, transmission quality, increasing number of towers near the subscribers' locations.

Review this scoring scale with mobile subscribers. Ask participants how they perceive the quality of mobile services from their operator will fall on this scoring scale. If the questionnaire is distributed to participants, don't question them on why they responded the way they did, but rather ask what could be done either to improve this score or to maintain the current level of the quality of mobile services that currently exists.

4.4 Relative effect of mTelQual dimensions on overall QMS, Overall satisfaction, mSV, mSS, and CIS

This section provides the results of relative effect of mTelQual dimensions on overall Quality of Mobile Services (overall QMS), Mobile Subscriber Value (mSV), Mobile Subscriber Satisfaction (mSS), overall mSS and Customer Intention to Stay (CIS). The results of multiple regression analysis are presented in Table 39.

Table 39
Relative importance of mTelQual dimensions

Independent variables – summed scores	Standardized coefficients, R^2 adj. R^2 , Tolerance and TIF values						
	Dependent variables					Collinearity Statistics	
	Overall QMS	mSV	mSS	Overall mSS	CIS	Tolerance	VIF
NS	.287 (***)	.205 (***)	.222 (***)	.323 (***)	.399 (***)	0.644	1.55
t	9.57	6.34	7.54	10.68	13.82		
DS	.064 (**)	.119 (***)	.077 (***)	.046 (.202)	.11 (***)	0.634	1.58
t	2.13	3.66	2.57	1.502	3.73		
CCS	.398 (***)	.240 (***)	.409 (***)	.363 (***)	.248 (***)	0.844	1.19
t	15.22	8.48	15.87	13.74	9.84		
Acc	.071 (**)	.166 (***)	.140 (***)	.074 (***)	.113 (***)	0.722	1.39
t	2.51	5.43	5.03	2.59	4.15		
F	169.404 (***)	106.09 (***)	181.35 (***)	160.89 (***)	201.81 (***)	df 4, 1056	
R^2	0.391	0.29	0.407	0.379	0.433		
Adjusted R^2	0.389	0.284	0.405	0.376	0.431		

Note: Numbers in parentheses are significance levels. ***. Significant at .01 level **. Significant at .05 level; NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility; CIS – Customer Intention to Stay; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; QMS – Quality of Mobile Services; R^2 - Coefficient of determination; VIF – Variance Inflation Factor.

The results indicated that mTelQual dimensions i.e., Network Service (NS), Data Service (DS), Customer Care Service (CCS) and Accessibility (Acc) have significant positive effect on all the dependent variables i.e., overall quality of mobile services

(NS: t = 9.57, p < .01; DS: t = 2.13, p < .05; CCS: t = 15.22, p < .01; Acc: t = 2.51, p < .05), mobile subscriber value (NS: t = 6.34, p < .01; DS: t = 3.66, p < .01; CCS: t = 8.48, p < .01; Acc: t = 5.43, p < .01), mobile subscriber satisfaction (NS: t = 7.54, p < .01; DS: t = 2.57, p < .01; CCS: t = 15.87, p < .01; Acc: t = 5.03, p < .01), overall mSS (NS: t = 10.68, p < .01; DS: t = 1.50, p > .05; CCS: t = 13.74, p < .01; Acc: t = 2.59, p < .01) and customer intention to stay (NS: t = 13.82, p < .01; DS: t = 3.73, p < .01; CCS: t = 9.84, p < .01; Acc: t = 4.15, p < .01). The results supported H2, H3, H4, H5 and H6 and there was no support for H5b. Thus, each dimension of mTelQual has a significant positive effect on overall QMS, mSV, mSS and overall mSS respectively. And, data service has no significant effect on overall mSS.

4.7.1 Relative effect of QMS, mSV and mSS on customer intention to stay

This section provides the results of relative effect of mTelQual dimensions, Overall Quality of Mobile Services (OQMS), Mobile Subscriber Value (mSV), Mobile Subscriber Satisfaction (mSS) and overall mSS on customer intention to stay (CIS). The results of hierarchical multiple regression analysis are presented in Table 40, Table 41 and Table 42. The relative effect of the above independent variables on CIS were assessed based on the hierarchical considerations as follows:

Model 1: dimensions of mTelQual (network service, data service, customer care service and accessibility);

Model 2: dimensions of mTelQual and OQMS;

Model 3: dimensions of mTelQual, OQMS and mSV;

Model 4: dimensions of mTelQual, OQMS, mSV and mSS;

Model 5: dimensions of mTelQual, OQMS, mSV, mSS and overall mSS.

The results of hierarchical regression analysis are presented in Table 40, Table 41 and Table 42. The model one has a good fit (F (4, 1056) = 201.81, p < .001, R^2 = .43 and adj. R^2 = .43). It shows that all the dimensions of mTelQual together explained 43.3 percent of variance to the dependent variable CIS. The mTelQual dimensions have significant contribution to CIS (for NS: t = 13.82, p < .001; for DS: t = 3.73, p < .001; for CCS: t = 9.84, p < .001; for Acc: t = 4.15; p < .001). The results indicated that network service has relatively more effect on CIS (β = .40) followed by CCS (β = .25), Acc (β = .11) and DS (β = .11). The model is free from multicollinearity effect

as the collinearity statistics are within the limits (Tolerance > .2 and VIF < 5) as suggested by Gaur, & Gaur (2006).

In the next step, Overall Quality of Mobile Services (OQMS) was included in the first model, then the relative effects were assessed based on the results. The model two has a good fit (F (5, 1055) = 220.74, R^2 = .51 and adj. R^2 = .51). The change statistics (R^2 change = .08, F (1, 1055) = 168.46, p < .001) revealed that the model one is further improved by adding OQMS. It showed that all the dimensions of mTelQual and OQMS together explained 50.9 percent of total variance to the CIS. The mTelQual dimensions (for NS: t = 10.60, p < .001; for DS: t = 3.51, p < .001; for CCS: t = 4.08, p < .001; for Acc: t = 3.45; p < .001) and OQMS (t = 12.98, p < .001) have significant contribution to CIS. The results indicated that OQMS has relatively more effect on CIS (β = .36) followed by NS (β = .30), CCS (β = .11), Acc (β = .09) and DS (β = .09). The model is free from multicollinearity effect as the collinearity statistics were within the limits (Tolerance > .2 and VIF < 5) as suggested by Gaur, & Gaur (2006). Therefore, it implied that quality of mobile services alone has major effect on customer intention to stay.

Table 40
Model Summary of relative effect models

Model	R	R^2	Adjusted R^2	Change Statistics				
				R^2 Change	F Change	df1	df2	Sig. F Change
1	.66[a]	.43	.43	.43	201.81	4	1056	***
2	.72[b]	.51	.51	.08	168.46	1	1055	***
3	.74[c]	.55	.55	.04	96.42	1	1054	***
4	.77[d]	.59	.59	.04	102.64	1	1053	***
5	.78[e]	.60	.60	.01	24.03	1	1052	***

Dependent variable: CIS, ***Significant at .001 level
a. Predictors: (Constant), NS, DS, CCS, Acc
b. Predictors: (Constant), NS, DS, CCS, Acc, OQMS
c. Predictors: (Constant), NS, DS, CCS, Acc, OQMS, mSV
d. Predictors: (Constant), NS, DS, CCS, Acc, OQMS, mSV, mSS
e. Predictors: (Constant), NS, DS, CCS, Acc, OQMS, mSV, mSS, overall mSS
Note: NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility; CIS – Customer Intention to Stay; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; OQMS – Overall Quality of Mobile Services; R – Correlation coefficient; R^2 - Coefficient of determination; df – degrees of freedom.

Similar to the previous step, Mobile Subscriber Value (mSV) was included in the model two, then the relative effect was assessed based on the results. The model three

also has good fit (F (6, 1054) = 216.66, R^2 = .55 and adj. R^2 = .55). The change statistics (R^2 change = .04, F (1, 1054) = 96.42, p < .001) revealed that the model two is further improved by adding mSV. It showed that all the dimensions of mTelQual, OQMS and mSV together explained 55.2 percent of total variance to the CIS. The mTelQual dimensions (for NS: t = 9.69, p < .001; for DS: t = 2.29, p < .05; for CCS: t = 2.74, p < .01; for Acc: t = 2.07; p < .05; OQMS (t = 11.23, p < .001) and mSV (t = 9.82, p < .001) have significant contribution to CIS. The results indicated that OQMS has relatively more effect on CIS (β = .30) followed by NS (β = .26), mSV (β = .25), CCS (β = .07), DS (β = .06) and DS (β = .05). The model is free from multicollinearity effect as the collinearity statistics are within the limits (Tolerance > .2 and VIF < 5) as suggested by Gaur, & Gaur (2006). Thus, overall QMS and Network service have more effect on CIS.

Table 41
Results of ANOVA for relative effect models

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13930.43	4	3482.61	201.81	***[b]
	Residual	18223.47	1056	17.26		
	Total	32153.89	1060			
2	Regression	16439.67	5	3287.93	220.74	***[c]
	Residual	15714.23	1055	14.89		
	Total	32153.89	1060			
3	Regression	17756.70	6	2959.45	216.66	***[d]
	Residual	14397.19	1054	13.66		
	Total	32153.89	1060			
4	Regression	19035.41	7	2719.34	218.28	***[e]
	Residual	13118.49	1053	12.46		
	Total	32153.89	1060			
5	Regression	19328.37	8	2416.05	198.17	***[f]
	Residual	12825.52	1052	12.19		
	Total	32153.89	1060			

a. Dependent Variable: CIS; ***Significant at .001 level
b. Predictors: (Constant), NS, DS, CCS, Acc
c. Predictors: (Constant), NS, DS, CCS, Acc, OQMS
d. Predictors: (Constant), NS, DS, CCS, Acc, OQMS, mSV
e. Predictors: (Constant), NS, DS, CCS, Acc, OQMS, mSV, mSS
f. Predictors: (Constant), NS, DS, CCS, Acc, OQMS, mSV, mSS, Overall mSS

Note: NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility; CIS – Customer Intention to Stay; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; OQMS – Overall Quality of Mobile Services; df – degrees of freedom.

Likewise in the previous step, Mobile Subscriber Satisfaction (mSS) was included in the model three, then the relative effect was assessed based on the results. The model four also has good fit (F (7, 1053) = 218.28, R^2 = .59 and adj. R^2 = .59). The change statistics (R^2 change = .04, F (1, 1053) = 102.64, p < .001) revealed that the model three was further improved by adding mSS. It showed that all the dimensions of mTelQual, OQMS, mSV and mSS together explained 59.2 percent of total variance to the CIS. The mTelQual dimensions except CCS and Acc (for NS: t = 9.05, p < .001; for DS: t = 2.14, p < .05; for CCS: t = -.12, p > .05; for Acc: t = 1.312; p > .05; OQMS (t = 9.16, p < .001), mSV (t = 5.57, p < .001) and mSS (t = 10.13, p < .001) have significant contribution to CIS. The results revealed that in the presence of mSS, dimensions as CCS and Acc were not significant. The results indicated that mobile subscriber satisfaction has relatively more effect on CIS (β = .29) followed by OQMS (β = .24), NS (β = .24), mSV (β = .14), and DS (β = .05). The model is free from multicollinearity effect as the collinearity statistics are within the limits (Tolerance > .2 and VIF < 5) as suggested by Gaur, & Gaur (2006).Thus, it implied that mSS has a major role to improve customer intention to stay followed by overall QMS and Network service.

Finally, in the previous step, overall mSS was included in the model four, then the relative effect was assessed based on the results. The model five also has good fit (F (8, 1052) = 198.17, R^2 = .60 and adj. R^2 = .60). The change statistics (R^2 change = .01, F (1, 1052) = 24.03, p < .001) revealed that the model four is further improved by adding overall satisfaction. It showed that all the dimensions of mTelQual, OQMS, mSV, mSS and overall satisfaction together explained 60.1 percent of total variance to the CIS. The mTelQual dimensions except CCS and Acc (for NS: t = 8.46, p < .001; for DS: t = 2.26, p < .05; for CCS: t = -.322, p > .05; for Acc: t = 1.36 p > .05; OQMS (t = 3.97, p < .001), mSV (t = 5.26, p < .001), mSS (t = 8.98, p < .001) and overall mSS (t = 4.90, p < .001) have significant contribution to CIS. The results revealed that in the presence of overall mSS also, dimensions as CCS and Acc were not significant. The results indicated that mobile subscriber satisfaction has relatively more effect on CIS (β = .26) followed by NS (β = .22), overall mSS (β = .17), OQMS ((β = .14), mSV (β = .14), and DS (β = .06). The model is free from multicollinearity effect as the collinearity statistics are within the limits (Tolerance > .2 and VIF < 5) as suggested by Gaur, & Gaur (2006).

Table 42
Coefficients[a] of relative effect models

Model	IV	Beta	t	Sig.	Collinearity Statistics	
					Tolerance	VIF
1	(Constant)		2.9	**		
	NS	.40	13.8	***	.64	1.55
	DS	.11	3.70	***	.63	1.58
	CCS	.25	9.80	***	.84	1.19
	Acc	.11	4.10	***	.72	1.39
2	(Constant)		3.51	***		
	NS	.30	10.6	***	.59	1.69
	DS	.09	3.20	***	.63	1.58
	CCS	.11	4.10	***	.69	1.45
	Acc	.09	3.50	***	.72	1.39
	OQMS	.36	13.00	***	.61	1.64
3	(Constant)		1.52	.13		
	NS	.26	9.70	***	.58	1.72
	DS	.06	2.29	*	.63	1.60
	CCS	.07	2.74	**	.68	1.48
	Acc	.05	2.07	*	.70	1.43
	OQMS	.30	11.23	***	.58	1.72
	mSV	.25	9.82	***	.68	1.47
4	(Constant)		.96	.34		
	NS	.24	9.05	***	.58	1.74
	DS	.05	2.14	**	.63	1.60
	CCS	-.00	-0.12	.91	.62	1.61
	Acc	.03	1.31	.19	.70	1.44
	OQMS	.24	9.16	***	.55	1.81
	mSV	.14	5.57	***	.58	1.72
	mSS	.29	10.13	***	.46	2.16
5	(Constant)		1.26	.21		
	NS	.22	8.46	***	.57	1.76
	DS	.06	2.26	**	.62	1.60
	CCS	-.01	-0.32	.75	.62	1.61
	Acc	.03	1.36	.18	.70	1.44
	OQMS	.14	3.97	***	.33	3.07
	mSV	.14	5.26	***	.58	1.73
	mSS	.26	8.98	***	.44	2.26
	OmSS	.17	4.90	***	.31	3.22

Note: a. Dependent Variable: CIS; *p < .05; **p < .01; ***p < .001; Note: NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility; CIS – Customer Intention to Stay; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; OmSS – Overall mobile subscriber satisfaction; OQMS – Overall Quality of Mobile Services; VIF – Variance Inflation Factor.

Thus, it implied that mobile subscriber satisfaction and network service have a major role to drive customer intention to stay followed by overall mSS, and overall QMS and mSV.

4.8 Mediation Analysis

This section presents the results of mediation effect of customer value and satisfaction on the relationship between quality of mobile services and customer intention to stay. Initially, reliability and validity of the mediation model was examined by CFA measurement model (in both contexts India and united AP). After validity of the measurement model, structural models were developed to examine the different types of mediation effects i.e., serial mediation, parallel mediation and combined mediation. The results are discussed in detail as follows.

4.8.1 Development of QMS and CIS mediation measurement model

The results of the mediation measurement model were presented in this section. The model is tested for its reliability and validity in the context of India. Also, the model is re-examined further for its reliability and validity in united AP.

4.8.1.1 Results of reliability and validity of the mediation model in India

The results of confirmatory factor analysis, Cronbach's alpha, Average Variance Extracted (AVE), Construct Reliability (CR), inter-construct correlations and squared inter-construct correlations, measurement model and model fit summary are presented in Table 43, Table 44, and Figure 14. The model fit summary indicates the overall fit (see Table 44). The result indicated that the mediation measurement model is reliable and valid for further analysis ((χ^2 / df – 3.30; GFI - .95; RMSEA - .06; NFI - .95; TLI - .96; CFI - .97; RFI - .94; AGFI - .93; PNFI - .75).

The content validity of each construct was duly assessed at the time of pilot study with subject experts, practitioners and subscribers of mobile services. Later, the items were modified to make statements conceivable to respondents that further checked the face or content validity (Kaplan & Sacuzzo, 1993; Churchill, 1992; Saraph, Benson, & Schroeder, 1989). The estimates of the standardized loading were more than 0.7 (except CIS7 - .67) thresholds (Hair et al., 2006) for all the items (ranges from .74 to .87; except for the item CIS7 - .67) and average variance extracted (AVE ≥ .5) was

ranging from .57 to .70 (Fornell & Lacker, 1981; Hair et al., 2008). Therefore, the mediation model has convergent validity.

Table 43
Reliability and validity of mediation model in India

Factor	CFA Loadings[a]	t-value	AVE	CR	Inter-construct correlations			
Quality of mobile services (QMS)				α = .89	QMS	VAL	CS	CIS
NS	.87	23.38***	.68	.89	1	.15[c]	.19[c]	.36[c]
DS	.85	22.72***						
CCS	.82	#						
Acc	.76	19.50***						
Customer value (VAL)				α =.84				
V1	.79	#	.57	.84	.39***	1	.56[c]	.54[c]
V2	.74	17.46***						
V3	.76	17.58***						
V4	.75	17.79***						
Customer satisfaction (CS)				α = .83				
S1	.75	18.59***	.68	.89	.44***	.75***	1	.59[c]
S2	.88	22.89***						
S3	.88	22.88***						
S4	.79	#						
Customer intention to stay (CIS)				α =.94				
CIS1	.75	#	.70	.94	.60***	.74***	.77***	1
CIS2	.89	22.24***						
CIS3	.90	22.44***						
CIS4	.88	21.84***						
CIS5	.86	21.41***						
CIS6	.88	21.85***						
CIS7	.67	16.18***						

Note: # t-value is not estimated, because its value is fixed at 1; ***significant at 0.001; CFA-Confirmatory factor analysis; AVE-Average variance extracted; CR-Construct Reliability; *significant at .001; a - standardized estimates of Amos output; c – Square of inter-construct correlations.

Table 44
Model fit summary of the mediation model

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
481.36	146	3.30	.95	.06	.95	.96	.97	.94	.93	0.75

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index; CFI - Comparative Fit Index; TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

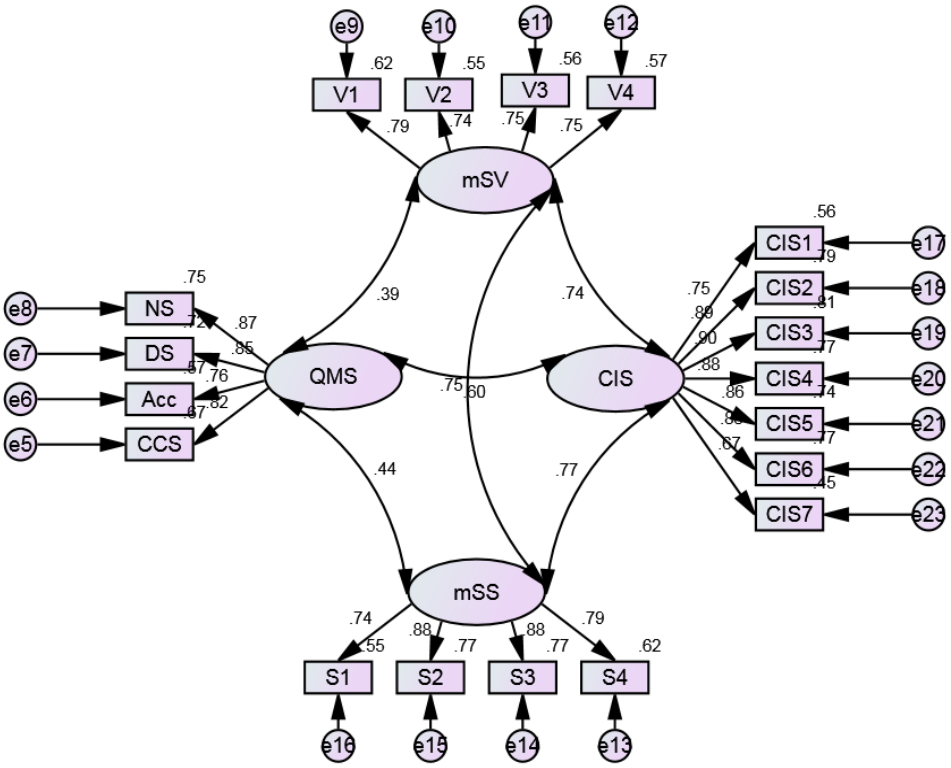

Figure 14 Mediation measurement model in India

Note: QMS – Quality of Mobile Services; mSV – mobile Service Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

The results in Table 43 showed that the Average Variance Extracted (AVE) values are greater than the squared correlations for each pair of the constructs. It shows the mediation model has discriminant validity (Fornell and Larcker, 1981). The correlations between each pair of constructs were significant ($p < .001$) and it indicated that the mediation model has nomological validity (Churchill, 1992). The mediation model has construct reliability (ranges from 0.84 to 0.94), convergent validity, discriminant validity and nomological validity. Therefore, the mediation model has construct validity too (Churchill, 1992; Gerbing and Anderson, 1988; Hair et al., 2006). Further, the quality of mobile services has a significant positive (structural) relationship with customer intention to stay ($r = .60$, $p < .001$; see Table 43). This result support for H7.

Overall, the results supported the adequate fit, reliability and validity of the mediation model. Thus, the mediation model of quality of mobile services and customer intention to stay is reliable and valid in Indian context.

4.8.1.2 Re-examining the reliability and validity of QMS and CIS mediation measurement model in united AP

This step exclusively exhibits the results of reliability and validity analysis of the QMS and CIS mediation measurement model in united AP. The reliability and validity of the model is re-examined as follows.

4.8.1.2.1 Results of reliability and validity of the mediation model in united AP

The results of confirmatory factor analysis, Cronbach's alpha, Average Variance Extracted (AVE), Construct Reliability (CR), inter-construct correlations and squared inter-construct correlations, measurement model and model fit summary are presented in Table 45, Table 46, and Figure 15. The model fit summary indicates the overall fit (see Table 46). The result showed that the mediation measurement model is reliable and valid for further analysis (χ^2 / df – 2.10 GFI - .97; RMSEA - .03; NFI - .97; TLI - .98; CFI - .98; RFI - .96; AGFI - .96; PNFI - .83).

The content validity of each construct was duly assessed at the time of pilot study with subject experts, practitioners and subscribers of mobile services. Later, the items were modified to make statements conceivable to respondents that further checked the face or content validity (Kaplan & Sacuzzo, 1993; Churchill, 1992; Saraph, Benson, & Schroeder, 1989). The estimates of the standardized loading were more than 0.7 (except CIS7 - .67) thresholds Hair, Black, Babin, Anderson, & Tatham, 2006) for all the items (ranges from .55 to .82) and average variance extracted (AVE $\geq$ .5) was ranging from .50 to .57 (Fornell & Lacker, 1981; Hair et al., 2008). Therefore, the mediation model has convergent validity. The results in Table 45 showed that the average variance extracted values are greater than the squared correlations for each pair of the constructs. It shows the mediation model has discriminant validity (Fornell and Larcker, 1981). The correlations between each pair of constructs were significant ($p < .001$) and it indicated that the mediation model has nomological validity (Churchill, 1992). The mediation model has construct reliability (ranges from .80 to .90), convergent validity, discriminant validity and nomological validity. Therefore, the mediation model has construct validity too (Churchill, 1992; Gerbing and Anderson, 1988; Hair et al., 2006). Further, the quality of mobile services has a significant positive (structural) relationship with customer intention to stay ($r = .58$, $p < .001$; see Table 45). This result supported the hypothesis H7.

Table 45

Reliability and validity of mediation model (united AP)

Factor	CFA Loadings[a]	t-value	AVE	CR	Inter-construct correlations			
Quality of mobile services (QMS)				α = .79	QMS	VAL	SAT	CIS
NS	.82	20.56***	.50	.80	1	.10[c]	.08[c]	.34[c]
DS	.78	20.12***						
CCS	.65	#						
Acc	.55	15.22***						
Customer value (VAL)				α =.75				
V1	.69	#	.54	.82	.32***	1	.36[c]	.23[c]
V2	.79	21.63***						
V3	.79	21.62***						
V4	.66	18.75***						
Customer satisfaction (CS)				α = .80				
S1	.63	18.32***	.50	.80	.28***	.60***	1	.25[c]
S2	.73	21.01***						
S3	.71	20.40***						
S4	.75	#						
Customer intention to stay (CIS)				α =.90				
CIS1	.75	#	.57	.90	.58***	.47***	.50***	1
CIS2	.74	24.33***						
CIS3	.72	23.54***						
CIS4	.75	24.74***						
CIS5	.82	27.09***						
CIS6	.76	25.01***						
CIS7	.73	23.99***						

Note: # t-value is not estimated, because its value is fixed at 1; ***significant at 0.001; CFA-Confirmatory factor analysis; AVE-Average variance extracted; CR-Construct Reliability; *significant at .001; a - standardized estimates of Amos output; c – Square of inter-construct correlations.

Table 46

Model fit summary of the mediation model for AP telecom circle

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
306.24	146	2.10	.97	.03	0.97	0.98	0.98	0.96	0.96	0.83

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index; CFI - Comparative Fit Index; TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

Overall, the results supported the adequate fit, reliability and validity of the mediation model in united AP. Thus, the mediation model of quality of mobile services and customer intention to stay is also reliable and valid in the context of united AP.

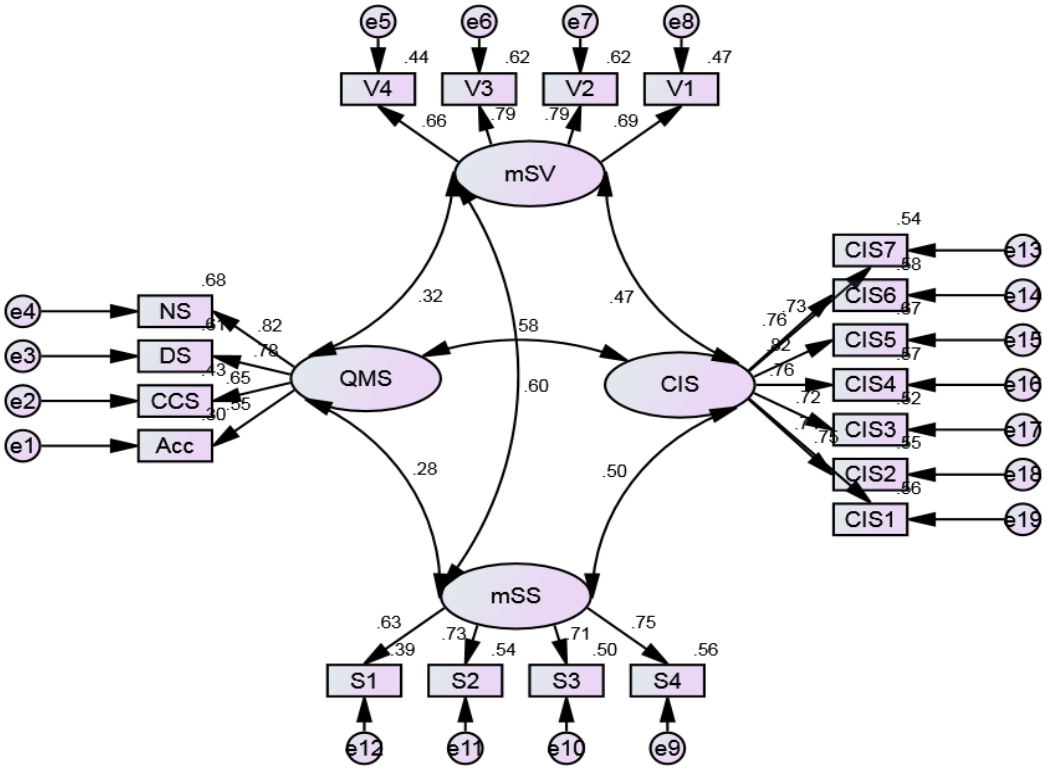

Figure 15 Mediation measurement model in united AP

Note: QMS – Quality of Mobile Services; mSV – mobile Service Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

4.8.2 Results of the QMS and CIS structural models

The results of reliability and validity of the QMS and CIS mediation model was valid in both the contexts i.e., Indian and united AP. Based on these results, the QMS and CIS mediation structural models were developed in the context of united AP to examine the mediation role of Mobile Subscriber Value (mSV) and Mobile Subscriber Satisfaction (mSS) between Quality of Mobile Services (QMS) and Customer Intention to Stay (CIS). The results of the mediation structural models are presented as follows:

4.8.2.1 Direct model

Based on the theoretical concept and results of the mediation measurement model, the direct structural model was specified (as shown in Figure 16) to understand the direct effect of QMS on CIS. The results of fit measures indicate that the direct structural

model is reliable and valid for further analysis (χ^2 / df – 3.30, GFI - .98; RMSEA - .05; NFI - .98; TLI - .98; CFI - .98; RFI - .97; AGFI - .96; PNFI - .76). The model fit summary indicated better overall fit. The results of the model indicated that quality of mobile services has a significant direct positive effect on mobile subscriber value (t = 12.69, r = .57, R^2 = .33, β = .58, p < .001). The bootstrap results also supported that the direct effect was significant (LB = .66, UB = .91, p < .001). Thus, quality of mobile services has a significant positive structural relationship and direct effect on customer intention to stay (support for H7 and H8).

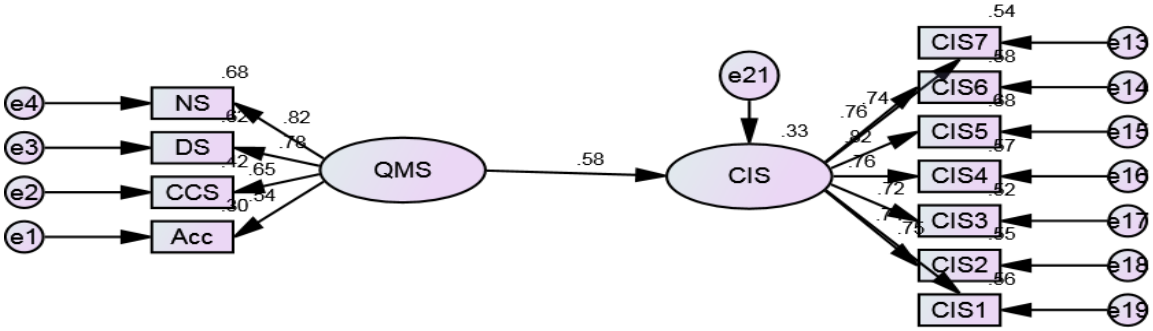

Figure 16 Serial mediation model in united AP
Note: QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

4.8.2.2 Serial mediation

Based on the theoretical framework and results of the mediation measurement model, the structural serial mediation model was specified (as shown in Figure 17). The results of goodness-of-fit measures are presented in Table 47. The model fit summary indicated better overall fit (see Table 47). The result showed that the structural serial mediation model is reliable and valid for further analysis (χ^2 / df – 2.22, GFI - .97; RMSEA - .03; NFI - .96; TLI - .98; CFI - .98; RFI - .96; AGFI - .96; PNFI - .83).

Table 47
Fit indices of Serial mediation structural model

	Absolute fit indices				Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
328.861	148	2.22	.97	.03	.96	.98	.98	.96	.96	.83

Note: *p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index; CFI - Comparative Fit Index; TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

The results of the model revealed that there was a significant positive direct effect of QMS on mSV (t = 8.39, p < .001), mSV on mSS (t = 14.37, p < .001), mSS on CIS (t

= 11.44, p < .001) and QMS on CIS (t = 11.98, p < .001). The results supported H9, H10 and H11 as shown in Table 48. Thus, QMS has a significant positive effect on mSV, mSV has a significant positive effect on mSS, and mSS has a significant effect on CIS.

Table 48
Serial mediation path analysis

			Estimate	S.E.	t	P
mSV	<---	QMS	.40	.05	8.39	***
mSS	<---	mSV	.63	.04	14.37	***
CIS	<---	mSS	.43	.04	11.44	***
CIS	<---	QMS	.64	.05	11.98	***

Note: ***Significant at .001 level; mSV – mobile Subscriber Value; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; p – probability value of significance level; S.E. – Standard Error.

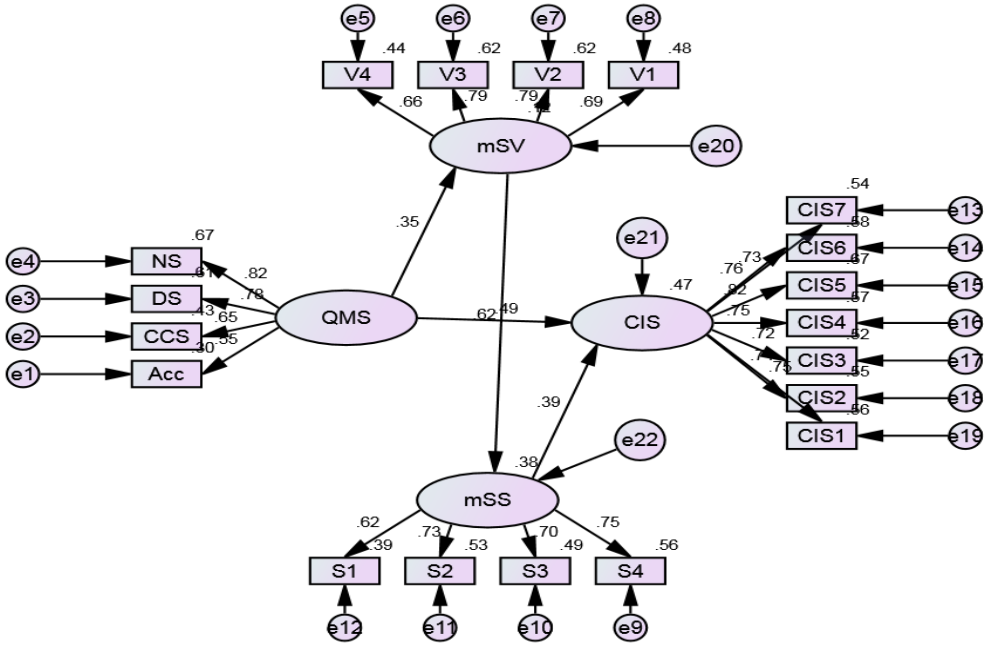

Figure 17 Serial mediation model in united AP

Note: QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

Table 49
Serial mediation bootstrap results

Path			Amos bootstrap results (5000 samples)			
			LB	UB	Sig.	Mediated by
mSS	<---	QMS	.19	.33	***	Value
CIS	<---	mSV	.21	.33	***	Satisfaction
CIS	<---	QMS	.08	.14	***	Both

Note: LB – lower bound; UB – upper bound; ***Significant at .001 level; ; mSV – mobile Subscriber Value; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; p – probability value of significance level.

The bootstrap results of serial mediation are presented in Table 49. The serial mediation effect was further examined with 5000 samples which are randomly generated by Amos software based on the actual sample size (1061). The mediation effect was tested for 5000 samples. If the mediation effect is significant for all the 5000 samples, then it can be confirmed that the effect is true in all the cases. The results of bootstrap revealed that the mediation effect of mSV was significant (LB = .19, UB = .33, $p < .001$) on the relationship between quality of mobile services (QMS) and subscriber satisfaction (mSS). Further, the mediation effect of mSS was significant (LB = .21, UB = .33, $p < .001$) on the relationship between mSV and Customer Intention to Stay (CIS). Finally, both mSV and mSS have significant serial mediation effect (LB = .08, UB = .14, $p < .001$) on the relationship between QMS and CIS. Since, both direct and indirect effects were significant, mSV and mSS were partially mediating the relationships between QMS and mSS, and mSV and CIS respectively. The total direct and indirect effect of QMS on CIS was .49 and .08 respectively. The direct effect of QMS on CIS (.58 in the direct model) was reduced to .49 in the serial mediation model. Thus, mSV and mSS have serial mediation effect between QMS and CIS (Support for H13).

4.4.2.3 Parallel mediation

Based on the theoretical framework and results of the mediation measurement model, the structural parallel mediation model was specified (as shown in Figure 18). The results of goodness-of-fit measures are presented in Table 50. The model fit summary indicated better overall fit (see Table 50). The result showed that the structural parallel mediation model was reliable and valid for further analysis (χ^2 / df – 3.68, GFI - .95; RMSEA - .05; NFI - .94; TLI - .95; CFI - .96; RFI - .93; AGFI - .94; PNFI - .75).

Table 50
Fit indices of parallel mediation structural model

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
540.39	147	3.68	.95	.05	.94	.95	.96	.93	0.94	0.75

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index; CFI - Comparative Fit Index; TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

The results of the model revealed that QMS has a significant positive effect on mSV ($t = 8.47$, $p < .001$). There was a significant positive direct effect of QMS on mSS ($t = 7.78$, $p < .001$). Mobile subscriber value has a significant positive direct effect on CIS ($t = 5.87$, $p < .001$) (support for H12). Mobile subscriber satisfaction has a significant positive direct effect on customer intention to stay ($t = 7.99$, $p < .001$). QMS has a significant positive direct effect on CIS ($t = 10.65$, $p < .001$) and these results are presented in Table 51.

Table 51
Parallel mediation path analysis

Path			Estimate	S.E.	t	P
mSV	<---	QMS	.41	.05	8.47	***
mSS	<---	QMS	.37	.05	7.77	***
CIS	<---	mSV	.21	.04	5.87	***
CIS	<---	mSS	.29	.04	7.99	***
CIS	<---	QMS	.58	.06	10.65	***

Note: ***Significant at .001 level; mSV – mobile Subscriber Value; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; p – probability value of significance level; S.E. – Standard Error.

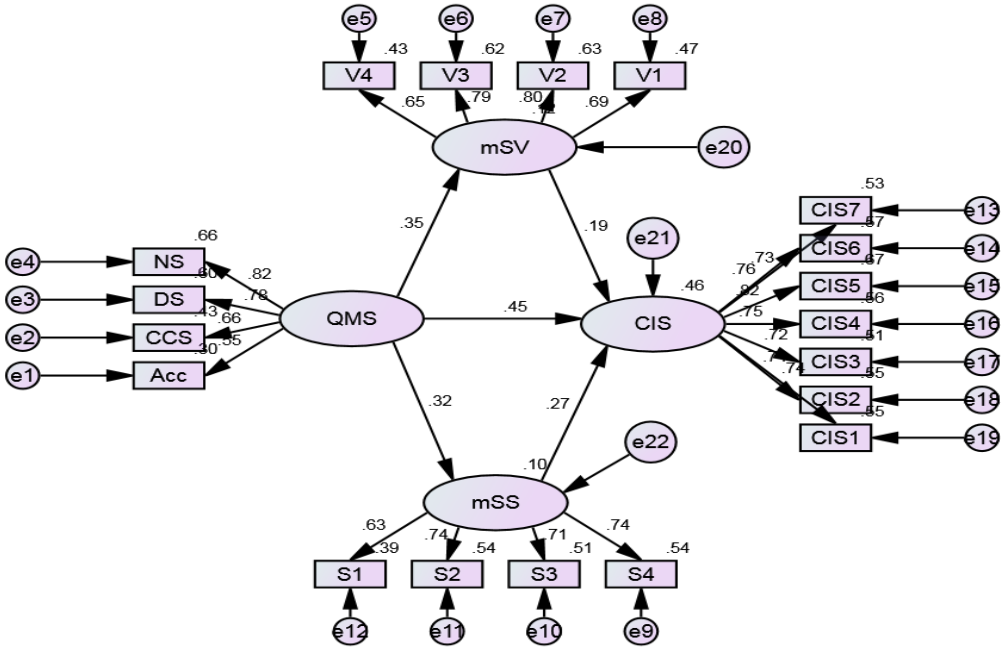

Figure 18 Structural parallel mediation model in united AP

Note: QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

The bootstrap results of parallel mediation model are presented in Table 52. The results of bootstrap revealed that the mediation effects of both mSV and mSS were significant (LB = .15, UB = .26, p < .001) on the relationship between quality of mobile services and customer intention to stay. Since, both direct and indirect effects were significant, mSV and mSS were having parallel partial mediation effect on the relationship between QMS and CIS (support for H14). The total effects, direct effects and indirect effects of QMS on CIS were .45 and .07 and .09 respectively. The total indirect effect of QMS on CIS through mSS (.09) was more than through mSV (.07) as shown in Table 53. The direct effect of QMS on CIS (.58 in the direct model) was reduced to .45 in the parallel mediation model. Thus, mSV and mSS have parallel mediation effect between QMS and CIS.

Table 52
Parallel mediation bootstrap results

Path			**Bootstrap results (5000 samples)**			
			LB	UB	Sig.	Mediated by
CIS	<---	QMS	.15	.26	***	Both mSV and mSS parallelly

Note: LB – lower bound; UB – upper bound; ***Significant at .001 level; mSV – mobile Subscriber Value; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

Table 53
Total effects for parallel mediation

Path					Effect
CIS	<---	mSV	<---	QMS	.07 (indirect)
CIS	<---	mSS	<---	QMS	.09 (indirect)
CIS		<---		QMS	.45 (direct)

Note: QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

4.8.2.4 Combined mediation effect (both serial and parallel)

Based on the theoretical framework and results of the mediation measurement model, the structural combined mediation model (both serial and parallel) was specified (as shown in Figure 19). The results of goodness-of-fit measures are presented in Table 54. The model fit summary indicated better overall fit. The result showed that the structural combined mediation model was reliable and valid for further analysis (χ^2 / df – 2.10, GFI - .97; RMSEA - .03; NFI - .97; TLI - .98, CFI - .98; RFI - .96; AGFI - .96; PNFI - .83). The results of the model revealed that QMS has a significant positive

direct effect on mSV (t = 7.88, p < .001). QMS has a significant positive direct effect on mSS (t = 2.71, p < .001). Mobile subscriber value has a significant positive direct effect on mSS (t = 13.00, p < .001). Mobile subscriber value has a significant positive direct effect on CIS (t = 4.15, p < .001). Mobile subscriber satisfaction has a significant positive direct effect on CIS (t = 6.60, p < .001). QMS has a significant positive direct effect on CIS (t = 11.20, p < .001).These results are presented in Table 55.

Table 54
Fit indices of combined mediation structural model

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
306.24	146	2.10	.97	.03	.97	.98	.98	.96	.96	.83

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index; CFI - Comparative Fit Index; TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

Table 55
Combined effect path analysis

Path			Estimate	S.E.	t	P
mSV	<---	QMS	.38	.05	7.879	***
mSS	<---	QMS	.12	.04	2.710	**
mSS	<---	mSV	.58	.04	13.001	***
CIS	<---	mSV	.19	.05	4.150	***
CIS	<---	mSS	.30	.05	6.597	***
CIS	<---	QMS	.59	.05	11.204	***

Note: ***Significant at .001 level; **Significant at .01 level; mSV – mobile Subscriber Value; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; p – probability value of significance level; S.E. – Standard Error.

The bootstrap results of combined mediation model are presented in Table 56. The results of bootstrap revealed that the mediation effect of mSV was significant (LB = .16, UB = .29, p < .001) for the relationship between Quality of Mobile Services (QMS) and Mobile Subscriber Satisfaction (mSS). Further, the mediation effect of mSS was significant (LB = .12, UB = .24, p < .001) on the relationship between mSV and Customer intention to stay (CIS). Finally, both mSV and mSS have significant combined mediation (both serial and parallel) effect (LB = .13, UB = .23, p < .001) on the relationship between QMS and CIS. Since, both direct and indirect effects were significant, mSV and mSS were partially mediating the relationship between QMS

and CIS. The total indirect effect of QMS on CIS through mSV (.054) was more than through mSS (.03) in parallel mediation. On the other hand, it was .05 in serial mediation (as shown in Table 57). It indicated that indirect effect of QMS on CIS through mSV was more than the other two cases (i.e., through mSS and serial mediation). The direct effect of QMS on CIS (.58 in the direct model) was reduced to .45 in the parallel mediation model. Thus, mSV and mSS have both serial and parallel mediation effects between QMS and CIS (Support for H15).

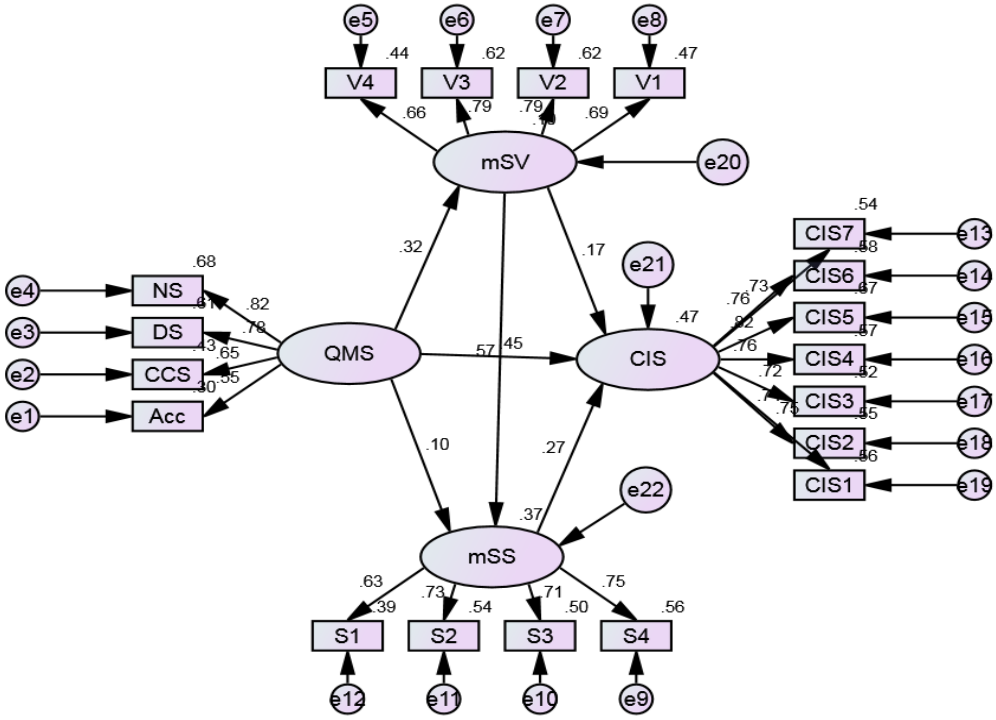

Figure 19 Structural mediation model (both serial and parallel) in united AP

Note: QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

Table 56

Bootstrap results for combined mediation model

Path			Bootstrap results (5000 samples)			
			LB	UB	Sig.	Mediated by
mSS	<---	QMS	.16	.29	***	Value
CIS	<---	mSV	.12	.24	***	Satisfaction
CIS	<---	QMS	.13	.23	***	Both

Note: LB – lower bound; UB – upper bound; ***Significant at .001 level; mSV – mobile Subscriber Value; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

Table 57
Total indirect effects for combined mediation model

Path					Effect
CIS	<---	mSV	<---	QMS	.054
CIS	<---	mSS	<---	QMS	.03
CIS	<---	Serial mediation	<---	QMS	.05
CIS		<---		QMS	.45

Note: mSV – mobile Subscriber Value; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

Based on the goodness-of-fit measures, it was observed that serial mediation model is better than parallel mediation model; and combined mediation (both serial and parallel) model was better than the individual models (serial and parallel) as shown in Table 58.

Table 58
Comparison of fit measures of mediation models

		Serial	Parallel	Combined
Absolute fit indices	χ^{2*}	328.86	540.39	306.24
	df	148	147	146
	χ^2 / df	2.22	3.68	2.10
	GFI	.97	.95	.97
	RMSEA	.03	.05	.03
Incremental fit indices	NFI	.96	.94	.97
	TLI	.98	.95	.98
	CFI	.98	.96	.98
	RFI	.96	.93	.96
Parsimony fit indices	AGFI	.96	.94	.96
	PNFI	.83	.75	.83

Note: ***p = 0.000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index, TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

4.9 Moderation analysis

The study performed a multi-group causal analysis (Jöreskog, & Sörbom 1993) to test the moderation effect of expectations of mobile subscribers, price, demographic (a. gender, b. age, c. education, d. occupation), technical (a. mobile technology, b. mobile data, and c. type of mobile phone) and functional (a. type of mobile connection, b. multi-SIM, c. user group, d. purpose of mobile usage, e. experience of mobile usage, and f. usage level of mobile services) variables of the mobile services. The multi-group analysis has been used to test the research hypotheses regarding the moderating effects of the above variables on the relationship between Quality of Mobile Services (QMS) and Customer Intention to Stay (CIS). The moderation analysis has the following four steps (Chang, & Chen, 2008):

i. The moderating variables were divided into various categories based on demographic, technical and functional variables.
ii. The path models were restricted which were estimated for the respective sub-groups, and for which all paths estimates were set to be equal between the sub-groups in the model.
iii. The path models were estimated for the respective sub-groups by removing the restrictions of the paths to be equal. Therefore, the path QMS→CIS was allowed to vary between the sub-groups in the corresponding model.
iv. Finally, a "chi-square difference test" was performed between the respective sub-groups to find that the paths significantly differ or not in the respective group.

4.9.1 Examining the moderation effect of demographic variables

The moderation effect of demographic variables (a. gender, b. age, c. education, d. occupation) are examined on the relationship between QMS and CIS. The results are presented as follows.

4.9.1.1 Moderation effect of gender

The moderating variable gender was divided into two sub-groups i.e., female and male. The moderation effect was tested on the relationship between QMS and CIS. Moderation effect exists if the chi-square difference test between the constrained and unconstrained model at one degree of freedom is statistically significant.

The results of model fit and path coefficients are presented in Table 59. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 59 shows standardized and unstandardized estimates of the paths and the results of moderation effect of gender. The chi-square difference was .816, df = 1 for the path QMS → CIS. The difference was less than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-square difference was not significant for the path. The result suggested that gender does not moderate the relationship between QMS and CIS. Therefore, the results did not provide support for the hypothesis H16a (the relationship between QMS and CIS is moderated by gender). The strength of the relationship was stronger for male (β = .59) than female (β = .56).

Table 59
Chi-square difference test for gender

Path		QMS → CIS		
		Model 1	Model 2 (H16a)	
		Full model	Female	Male
Unstandardized estimates				
QMS	→ CIS	.77***	.77***	.77***
Standardized estimates				
QMS	→ CIS	.58***	.56***	.59***
$\Delta\chi^2$			$.816^{ns}$	
χ^2/df		3.30 (p = .000)	2.47 (p = .000)	
GFI		.98	.96	
AGFI		.96	.95	
RMSEA		.05	.04	
CFI		.98	.98	

Note: ***p<.001; ns – not significant; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative fit index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

4.9.1.2 Moderation effect of age

The moderating variable age was divided into two sub-groups i.e., youth and adulthood based on median age (23 years) of the samples. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 60. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 60 shows standardized and unstandardized estimates of the paths and the results of moderation effect of age. The chi-square difference was 4.961, df = 1 for the path QMS → CIS. The difference was

greater than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-square difference was significant for the path. The result suggested that the age moderates the relationship between QMS and CIS. Therefore, the results provided a support for the hypothesis H16b (the relationship between QMS and CIS is moderated by age). The strength of the relationship was stronger for youth (β = .58) than adulthood (β = .55).

Table 60
Chi-square difference test for age

Path		QMS → CIS		
		Model 1	Model 2 (H16b)	
		Full model	Youth	Adulthood
Unstandardized estimates				
QMS	→ CIS	.77***	.74***	.74***
Standardized estimates				
QMS	→ CIS	.58***	.58***	.55***
$\Delta\chi^2$			4.961*	
χ^2/df		3.30 (p = .000)	2.76 (p = .000)	
GFI		.98	.96	
AGFI		.96	.94	
RMSEA		.05	.04	
CFI		.98	.97	

Note: ***p<.001; *Significant at .05 level; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

4.9.1.3 Moderation effect of education

The moderating variable education was divided into four sub-groups i.e., inter, graduate, post-graduate and post-PG based on the samples' response. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 61. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 61 shows standardized and unstandardized estimates of the paths and the results of moderation effect of education. The chi-square difference was 1.622, df = 3 for the path QMS → CIS. The difference was less than the critical value 7.81, df = 3 at .05 level. Therefore, the chi-square difference was not significant for the path. The result suggested that the education does not moderate the relationship between QMS and CIS. Therefore, the results did not provide support for the hypothesis H16c (the relationship between QMS and CIS is moderated by education). The strength of the relationship was

stronger for post-PG (β = .67) followed by inter (β = .62), graduate (β = .57) and PG (β = .55).

Table 61
Chi-square difference test for education

Path	QMS → CIS				
	Model 1	Model 2 (H16c)			
	Full model	Inter	Graduate	PG	Post-PG
Unstandardized estimates					
QMS ⟶ CIS	.77***	.77***	.77***	.77***	.77***
Standardized estimates					
QMS ⟶ CIS	.58***	.62***	.57***	.55***	.67***
$\Delta\chi^2$			1.62^{ns} (df = 3)		
χ^2/df	3.30 (p = .000)		1.87 (p = .000)		
GFI	.98		.95		
AGFI	.96		.92		
RMSEA	.05		.03		
CFI	.98		.97		

Note: ***p<.001; ns – not significant at .05 level; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

4.9.1.4 Moderation effect of occupation

The moderating variable occupation was divided into three sub-groups i.e., student, employee and self-employee based on the samples' response. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 62. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 62 shows standardized and unstandardized estimates of the paths and the results of moderation effect of occupation. The chi-square difference was 8.87, df = 2 for the path QMS → CIS. The difference was greater than the critical value 5.99, df = 2 at .05 level. Therefore, the chi-square difference was significant for the path. The result suggested that the occupation moderates the relationship between QMS and CIS. Therefore, the results provided a support for the hypothesis H16d (the relationship between QMS and CIS is moderated by occupation). The strength of the relationship was more for self-employee (β = .76) followed by employee (β = .58) and student (β = .53).

Table 62
Chi-square difference test for occupation

Path	QMS → CIS			
	Model 1	Model 2 (H16d)		
	Full model	Student	Employee	Self-employee
Unstandardized estimates				
QMS → CIS	.77***	.74***	.74***	.74***
Standardized estimates				
QMS → CIS	.58***	.53***	.58***	.76***
$\Delta\chi^2$			8.87* (Δdf = 2)	
χ^2/df	3.30 (p = .000)		2.26 (p = .000)	
GFI	.98		.95	
AGFI	.96		.93	
RMSEA	.05		.04	
CFI	.98		.97	

Note: ***p<.001; *Significant at .05 level; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

Table 63
Multi-group analysis and chi-square difference test for demographic variables

Variable	**Gender**		**Age**	
	Unconstrained	Fully constrained	Unconstrained	Fully constrained
χ^2	214.13	227.64	237.65	251.7
df	86	96	86	96
No. of groups	2		2	
Invariant	Yes		Yes	
$\Delta\chi^2$	.82		4.96	
Δ df	1		1	
Sig. level	No #		Yes *	
Moderation	No		Yes	
	Education		**Occupation**	
	Unconstrained	Fully constrained	Unconstrained	Fully constrained
χ^2	326.17	361.57	287.77	331.91
df	172	202	129	149
No. of groups	4		3	
Invariant	Yes		No	
$\Delta\chi^2$	1.62		8.87	
Δ df	3		2	
Sig. level	No #		Yes *	
Moderation	No		Yes	

Note: #not significant; *significant at .05 level; χ^2 – Chi-square; df-degrees of freedom.

The summary of chi-square difference test for demographic variables are presented in Table 63. The results revealed that both gender and education have no moderation effects, whereas both age and occupation have significant moderation effects on the relationship between quality of mobile services and customer intention to stay.

4.9.2 Examining the moderation effect of technical variables

The moderation effect of technical variables (a. mobile technology, b. mobile data, and c. type of mobile phone) were examined on the relationship between quality of mobile services and customer intention to stay. The results are presented as follows.

4.9.2.1 Moderation effect of mobile technology

The moderating variable mobile technology was divided into two sub-groups i.e., CDMA and GSM based on usage characteristics of mobile subscribers. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 64. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994).

Table 64
Chi-square difference test for mobile technology

Path		QMS → CIS		
		Model 1	Model 2 (H17a)	
		Full model	CDMA	GSM
Unstandardized estimates				
QMS	→ CIS	.77***	.77***	.77***
Standardized estimates				
QMS	→ CIS	.58***	.65***	.58***
$\Delta\chi^2$			.753# (Δdf = 1)	
χ^2/df		3.30 (p = .000)	2.26 (p = .000)	
GFI		.98	.97	
AGFI		.96	.95	
RMSEA		.05	.04	
CFI		.98	.98	

Note: ***p<.001; # - not significant; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

Table 64 shows standardized and unstandardized estimates of the paths and the results of moderation effect of mobile technology. The chi-square difference was .75, df = 1 for the path QMS → CIS. The difference was less than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-square difference was not significant for the path. The

result suggested that mobile technology does not moderate the relationship between QMS and CIS. Therefore, the results did not provided support for the hypothesis H17a (the relationship between QMS and CIS is moderated by mobile technology). The strength of the relationship was stronger for CDMA (β = .65) than GSM (β = .58).

4.9.2.2 Moderation effect of mobile data

The moderating variable mobile data was divided into three sub-groups i.e., 2G, 3G and both. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 65. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 65 shows standardized and unstandardized estimates of the paths and the results of moderation effect of mobile data. The chi-square difference was 2.95 (df = 2) for the path QMS → CIS. The difference was less than the critical value 5.99, df = 2 at .05 level. Therefore, the chi-square difference was not significant for the path. The result suggested that mobile data does not moderate the relationship between QMS and CIS. Therefore, the results did not provide support for the hypothesis H17b (the relationship between QMS and CIS is moderated by mobile data). The strength of the relationship was stronger for 2G (β = .65) followed by 3G (β = .56) and both (β = .50).

Table 65
Chi-square difference test for mobile data

Path			QMS → CIS		
	Model 1	Model 2 (H17b)			
	Full model	2G	3G	Both
Unstandardized estimates				
QMS → CIS	.77***	.79***	.79***	.79***
Standardized estimates				
QMS → CIS	.58*	.65***	.56***	.50***
$\Delta\chi^2$		2.95# (Δdf = 2)		
χ^2/df	3.30 (p = .000)	2.01 (p = .000)		
GFI	.98	.95		
AGFI	.96	.93		
RMSEA	.05	.03		
CFI	.98	.98		

Note: ***p<.001; # - not significant; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

4.9.2.3 Moderation effect of type of mobile phone

The moderating variable type of mobile phone was divided into two sub-groups i.e., normal phone and smartphone based on the samples' response. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 66. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 66 shows standardized and unstandardized estimates of the paths and the results of moderation effect of type of mobile phone. The chi-square difference was .825 (df = 1) for the path QMS → CIS. The difference was less than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-square difference was not significant for the path. The result suggested that type of mobile phone does not moderate the relationship between QMS and CIS. Therefore, the results did not provide support for the hypothesis H17c (the relationship between QMS and CIS is moderated by type of mobile phone). The strength of the relationship was stronger for normal phone (β = .59) than smartphone (β = .57).

Table 66
Chi-square difference test for type of mobile phone

Path			QMS → CIS	
		Model 1	Model 2 (H17c)	
		Full model	Normal	Smart
Unstandardized estimates				
QMS	→ CIS	.77***	.77***	.77***
Standardized estimates				
QMS	→ CIS	.58***	0.59***	.57***
$\Delta\chi^2$			$.825^{\#}$ (Δdf = 1)	
χ^2/df		3.30 (p = .000)	2.70 (p = .000)	
GFI		.98	.96	
AGFI		.96	.94	
RMSEA		.05	.04	
CFI		.98	.97	

Note: ***p<.001; # - not significant; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

The summary of chi-square difference test for technical variables are presented in Table 67. The results revealed that all the three variables (mobile technology, mobile data and type of mobile phone) have no moderation effects on the relationship

between quality of mobile services and customer intention to stay (no support for the hypothesis H17).

Table 67
Multi-group analysis and Chi-square difference test for technical variables

Variable	Mobile technology		Mobile data	
	Unconstrained	Fully constrained	Unconstrained	Fully constrained
χ^2	195.95	209.44	260.52	283.24
df	86	96	129	149
No. of groups	2		3	
Invariant	Yes		Yes	
$\Delta \chi^2$	0.75		2.95	
Δ df	1		2	
Sig.	No		No	
Moderation	No		No	
	Type of mobile phone			
	Unconstrained	Fully constrained		
χ^2	234.21	242.69		
df	86	96		
No. of groups	2			
Invariant	Yes			
$\Delta \chi^2$	0.83			
Δ df	1			
Sig.	No			
Moderation	No			

Note: #not significant; *significant at .05 level; χ^2 – Chi-square; df-degrees of freedom.

4.9.3 Examining the moderation effect of functional variables

The moderation effect of functional variables (a. type of mobile connection, b. multi-SIM, c. user group, d. purpose of mobile usage, e. experience of mobile usage, and f. usage level of mobile services) were examined on the relationship between Quality of Mobile Services (QMS) and Customer Intention to Stay (CIS). The results are presented as follows.

4.9.3.1 Moderation effect of mobile connection

The moderating variable mobile connection was divided into two sub-groups i.e., prepaid and postpaid. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 68. The results indicated that the model has good fit and the fit measures are more

than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 68 shows standardized and unstandardized estimates of the paths and the results of moderation effect of type of mobile connection. The chi-square difference was 1.99 (df = 1) for the path QMS → CIS. The difference was less than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-square difference was not significant for the path. The result suggested that type of mobile connection does not moderate the relationship between QMS and CIS. Therefore, the results did not provide support for the hypothesis H18a (the relationship between QMS and CIS is moderated by mobile connection). The strength of the relationship was stronger for postpaid (β = .62) than prepaid (β = .57).

Table 68
Chi-square difference test for mobile connection

Path			QMS → CIS	
		Model 1	Model 2 (H18a)	
		Full model	Prepaid	Postpaid
Unstandardized estimates				
QMS	→ CIS	0.77***	.76***	.76***
Standardized estimates				
QMS	→ CIS	0.58***	0.57***	.62***
$\Delta\chi^2$			$1.99^{\#}$ (Δdf = 1)	
χ^2/df		3.30 (p = .000)	2.922 (p = .000)	
GFI		.98	.96	
AGFI		.96	.93	
RMSEA		.05	.04	
CFI		.98	.97	

Note: ***p<.001; # - not significant; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

4.9.3.2 Moderation effect of usage of multi-SIM

The moderating variable usage of multi-SIM was divided into two sub-groups i.e., single SIM and Dual SIM based on the samples' response. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 69. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 69 shows standardized and unstandardized estimates of the paths and the results of moderation effect of usage of multi-SIM. The chi-square difference was .88 (df = 1) for the path QMS → CIS. The difference was less than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-

square difference was not significant for the path. The result suggested that usage of multi-SIM does not moderate the relationship between QMS and CIS. Therefore, the results did not provide support for the hypothesis H18b (the relationship between QMS and CIS is moderated by multi-SIM usage). The strength of the relationship was stronger for dual SIM (β = .61) than single SIM usage (β = .56).

Table 69
Chi-square difference test for multi-SIM

Path		QMS → CIS		
		Model 1	Model 2 (H18b)	
		Full model	Single SIM	Dual SIM
Unstandardized estimates				
QMS	→ CIS	.77***	.77***	.77***
Standardized estimates				
QMS	→ CIS	.58***	.56***	.61***
$\Delta\chi^2$			$.88^{\#}$ (Δdf = 1)	
χ^2/df		3.30 (p = .000)	2.29 (p = .000)	
GFI		.98	.97	
AGFI		.96	.95	
RMSEA		.05	.04	
CFI		.98	.98	

Note: ***p<.001; # - not significant; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

4.9.3.3 Moderation effect of user group

The moderating variable user group was divided into two sub-groups i.e., open user group and closed user group (CUG) based on the samples' response. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 70. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 70 shows standardized and unstandardized estimates of the paths and the results of moderation effect of user group. The chi-square difference was 2.97 (df = 1) for the path QMS → CIS. The difference was greater than the critical value 2.71, df = 1 at .10 level. Therefore, the chi-square difference was significant for the path. The result suggested that user group moderates the relationship between QMS and CIS. Therefore, the results provided a support for the hypothesis H18c (the relationship between QMS and CIS is moderated by user group). The strength of the relationship was stronger for open user group (β = .58) than CUG (β = .50).

Table 70
Chi-square difference test for user group

Path			QMS → CIS	
		Model 1	Model 2 (H18c)	
		Full model	Open user	CUG
Unstandardized estimates				
QMS	→	CIS	0.77***	.77***	.77***
Standardized estimates				
QMS	→	CIS	0.58***	0.58***	.50***
$\Delta\chi^2$				2.97^{s} (Δdf = 1)	
χ^2/df			3.30 (p = .000)	2.21 (p = .000)	
GFI			.98	.97	
AGFI			.96	.95	
RMSEA			.05	.03	
CFI			.98	.98	

Note: ***p<.001; s – significant at .10 level; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

4.9.3.4 Moderation effect of purpose of mobile usage

The moderating variable purpose of mobile usage was divided into two sub-groups i.e., personal and business based on the samples' response. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 71. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994).

Table 71
Chi-square difference test for purpose of mobile usage

Path			QMS → CIS	
		Model 1	Model 2 (H18d)	
		Full model	Personal	Business
Unstandardized estimates				
QMS	→	CIS	.77***	.75***	.75***
Standardized estimates				
QMS	→	CIS	.58***	.55***	.62***
$\Delta\chi^2$				4.53* (Δdf = 1)	
χ^2/df			3.30 (p = .000)	2.67 (p = .000)	
GFI			.98	.96	
AGFI			.96	.94	
RMSEA			.05	.04	
CFI			.98	.97	

Note: ***p<.001; *Significant at .05 level; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

Table 71 shows standardized and unstandardized estimates of the paths and the results of moderation effect of purpose of mobile usage. The chi-square difference was 4.53 (df = 1) for the path QMS → CIS. The difference was greater than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-square difference was significant for the path. The result suggested that purpose of mobile usage moderates the relationship between QMS and CIS. Therefore, the results provided a support for the hypothesis H18d (the relationship between QMS and CIS is moderated by purpose of mobile usage). The strength of the relationship was more for business purpose (β = .62) than personal purpose (β = .55).

4.9.3.5 Moderation effect of mobile usage experience

The moderating variable mobile usage experience was divided into two sub-groups i.e., low mobile experience (Low mExper) and high mobile experience (High mExper) based on the median score (5 years) of the subscribers' usage experience of mobile phone. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 72.

Table 72
Chi-square difference test for mobile usage experience

Path		QMS → CIS		
		Model 1	Model 2 (H18e)	
		Full model	Less mExper	High mExper
Unstandardized estimates				
QMS	→ CIS	.77***	.77***	.75***
Standardized estimates				
QMS	→ CIS	.58***	.59***	.55***
$\Delta\chi^2$			6.45* (Δdf = 1)	
χ^2/df		3.30 (p = .000)	2.64 (p = .000)	
GFI		.98	.96	
AGFI		.96	.94	
RMSEA		.05	.04	
CFI		.98	.97	

Note: ***p<.001; *Significant at .05 level; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 72 shows standardized and unstandardized estimates of the paths and the results of moderation effect of mobile usage experience. The chi-square difference was 6.45 (df = 1) for the path QMS → CIS. The difference was greater

than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-square difference was significant for the path. The result suggested that mobile usage experience moderates the relationship between QMS and CIS. Therefore, the results provided a support for the hypothesis H18e (the relationship between QMS and CIS is moderated by experience of mobile usage). The strength of the relationship was stronger for low mobile experience (β = .59) than high mobile experience (β = .55).

4.5.3.6 Moderation effect of usage level of mobile services

The moderating variable i.e., usage level of mobile services was divided into two sub-groups as low usage and high usage based on the median score (Rs. 300) of subscribers' monthly spending on mobile services. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 73. The results indicated that the model has good fit and the measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994).

Table 73
Chi-square difference test for usage level of mobile services

Path		Model 1	QMS → CIS Model 2 (H18f)	
		Full model	Low usage	High usage
Unstandardized estimates				
QMS	→ CIS	.77***	.77***	.77***
Standardized estimates				
QMS	→ CIS	.58***	.52***	.65***
$\Delta\chi^2$			.001# (Δdf = 1)	
χ^2/df		3.30 (p = .000)	2.21 (p = .000)	
GFI		.98	.97	
AGFI		.96	.95	
RMSEA		.05	.03	
CFI		.98	.98	

Note: ***p<.001; # - not significant; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

Table 73 shows standardized and unstandardized estimates of the paths and the results of moderation effect of mobile usage level. The chi-square difference was .001 (df = 1) for the path QMS → CIS. The difference was less than the critical value 3.84, df = 1 at .05 level. Therefore, the chi-square difference was not significant for the path. The result suggested that usage level of mobile services did not moderate the relationship between QMS and CIS. Therefore, the results did not provide support for

the hypothesis H18f (the relationship between QMS and CIS is moderated by usage level of mobile services). The strength of the relationship was stronger for high usage (β = .65) than less usage level of mobile services (β = .52).

4.9.3.7 Moderation effect of expectations of mobile subscribers

The moderating variable expectations of mobile subscribers (mExp) was a latent construct of the study. Therefore, one interaction variable was created with the product of the composite mean score of the expectations and the composite mean score of quality of mobile services (mExp * QMS). The interaction variable was introduced in the direct model of QMS and CIS for testing the moderation effect of mExp. The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 74.

Table 74
Chi-square difference test for expectations of mobile subscribers

Path		QMS → CIS	
		Model 1	Model 2 (H19)
		Full model	Expectations
Unstandardized estimates			
QMS	→ CIS	.77***	.33***
QMS*mExp	→ CIS	-	.002***
Standardized estimates			
QMS	→ CIS	.58***	.39***
QMS*mExp	→ CIS	-	.33***
R^2		.33	.41
χ^2/df		3.30 (p = .000)	3.65 (p = .000)
GFI		.98	.97
AGFI		.96	.95
RMSEA		.05	.05
CFI		.98	.98

Note: ***p<.001; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay; mExp – expectations of mobile subscribers.

The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 74 shows standardized and unstandardized estimates of the paths and the results of moderation effect of expectations of mobile subscribers. The results indicated that the interaction (QMS * mExp) variable (t = 9.416, p < .001) and QMS (t = .965, p < .001) were significant, variance explained increased from 33% to 41%. The result suggested that expectations of mobile subscribers moderated the

relationship between QMS and CIS. Therefore, the results provided a support for the hypothesis H19 (the relationship between QMS and CIS is moderated by expectations of mobile subscribers).

4.9.3.8 Moderation effect of perceived price of mobile services

The moderating variable perceived price of mobile services is also a latent construct of the study. Therefore, one interaction variable was created with the product of the composite mean score of the price and the composite mean score of quality of mobile services (Price * QMS). The interaction variable was introduced in the direct model of QMS and CIS for testing the moderation effect of the price of mobile services.

Table 75
Chi-square difference test for price of mobile services

Path	QMS → CIS	
	Model 1	Model 2 (H20)
	Full model	Price
Unstandardized estimates		
QMS → CIS	.77***	.33***
QMS*Price → CIS	-	.02***
Standardized estimates		
QMS → CIS	.58***	.39***
QMS*Price → CIS	-	.44***
R^2	.33	.49
χ^2/df	3.30 (p = .000)	3.43 (p = .000)
GFI	.98	.97
AGFI	.96	.96
RMSEA	.05	.05
CFI	.98	.98

Note: ***p<.001; χ^2 – Chi-square; df-degrees of freedom; GFI-Goodness of fit, AGFI-Adjusted goodness of fit; RMSEA-Root mean square error of approximation; CFI - Comparative Fit Index; QMS – Quality of Mobile Services; CIS – Customer Intention to Stay.

The moderation effect was tested on the relationship between QMS and CIS. The results of model fit and path coefficients are presented in Table 75. The results indicated that the model has good fit and the fit measures are more than the minimum required criteria (Bagozzi & Yi, 1988; Hair et al., 1998; Jöreskog & Sörbom, 1994). Table 75 shows standardized and unstandardized estimates of the paths and the results of moderation effect of the expectations of mobile subscribers. The results indicated that the interaction (QMS * Price) variable (t = 14.28, p < .001) and QMS (t = 11.41, p < .001) were significant, variance explained increased from 33 % to 49 %. The result suggested that perceived price of mobile services moderate the relationship

between QMS and CIS. Therefore, the results provided a support for the hypothesis H20 (the relationship between QMS and CIS is moderated by perceived price of mobile services).

The summary of chi-square difference test for functional variables are presented in Table 76. The results revealed that only three functional variables (user group, purpose of mobile usage and mobile usage experience) have significant moderation effect on the relationship between quality of mobile services and customer intention to stay.

Table 76

Multi-group analysis and chi-square difference test for functional variables

Variable		χ^2	df	No. of groups	Invariant	$\Delta\chi^2$	Δdf	Sig.	level	Moderation
Mobile Connection	Unconstrained	253.19	86	2	No	1.992	1	No		No
	Fully constrained	271.60	96							
Usage of multi-SIM	Unconstrained	198.66	86	2	Yes	0.88	1	No		No
	Fully constrained	207.52	96							
User group	Unconstrained	189.24	86	2	Yes	2.97	1	Yes	0.10	Yes
	Fully constrained	201.56	96							
Purpose of mobile usage	Unconstrained	227.65	86	2	No	4.53	1	Yes	0.05	Yes
	Fully constrained	250.06	96							
Mobile usage experience	Unconstrained	223.40	86	2	Yes	6.45	1	Yes	0.05	Yes
	Fully constrained	238.71	96							
Mobile usage level	Unconstrained	191.84	86	2	No	0.001	1	No		No
	Fully constrained	224.19	96							

Note: χ^2 – Chi-square; df-degrees of freedom;

4.9.4 Integrated model (both mediation and moderation)

This section presents the results of integrated model which has both mediation and moderation effects on the relationship between quality of mobile services and customer intention to stay. Initially, reliability and validity of the integrated model was examined by CFA measurement model (in both the contexts India and united AP). After validation of the measurement model, structural model was developed to examine the mediation and moderation effect in a single model. The results are discussed in detail as follows.

4.9.4.1 Development of QMS and CIS integrated measurement model

The results of measurement model are presented in this section. The model is tested for its reliability and validity in Indian context. Also, the model is re-examined further for its reliability and validity in united AP.

4.9.4.1.1 Results of reliability and validity of the integrated model in India

The results of confirmatory factor analysis, Cronbach's alpha, Average Variance Extracted (AVE), Construct Reliability (CR), inter-construct correlations and squared inter-construct correlations, measurement model and model fit summary are presented in Table 77, Table 78, Table 79 and Figure 20. The model fit summary indicated better overall fit (see Table 77). The result indicated that the integrated measurement model is reliable and valid for further analysis ((χ^2 / df – 2.81; GFI - .94; RMSEA - .05; NFI - .93; TLI - .94; CFI - .95; RFI - .92; AGFI - .92; PNFI - .81).

The content validity of each construct was duly assessed at the time of pilot study with subject experts, practitioners and subscribers of mobile services. Later, the items were modified to make statements conceivable to respondents that further checked the face or content validity (Kaplan & Sacuzzo, 1993; Churchill, 1992; Saraph, Benson, & Schroeder, 1989). The estimates of the standardized loading were more than 0.7 (except Ex8, Ex2, CIS7 and P2) thresholds (Hair et al., 2006) for all the items (ranges from .61 to .90; and average variance extracted (AVE $\geq$ .5) was ranging from .56 to .70 (Fornell & Lacker, 1981; Hair et al., 2008). Therefore, the integrated model has convergent validity.

Table 77

Model fit summary of the integrated model in India

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
1017.93	362	2.81	.94	.05	0.93	0.94	0.95	0.92	0.92	0.81

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index, TLI-Tucker-Lewis index, CFI - Comparative Fit Index; AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

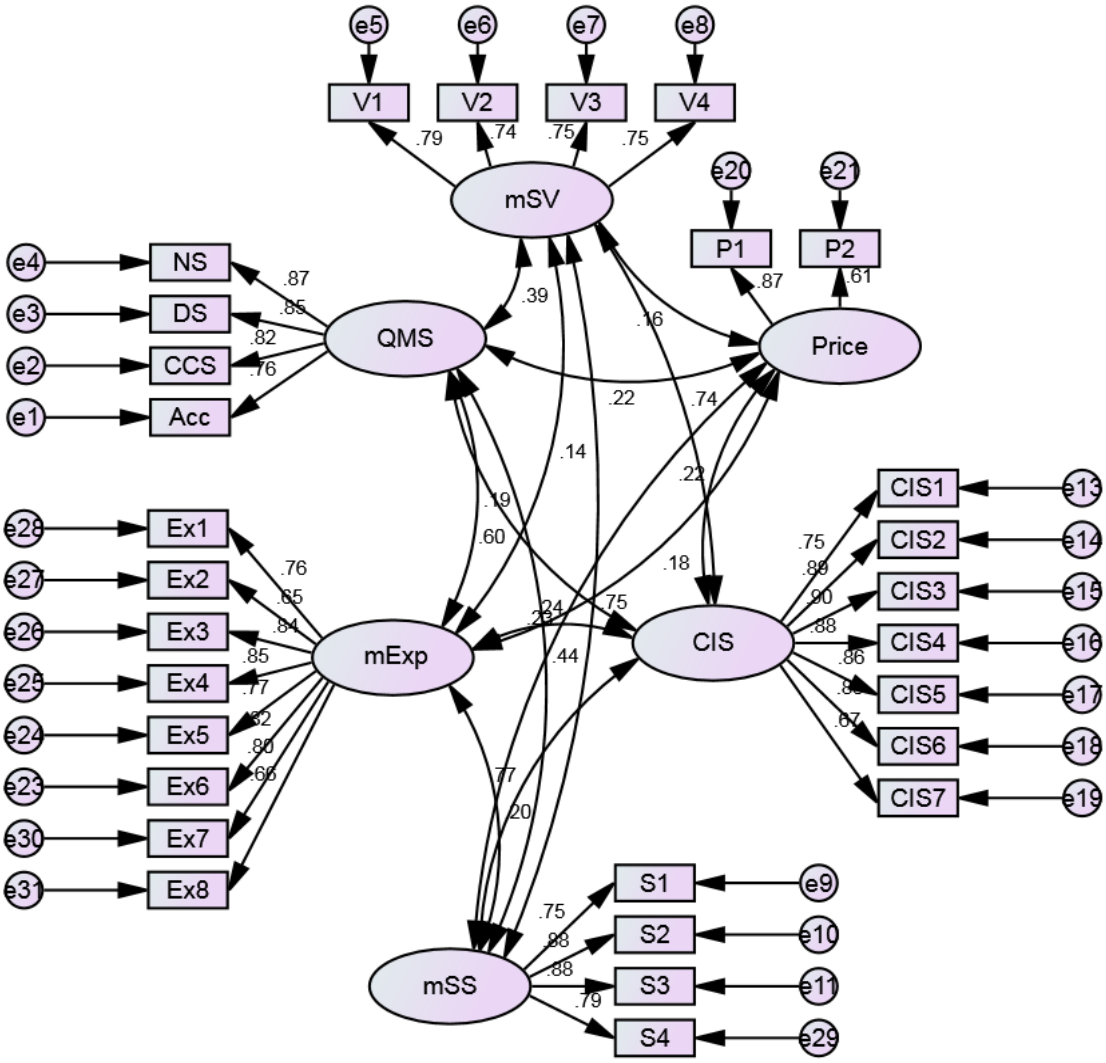

Figure 20 Integrated measurement model in India

Note: QMS – Quality of Mobile Services; mExp – Expectations of mobile subscribers; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

Table 78
Reliability and validity of the integrated model in India

Construct	Item	CFA Loadings[a]	t-value	AVE	CR	Cronbach's alpha
Quality of mobile services (QMS)	NS	.87	20.72***	.68	.90	.88
	DS	.85	20.26***			
	CCS	.82	19.49***			
	Acc	.76	#			
Expectations of mobile subscriber (mExp)	Ex1	.76	20.21***	.60	.93	.91
	Ex2	.65	16.59***			
	Ex3	.84	23.25***			
	Ex4	.85	23.93***			
	Ex5	.77	20.72***			
	Ex6	.82	#			
	Ex7	.80	21.67***			
	Ex8	.66	16.79***			
Mobile subscriber value (mSV)	V1	.79	#	.57	.84	.82
	V2	.74	17.45***			
	V3	.75	17.58***			
	V4	.75	17.81***			
Mobile subscriber Satisfaction (mSS)	S1	.75	#	.68	.90	.89
	S2	.88	20.95***			
	S3	.88	20.93***			
	S4	.79	18.59***			
Customer Intention Stay (CIS)	CIS1	.75	23.99***	.70	.94	.92
	CIS2	.89	23.85***			
	CIS3	.90	22.99***			
	CIS4	.88	24.15***			
	CIS5	.86	26.34***			
	CIS6	.88	24.40***			
	CIS7	.68	#			
Price	P1	.87	#	.56	.72	.71
	P2	.61	4.67***			

Note: # t-value is not estimated, because its value is fixed at 1; ***significant at 0.001; CFA-Confirmatory factor analysis; AVE-Average variance extracted; CR-Construct Reliability; *significant at .001; a - standardized estimates of Amos output.

The results in Table 79 show that the Average Variance Extracted (AVE) values were greater than the squared correlations for each pair of the constructs. It shows the model has discriminant validity (Fornell and Larcker, 1981). The correlations between each pair of constructs were significant ($p < .001$) and it indicated that the model has nomological validity (Churchill, 1992). The model has construct reliability (range from 0.71 to 0.91), convergent validity, discriminant validity and nomological validity. Therefore, the integrated model has construct validity (Churchill, 1992; Gerbing and Anderson, 1988; Hair et al., 2006).

Table 79
Discriminant and nomological validity of the integrated model in India

	QMS	mSV	mSS	CIS	mExp	Price
QMS	***.68#***	0.15[c]	.19 [c]	.36 [c]	.55 [c]	.59 [c]
mSV	.39[***]	***.57#***	.56 [c]	.55 [c]	.02 [c]	.03 [c]
mSS	.44[***]	.75[***]	***.68#***	.59 [c]	.04 [c]	.05 [c]
CIS	.60[***]	.74[***]	.77[***]	***.70#***	.06 [c]	.05 [c]
mExp	.19[***]	.14[***]	.20[***]	.25[***]	**.60#**	.03 [c]
Price	.22[***]	.16[***]	.23[***]	.22[***]	.18[***]	***.56#***

Note: c – squared inter-construct correlations; ***correlation is significant at .001 level; #AVE – Average Variance Extracted; QMS – Quality of Mobile Services, mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer intention to Stay; mExp – Expectations of mobile subscribers.

Overall, the results supported for the adequate fit, reliability and validity of the model. Thus, the integrated model of mobile services and customer intention to stay is reliable and valid in Indian context.

4.9.4.1.2 Re-examining the reliability and validity of the integrated measurement model in united AP

This step exclusively exhibits the results of reliability and validity analysis of the integrated measurement model in united AP. The reliability and validity of the model was re-examined as follows.

4.9.4.1.2.1 Results of reliability and validity of the integrated model in united AP

The results of confirmatory factor analysis, Cronbach's alpha, Average Variance Extracted (AVE), construct reliability (CR), inter-construct correlations and squared inter-construct correlations, and model fit summary are presented in Table 80, Table 81, Table 82 and Figure 21. The result indicated that the integrated measurement model is reliable and valid for further analysis (χ^2 / df – 2.59; GFI - .94; RMSEA - .04; NFI - .94; TLI - .95; CFI - .96; RFI - .93; AGFI - .93; PNFI - .83).

The content validity of each construct was duly assessed at the time of pilot study with subject experts, practitioners and subscribers of mobile services. Later, the items were modified to make statements conceivable to respondents that further checked the face or content validity (Kaplan & Sacuzzo, 1993; Churchill, 1992; Saraph, Benson, & Schroeder, 1989). The estimates of the standardized loading were more than 0.5 thresholds (Hair et al., 2008) for all the items (ranges from .63 to .82) and average

variance extracted (AVE ≥ .5) was ranging from .50 to .59 (Fornell & Lacker, 1981; Hair et al., 2008). Therefore, the integrated model has convergent validity.

Table 80
Model fit summary of the integrated model in united AP

	Absolute fit indices				Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
937.80	362	2.59	.94	.04	0.94	0.95	0.96	0.93	0.93	0.83

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index, TLI-Tucker-Lewis index, CFI - Comparative Fit Index; AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

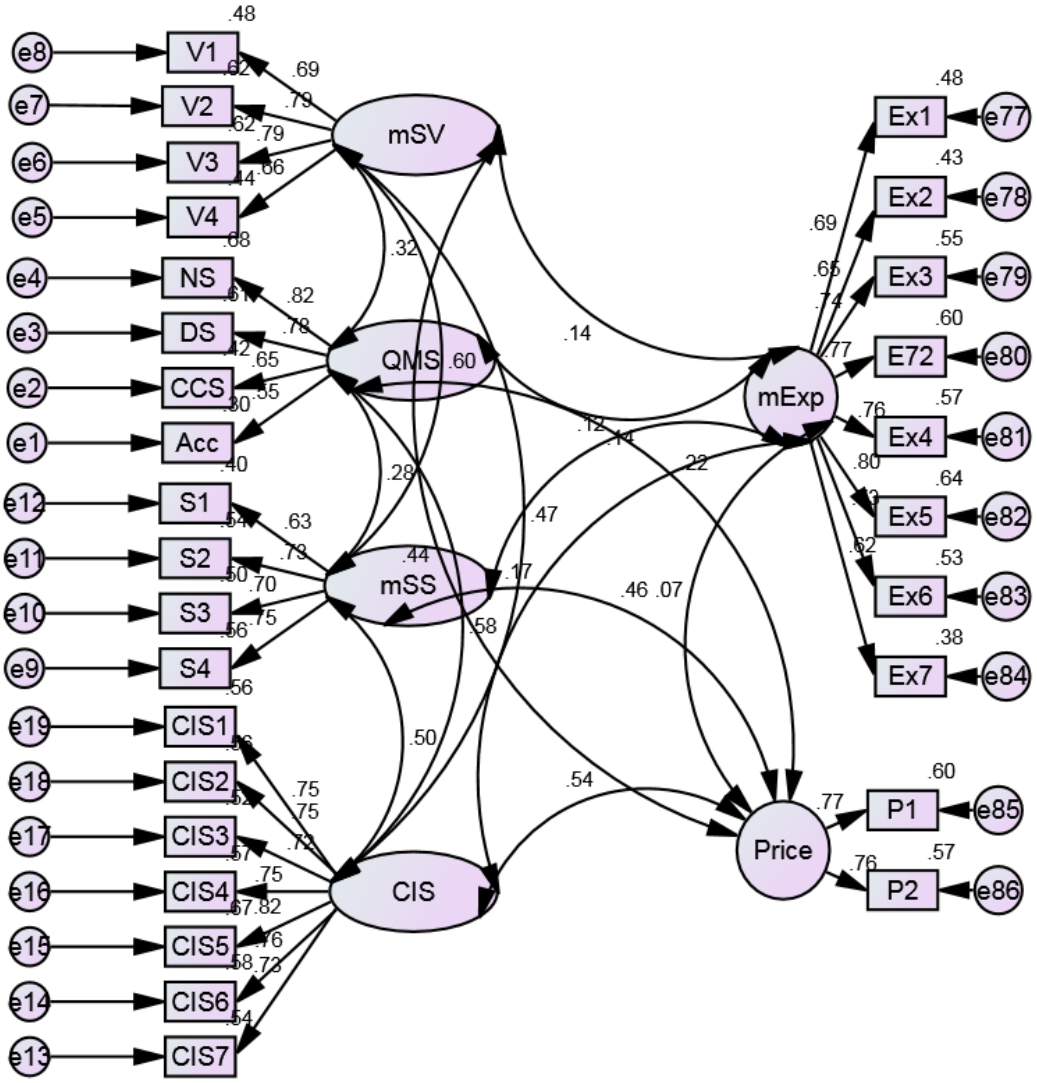

Figure 21 Integrated measurement model in united AP

Note: QMS – Quality of Mobile Services; mExp – Expectations of mobile subscribers; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

Table 81
Reliability and validity of the integrated model in united AP

Construct	Item	CFA Loadings[a]	t-value	AVE	CR	Cronbach's alpha
Quality of mobile services (QMS)	NS	.80	16.99***	.50	.80	.79
	DS	.79	16.72***			
	CCS	.60	15.20***			
	Acc	.64	#			
Expectations of mobile subscriber (mExp)	Ex1	.69	#	.52	.91	.88
	Ex2	.65	19.60***			
	Ex3	.75	22.08***			
	Ex4	.77	22.83***			
	Ex5	.76	22.41***			
	Ex6	.80	23.51***			
	Ex7	.73	21.71***			
	Ex8	.62	18.54***			
Mobile subscriber value (mSV)	V1	.69	18.81***	.54	.82	.75
	V2	.79	20.76***			
	V3	.79	20.75***			
	V4	.66	#			
Mobile subscriber Satisfaction (mSS)	S1	.63	18.43***	.50	.80	.80
	S2	.73	21.09***			
	S3	.70	20.44***			
	S4	.75	#			
Customer Intention Stay (CIS)	CIS1	.75	23.99***	.57	.90	.90
	CIS2	.75	23.85***			
	CIS3	.72	22.99***			
	CIS4	.75	24.15***			
	CIS5	.82	26.34***			
	CIS6	.76	24.40***			
	CIS7	.73	#			
Price	P1	.77	#	.59	.74	.73
	P2	.72	15.77***			

Note: # t-value is not estimated, because its value is fixed at 1; ***significant at 0.001; CFA-Confirmatory factor analysis; AVE-Average variance extracted; CR-Construct Reliability; *significant at .001; a - standardized estimates of Amos output.

The results in Table 82 show that the Average Variance Extracted (AVE) values were greater than the squared correlations for each pair of the constructs. It shows that the model has discriminant validity (Fornell and Larcker, 1981). The correlations between each pair of the constructs are significant ($p < .001$) and it indicated that the model has nomological validity (Churchill, 1992). The integrated model has construct reliability (range from .74 to .91), convergent validity, discriminant validity and nomological validity. Therefore, the model has construct validity (Churchill, 1992; Gerbing and Anderson, 1988; Hair et al., 2006).

Table 82
Discriminant and nomological validity of the integrated model in united AP

	QMS	mSV	mSS	CIS	mExp	Price
QMS	***.50#***	.10[c]	.08 [c]	.34 [c]	.22 [c]	.25 [c]
mSV	.32[***]	***.54#***	.36 [c]	.22 [c]	.02 [c]	.19 [c]
mSS	.28[***]	.60[***]	***.50#***	.25 [c]	.01 [c]	.22 [c]
CIS	.58[***]	.47[***]	.50[***]	***.57#***	.03 [c]	.29 [c]
mExp	.14[***]	.14[***]	.12[***]	.17[***]	***.52#***	.01 [c]
Price	.22[***]	.44[***]	.47[***]	.54[***]	.08[***]	***.59#***

Note: c – squared inter-construct correlations; ***correlation is significant at .001 level; #AVE – Average Variance Extracted; QMS – Quality of Mobile Services, mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer intention to Stay; mExp – Expectations of mobile subscribers.

Overall, the results supported for adequate fit, reliability and validity of the model in united AP. Thus, the integrated model of quality of mobile services and customer intention to stay is also reliable and valid in the context of united AP also.

4.9.5 An Integrated model of QMS and CIS

Based on the results of mediation and moderation, the moderation results of price and expectations were incorporated in the mediation model to understand the significance of the results in the combined model. The results of the structural model are presented in Figure 22, Table 83, Table 84 and Table 85. The results indicated that the model is reliable and valid for further analysis (χ^2 / df – 4.32; GFI - .94; RMSEA - .06; NFI - .93; TLI - .93; CFI - .94; RFI - .91; AGFI - .92; PNFI - .79). The results revealed that quality of mobile services has a significant positive direct effects on mSV (t = 9.95, p < .001), mSS (t = 4.34, p < .001) and CIS (t = 7.68, p < .001).

Table 83
Goodness-of-fit measures of the integrated model

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2***}	df	χ^2 / df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
778.12	180	4.32	.94	.06	.93	0.93	0.94	0.91	.92	0.79

Note: ***p = .000; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index, TLI-Tucker-Lewis index, CFI - Comparative Fit Index; AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

Mobile subscriber value has a significant direct positive effect on mSS (t = 11.96, p < .001) and it has no direct significant effect on CIS. Mobile subscriber satisfaction has a significant direct positive effect on CIS (t = 2.95, p < .001). The interaction term QMS_Price has a significant direct positive effect on CIS (t = 9.31, p < .001).

Therefore, price moderated the relationship between QMS and CIS. Similarly, the interaction term mExp_QMS has a significant positive direct effect on CIS ($t = 2.32$, $p < .05$). Therefore, expectations of mobile subscribers moderated the relationship between QMS and CIS. Thus, all the direct effects were significant in the moderation and mediation model except the direct effect of mSV on CIS.

Table 84
Regression weights of the integrated model

			Estimate	S.E.	t	P
mSV	<---	QMS	.47	.05	9.95	***
mSS	<---	QMS	.19	.04	4.34	***
mSS	<---	mSV	.54	.05	11.96	***
CIS	<---	mSV	.06	.04	1.50	.134
CIS	<---	mSS	.12	.04	2.95	***
CIS	<---	QMS	.45	.06	7.68	***
CIS	<---	mExp_QMS	.00	.00	2.32	*
CIS	<---	QMS_Price	.01	.00	9.31	***

Note: ***Significant at .001 level; *Significant at .05 level; QMS – Quality of Mobile Services, mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer intention to Stay; mExp – Expectations of mobile subscribers; S.E. – Standard Error; p – probability value of significance level.

Table 85
Standardized direct, indirect and total effects of the integrated model

Effects		QMS_Price	mExp_QMS	QMS	mSV	mSS
Direct	mSV			.42***		
	mSS			.17***	.53***	
	CIS	.30***	.08*	.37***	.06***	.11***
Indirect	mSV					
	mSS			.23***		
	CIS			.07***	.06***	
Total	mSV			.42***		
	mSS			.39***	.53***	
	CIS	.30***	.08*	.44***	.12***	.11***

Note: ***Significant at .001 level; *Significant at .05 level; QMS – Quality of Mobile Services, mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer intention to Stay; mExp – Expectations of mobile subscribers.

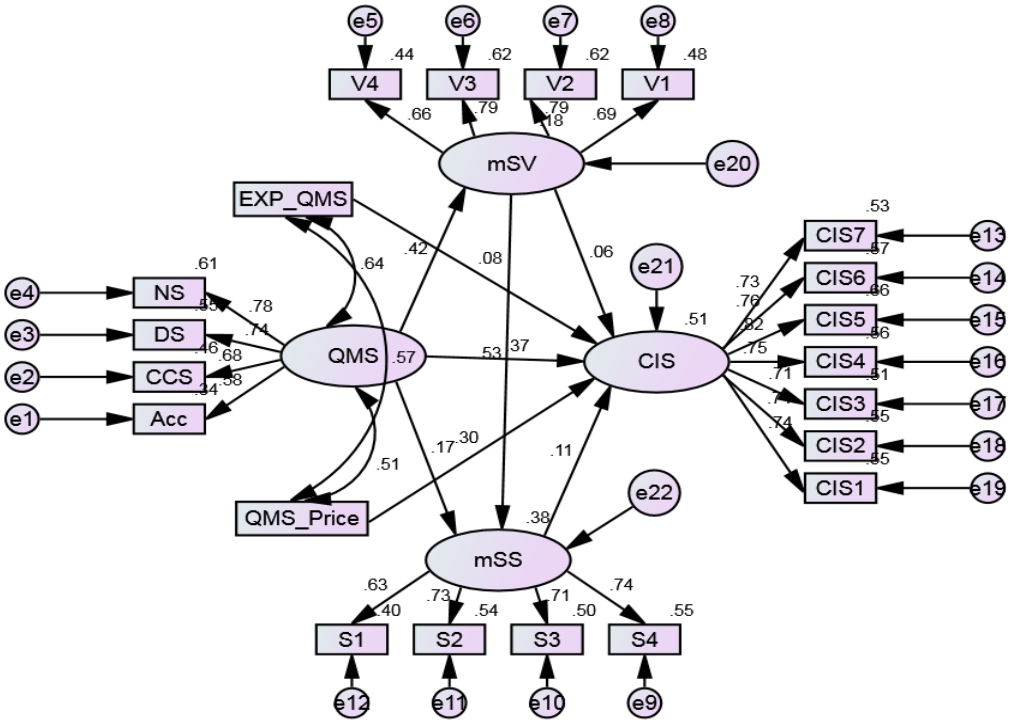

Figure 22 Integrated structural model

Note: QMS – Quality of Mobile Services; mExp – Expectations of mobile subscribers; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; EXP_QMS – Interaction between expectations of mobile subscribers and quality of mobile services; QMS_Price - Interaction between quality of mobile services and price of mobile services.

In the mediation model, all the direct effects were significant and mSV and mSS were partially mediating the relationship between QMS and CIS. The total variance explained in the model was 47% (for CIS: R^2 = .47). Whereas, the integrated model was slightly different in the results. Price of mobile services and expectations of mobile subscribers were included in the mediation model and the results were examined. The results of the integrated model revealed that mSV has no direct effect on CIS and the total variance explained by the model increased to 51% (for CIS: R^2 = .51). It implied that the mSV and mSS have partial serial mediation effect on the relationship between QMS and CIS in the presence of the moderating variables price and expectations. Also, QMS has more direct effect on mSV (β = .42) followed by CIS (β =.37) and more indirect effect on mSS (β =.23). On the other hand, QMS has more total effect on CIS (β =.44) followed by mSV (β =.42) and mSS (β =.39). Further, price (β =.30) moderated the relationship between QMS and CIS more than the expectations (β =.08).

4.10 Evaluation of quality of mobile services, mobile subscriber satisfaction and customer intention to stay

This section presents the results of descriptive statistics and evaluation of Quality of Mobile Services, Mobile Subscriber Satisfaction (mSS) and Customer Intention to Stay (CIS) in context of Andhra Pradesh (AP), Telangana State (TS), united Andhra Pradesh and India. Further, this section compares the mean differences among various demographic and technical variables in context of united Andhra Pradesh using independent t-test and Analysis of Variance (ANOVA).

4.10.1 Evaluation of QMS, mSS and CIS in AP, TS and India

The results presented in Table 86 and Table 87 show that count, minimum (Min.), maximum (Max.) and mean (M) scores, and standard deviation (SD) of QMS, mSS, and CIS based on gender (female and male) and region (rural, semi-urban and urban) classification in AP, TS and India respectively. The results are discussed in the specified context of the study as follows:

4.10.1.1 Descriptive statistics of gender and region in Andhra Pradesh

The number of respondents in rural (female = 110, male = 137), semi-urban (female = 58, male = 83, and urban (female = 148, male = 208) areas are 247, 141 and 356 respectively in AP. The total scores of QMS, mSS, and CIS are 95, 20 and 35 respectively. The results are discussed in detail based on gender and regional area classifications (see Table 86).

In rural area, the scores of QMS were as follows: for female Min. = 32, Max. = 84, M = 64.55, SD = 9.4; for male Min. = 34, Max. = 92, M = 64.34, SD = 11.02. The scores of mSS were as follows: for female Min. = 4, Max. = 20, M = 13.45, SD = 2.80; for male Min. = 4, Max. = 20, M = 13.44, SD = 3.10. The scores of CIS were as follows: for female Min. = 12, Max. = 35, M = 24.85, SD = 4.99; for male Min. = 7, Max. = 35, M = 24.25, SD = 5.79.

In semi-urban area, the scores of QMS were as follows: for female Min. = 40, Max. = 87, M = 66.74, SD = 11.22; for male Min. = 44, Max. = 93, M = 66.18, SD = 10.36. The scores of mSS were as follows: for female Min. = 6, Max. = 20, M = 14.02, SD = 2.86; for male Min. = 5, Max. = 20, M = 13.35, SD = 3.26. The scores of CIS were as

follows: for female Min. = 12, Max. = 35, M = 26.21, SD = 4.93; for male Min. = 11, Max. = 35, M = 24.78, SD = 5.48.

In urban area, the scores of QMS were as follows: for female Min. = 44, Max. = 92, M = 65.11, SD = 9.58; for male Min. = 31, Max. = 95, M = 65.44, SD = 11.05. The scores of mSS were as follows: for female Min. = 5, Max. = 20, M = 13.33, SD = 2.91; for male Min. = 4, Max. = 20, M = 13.70, SD = 2.95. The scores of CIS were as follows: for female Min. = 9, Max. = 35, M = 24.32, SD = 5.64; for male Min. = 7, Max. = 35, M = 24.66, SD = 5.34.

The total number of respondents in AP state were 744. The scores for QMS, mSS and CIS were Min. = 31, Max. = 95, M = 65.23, SD = 10.46; Min. = 4, Max. = 20, M = 13.53, SD = 2.97; and Min. = 7, Max. = 35, M = 24.68, SD = 5.42 respectively (see Table 87).

The results indicate that the perceived level of quality of mobile services was 68.66 % (rural = 67.82; semi-urban = 69.91; urban = 68.74), the level of subscriber satisfaction was 67.65 % (rural = 67.22; semi-urban = 68.13; urban = 67.73) and the level of customer intention to stay was 70.51 % (rural = 63.11; semi-urban = 72.48; urban = 70.05) respectively in Andhra Pradesh state.

4.10.1.2 Descriptive statistics of gender and region in Telangana State

The number of respondents in rural (female = 34, male = 33), semi-urban (female = 37, male = 30, and urban (female = 71, male = 112) areas are 64, 67 and 183 respectively in Telangana state. The total scores of QMS, mSS, and CIS are 95, 20 and 35 respectively. The results are discussed in detail based on gender and regional area classifications (see Table 86).

In rural area, the scores of QMS were as follows: for female Min. = 41, Max. = 88, M = 68.35, SD = 10.96; for male Min. = 39, Max. = 86, M = 63, SD = 10.31. The scores of mSS were as follows: for female Min. = 8, Max. = 18, M = 14.09, SD = 2.59; for male Min. = 5, Max. = 20, M = 13.06, SD = 3.77. The scores of CIS were as follows: for female Min. = 11, Max. = 35, M = 24.85, SD = 6.13; for male Min. = 8, Max. = 35, M = 25.33, SD = 6.14.

In semi-urban area, the scores of QMS were as follows: for female Min. = 41, Max. = 82, M = 63.41, SD = 10.56; for male Min. = 32, Max. = 90, M = 67.13, SD = 12.75. The scores of mSS were as follows: for female Min. = 7, Max. = 19, M = 12.49, SD = 3.14; for male Min. = 5, Max. = 19, M = 13.97, SD = 3.43. The scores of CIS were as follows: for female Min. = 10, Max. = 35, M = 23.30, SD = 6.95; for male Min. = 7, Max. = 34, M = 25.23, SD = 6.35.

In urban area, the scores of QMS were as follows: for female Min. = 32, Max. = 84, M = 65.27, SD = 11.69; for male Min. = 35, Max. = 95, M = 68.47, SD = 10.07. The scores of mSS were as follows: for female Min. = 4, Max. = 20, M = 13.35, SD = 3.05; for male Min. = 6, Max. = 20, M = 13.96, SD = 2.82. The scores of CIS were as follows: for female Min. = 7, Max. = 35, M = 24.59, SD = 5.18; for male Min. = 7, Max. = 35, M = 25.77, SD = 5.01.

The total number of respondents in Telangana state were 317. The scores for QMS, mSS and CIS were Min. = 32, Max. = 95, M = 66.45, SD = 11.02; Min. = 4, Max. = 20, M = 13.57, SD = 3.08; and Min. = 7, Max. = 35, M = 25.14, SD = 5.69 respectively (see Table 87).

The results indicate that the perceived level of quality of mobile services was 69.95 % (rural = 69.17; semi-urban = 68.50; urban = 70.77), the level of subscriber satisfaction was 67.85 % (rural = 67.91; semi-urban = 65.76; urban = 68.62) and the level of customer intention to stay was 71.83% (rural = 73.26; semi-urban = 69.04; urban = 72.32) in the state of Telangana.

4.10.1.3 Descriptive statistics of gender and region in India

The number of respondents in rural (female = 11, male = 49), semi-urban (female = 18, male = 61, and urban (female = 117, male = 291) areas are 60, 79 and 408 respectively in India. The total scores of QMS, mSS, and CIS are 95, 20 and 35 respectively. The results are discussed in detail based on gender and regional area classifications (see Table 86).

In rural area, the scores of QMS were as follows: for female Min. = 55, Max. = 94, M = 74.09, SD = 12.93; for male Min. = 32, Max. = 87, M = 63.04, SD = 13.32. The scores of mSS were as follows: for female Min. = 4, Max. = 20, M = 17.91, SD =

5.75; for male Min. = 4, Max. = 20, M = 16.78, SD = 5.03. The scores of CIS were as follows: for female Min. = 8, Max. = 35, M = 25.82, SD = 7.72; for male Min. = 7, Max. = 35, M = 24.90, SD = 6.67.

In semi-urban area, the scores of QMS were as follows: for female Min. = 44, Max. = 88, M = 71.11, SD = 10.91; for male Min. = 32, Max. = 95, M = 67.30, SD = 12.48. The scores of mSS were as follows: for female Min. = 12, Max. = 19, M = 17.56, SD = 3.54; for male Min. = 5, Max. = 20, M = 16.80, SD = 4.27. The scores of CIS were as follows: for female Min. = 18, Max. = 35, M = 27.56, SD = 4.16; for male Min. = 12, Max. = 35, M = 25.77, SD = 5.28.

In urban area, the scores of QMS were as follows: for female Min. = 38, Max. = 95, M = 70.97, SD = 12.26; for male Min. = 34, Max. = 95, M = 69.03, SD = 12.49. The scores of mSS were as follows: for female Min. = 6, Max. = 20, M = 17.73, SD = 4.31; for male Min. = 5, Max. = 20, M = 17.05, SD = 4.38. The scores of CIS were as follows: for female Min. = 7, Max. = 35, M = 25.79, SD = 6.25; for male Min. = 7, Max. = 35, M = 25.07, SD = 5.99.

The total number of respondents in India were 547. The scores for quality of mobile services, subscriber satisfaction and customer intention to stay were Min. = 32, Max. = 95, M = 68.88, SD = 12.62; Min. = 4, Max. = 20, M = 17.18, SD = 4.41; and Min. = 7, Max. = 35, M = 25.38, SD = 6.02 respectively (see Table 87).

The results indicate that the perceived level of quality of mobile services was 72.51 % (rural = 68.49; semi-urban = 71.76; urban = 73.25), the level of subscriber satisfaction was 85.90 % (rural = 84.94; semi-urban = 84.87; urban = 86.23) and the level of customer intention to stay was 72.51% (rural = 71.62; semi-urban = 74.79; urban = 72.22) in India.

The consolidated results of quality of mobile services, subscriber satisfaction and customer intention to stay were compared across AP, TS and India as shown in Figure 23 and Figure 24. The results revealed that the level of quality of mobile services, in rural areas, was more Telangana state (69.17%) followed by India (68.49%) and Andhra Pradesh (67.82%). Similarly, the level of quality of mobile services, in semi-urban area, was more in India (71.76%) followed by Andhra Pradesh (69.91%) and

Telangana state (68.5%). Likewise, the level of quality of mobile services, in urban areas, was more in India (73.25%) followed by Telangana state (70.77%) and Andhra Pradesh state (68.74%).

The results also revealed that the level of subscriber satisfaction, in rural area, was more in India (M = 84.94) followed by Telangana state (67.91%) and Andhra Pradesh (67.22%). Likewise, subscriber satisfaction level, in semi-urban areas, was more in India (84.87%) followed by Andhra Pradesh (68.13%) and Telangana state (65.76%). Similarly, the level of mSS, in urban areas, was more in India (86.23%) followed by Telangana state (68.62%) and Andhra Pradesh state (67.73%).

Furthermore, the results revealed that the level of customer intention to stay, in rural area, was more in Telangana state (73.26%) followed by India (71.62%) and Andhra Pradesh (63.11%). Likewise, the level of CIS, in semi-urban area, was more in India (74.79%) followed by Andhra Pradesh (72.48%) and Telangana state (69.04%). Similarly, the level of customer intention to stay, in urban area, was more in Telangana state (72.32%) followed by India (72.22%) and Andhra Pradesh (70.05%). Overall, the consolidated results indicate that the level of quality of mobile services, subscriber satisfaction and customer intention to stay were comparatively high in India followed by Telangana state and Andhra Pradesh state (see Figure 24).

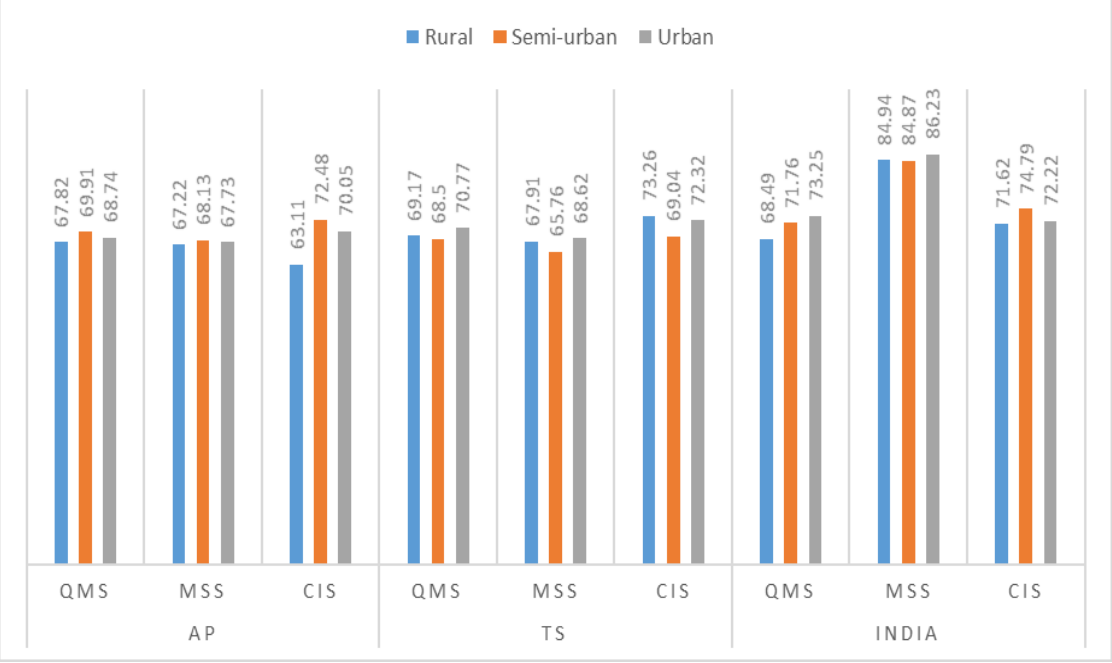

Figure 23 Comparison of QMS, mSS and CIS

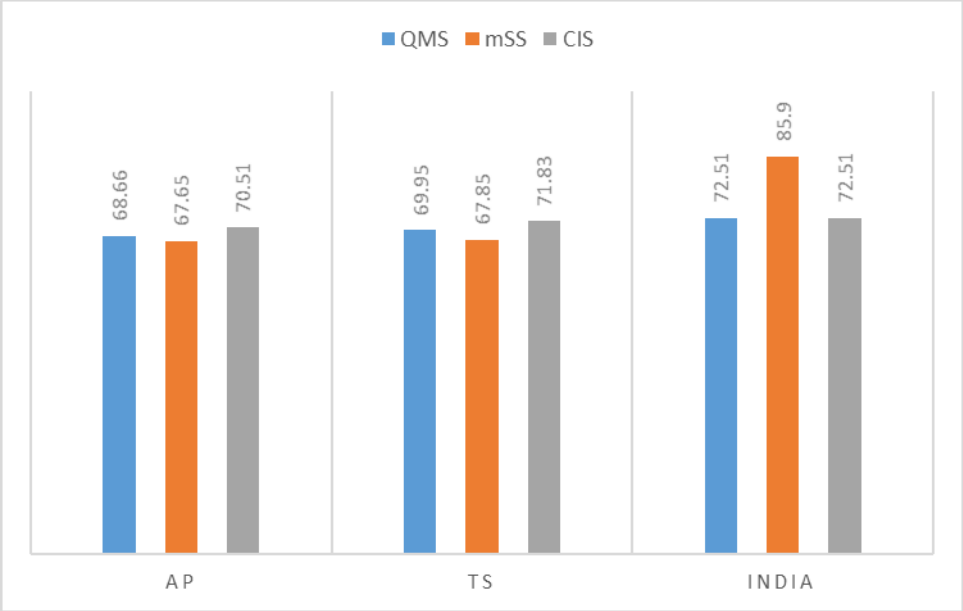

Figure 24 Comparison of QMS, mSS and CIS in AP, TS and India

Table 86

Evaluation of QMS, mSS and CIS in AP, TS and India (region and gender)

State	Region	Gender	Quality of mobile services					Mobile subscriber satisfaction				Customer intention to stay			
			Frequency	Mean	Min.	Max.	SD	Mean	Min.	Max.	SD	Mean	Min.	Max.	SD
AP	Rural	Female	110	64.55	32.00	84.00	9.40	13.45	4.00	20.00	2.80	24.85	12.00	35.00	4.99
		Male	137	64.34	34.00	92.00	11.02	13.44	4.00	20.00	3.10	24.25	7.00	35.00	5.79
	Semi-urban	Female	58	66.74	40.00	87.00	11.22	14.02	6.00	20.00	2.86	26.21	12.00	35.00	4.93
		Male	83	66.18	44.00	93.00	10.36	13.35	5.00	20.00	3.26	24.78	11.00	35.00	5.48
	Urban	Female	148	65.11	44.00	92.00	9.58	13.33	5.00	20.00	2.91	24.32	9.00	35.00	5.64
		Male	208	65.44	31.00	95.00	11.05	13.70	4.00	20.00	2.95	24.66	7.00	35.00	5.34
TS	Rural	Female	34	68.35	41.00	88.00	10.96	14.09	8.00	18.00	2.59	25.94	11.00	35.00	6.13
		Male	33	63.00	39.00	86.00	10.31	13.06	5.00	20.00	3.77	25.33	8.00	35.00	6.14
	Semi-urban	Female	37	63.41	41.00	82.00	10.56	12.49	7.00	19.00	3.14	23.30	10.00	35.00	6.95
		Male	30	67.13	32.00	90.00	12.75	13.97	5.00	19.00	3.43	25.23	7.00	34.00	6.35
	Urban	Female	71	65.27	32.00	84.00	11.69	13.35	4.00	20.00	3.05	24.59	7.00	35.00	5.18
		Male	112	68.47	35.00	95.00	10.07	13.96	6.00	20.00	2.82	25.77	7.00	35.00	5.01
India	Rural	Female	11	74.09	55.00	94.00	12.93	17.91	4.00	20.00	5.75	25.82	8.00	35.00	7.72
		Male	49	63.04	32.00	87.00	13.32	16.78	4.00	20.00	5.03	24.90	7.00	35.00	6.67
	Semi-urban	Female	18	71.11	44.00	88.00	10.91	17.56	12.00	19.00	3.54	27.56	18.00	35.00	4.16
		Male	61	67.30	32.00	95.00	12.48	16.80	5.00	20.00	4.27	25.77	12.00	35.00	5.28
	Urban	Female	117	70.97	38.00	95.00	12.26	17.73	6.00	20.00	4.31	25.79	7.00	35.00	6.25
		Male	291	69.03	34.00	95.00	12.49	17.05	5.00	20.00	4.38	25.07	7.00	35.00	5.99

Note: AP – Andhra Pradesh; TS – Telangana State; Min. – Minimum; Max. – Maximum; SD – Standard Deviation.

Table 87

QMS, mSS and CIS in AP, TS and India

State	Quality of Mobile Services (QMS)					Mobile Subscriber Satisfaction (mSS)				Customer Intention to Stay (CIS)			
	Frequency	Mean	Min.	Max.	SD	Mean	Min.	Max.	SD	Mean	Min.	Max.	SD
AP	744	65.23	31.00	95.00	10.46	13.53	4.00	20.00	2.97	24.68	7.00	35.00	5.42
TS	317	66.45	32.00	95.00	11.02	13.57	4.00	20.00	3.08	25.14	7.00	35.00	5.69
India	547	68.88	32	95	12.62	17.18	4.00	20.00	4.41	25.38	7.00	35.00	6.02

Note: AP – Andhra Pradesh; TS – Telangana State; Min. – Minimum; Max. – Maximum; SD – Standard Deviation.

Table 88

Evaluation of dimensions of QMS in AP, TS and India

State	Network service (NS)				Data service (DS)				Customer care service (CCS)				Accessibility (Acc)			
	Mean	Min.	Max.	SD	Mean	Min.	Max.	SD	Mean	Min.	Max.	SD	Mean	Min.	Max.	SD
AP	25.41	7.00	35.00	4.95	10.58	3.00	15.00	2.73	18.57	6.00	30.00	4.24	11.07	3.00	15.00	2.40
TS	26.20	7.00	35.00	5.09	10.77	3.00	15.00	2.73	18.82	6.00	30.00	4.27	11.12	3.00	15.00	2.40
India	26.12	7.00	35.00	5.76	10.73	3.00	15.00	2.59	20.79	6.00	30.00	5.06	11.26	3.00	15.00	2.60

Note: AP – Andhra Pradesh; TS – Telangana State; Min. – Minimum; Max. – Maximum; SD – Standard Deviation.

Table 89

Evaluation of Overall QMS and overall mSS in AP, TS and India

State	Region	Gender	Overall QMS					Overall mSS			
			Frequency	Mean	Min.	Max.	SD	Mean	Min.	Max.	SD
AP	Rural	Female	110	7	1	10	2	7	1	10	2
		Male	137	7	1	10	2	7	1	10	2
	Semi-urban	Female	58	7	2	10	2	7	2	10	2
		Male	83	7	2	10	2	7	2	10	2
	Urban	Female	148	7	1	10	2	7	1	10	2
		Male	208	7	1	10	2	7	1	10	2
TS	Rural	Female	34	7	3	9	2	7	1	9	2
		Male	33	7	3	10	2	7	3	10	2
	Semi-urban	Female	37	7	2	10	2	6	2	10	2
		Male	30	7	1	10	2	7	1	10	2
	Urban	Female	71	7	1	10	2	6	1	10	2
		Male	112	7	2	10	2	7	1	10	2
India	Rural	Female	11	7.2	1	10	2.7	6.7	1	10	2.6
		Male	49	6.6	1	10	2.4	6.6	1	10	2.4
	Semi-urban	Female	18	7.0	4	10	1.6	6.8	3	10	1.9
		Male	61	6.5	1	10	2.0	6.5	1	10	2.1
	Urban	Female	117	7.1	2	10	1.9	7.0	1	10	2.0
		Male	291	6.8	1	10	2.0	6.7	1	10	2.1

Note: AP – Andhra Pradesh; TS – Telangana State; Min. – Minimum; Max. – Maximum; SD – Standard Deviation; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction.

4.10.2 Evaluation of dimensions of QMS in AP, TS and India

Table 88 shows the results of mTelQual dimensions (network, data, customer care and accessibility) in AP, TS, and India. Minimum, maximum, mean and standard deviation values were presented for each dimension of the QMS. The minimum (NS = 7, DS = 3, CCS = 6 and Acc = 3) and maximum (NS = 35, DS = 15, CCS = 30 and Acc = 15) values for all the dimensions were scored same for AP, TS and India. Network service has high score (M = 26.20, SD = 5.09) in Telangana state followed by India (M = 26.12, SD = 5.76) and Andhra Pradesh (M = 25.41, SD = 4.95). Similarly, data service has high score (M = 10.77, SD = 2.73) in Telangana state followed by India (M = 10.73, SD = 2.59) and Andhra Pradesh (M = 10.58, SD = 2.73). Furthermore, customer care service has high score (M = 20.79, SD = 5.06) in India followed by TS (M = 18.82, SD = 4.27) and AP (M = 18.57, SD = 4.24). Similarly, accessibility has high score (M = 11.26, SD = 2.60) in India followed by TS (M = 11.12, SD = 2.40) and AP (M = 11.07, SD = 2.40). The results are also represented in Figure 25.

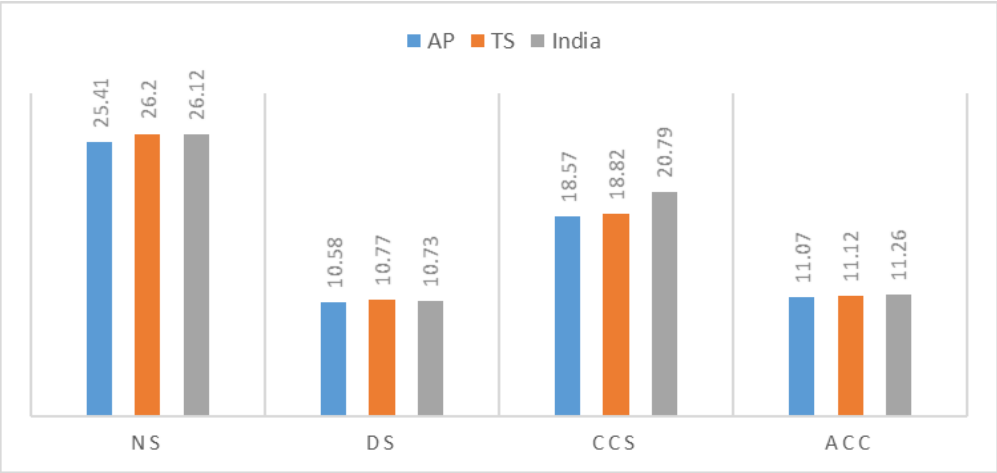

Figure 25 Comparison of QMS dimensions in AP, TS and India

4.10.3 Evaluation of overall QMS and mSS in AP, TS and India

The results of overall quality of mobile services (10 point format) and overall mobile subscriber satisfaction (Overall mSS) (10 point format) are presented in Table 89 based on region (rural, semi-urban and urban) and gender (female and male) classifications in Andhra Pradesh, Telangana state and India level. The results are also shown in Figure 26. The table represents mean, minimum, maximum, and standard deviation values which were captured on 10 point rating format. The results indicated that the overall quality of mobile services was rated 7th in both the states i.e., Andhra

and Telangana for all the regional areas and gender wise. Further, the overall QMS was rated high i.e., 7.2 for rural female category followed by urban (7.1) and semi-urban (7) in India. The urban male rated high overall QMS (6.8) followed by rural (6.6) and semi-urban (6.5) male. It implied that the overall quality of mobile services was perceived same across the gender and region in both AP and Telangana states. On the other hand, it perceived slightly different across the gender and region in the Indian context.

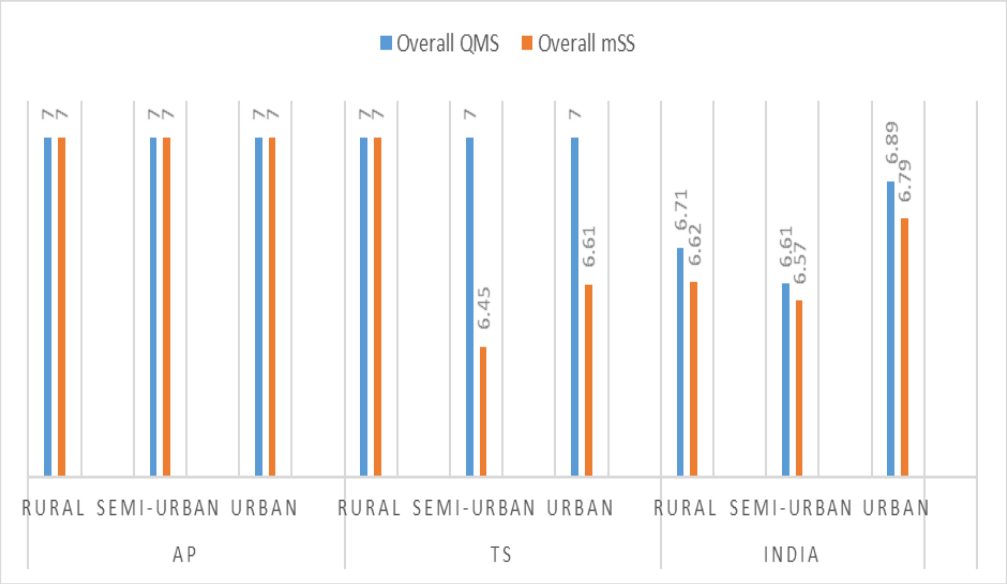

Figure 26 Comparison of overall QMS and CS in AP, TS and India

4.10.4 Evaluation of QMS, mSS and CIS across Indian telecom circles

The study also evaluated the quality of mobile services, subscriber satisfaction and customer intention to stay based on telecom circles (Metro, A, B, and C) in Indian context. Minimum, maximum, mean, and standard deviation values of quality of mobile services, subscriber satisfaction and customer intention to stay are presented in Table 90 and Figure 27. The table shows that the telecom circle B has better quality of mobile services (M = 70.16; SD = 11.51) when compared to the circle A (M = 68.90; SD = 12.61), the metro circle (M = 68.83; SD = 14.16) and the telecom circle C (M = 66.33; SD = 13.04). Similarly, the telecom circle B has more subscriber satisfaction (M = 17.55; SD = 3.97) followed by the metro circle (M = 17.19; SD = 5.07), the circle A (M = 17.09; SD = 4.51) and the telecom circle C (M = 16.98; SD = 3.95). Further, intention to stay of the mobile subscribers was more in the telecom circle A (M = 25.50; SD = 6.02) followed by the circle B (M = 25.30; SD = 5.81), the circle C (M = 25.13; SD = 6.19) and the metro telecom circle (M = 25.06; SD = 6.44).

Table 90
QMS, mSS and CIS in Telecom circles

Telecom circle	Quality of mobile services				
	Count	Mean	Min.	Max.	SD
A	191	68.90	32.00	95.00	12.61
B	213	70.16	34.00	95.00	11.51
C	77	66.33	32.00	93.00	13.04
Metro	66	68.83	38.00	93.00	14.16
	Mobile subscriber satisfaction				
A	191	17.09	4.00	20.00	4.51
B	213	17.55	6.00	20.00	3.97
C	77	16.98	4.00	20.00	3.95
Metro	66	17.19	5.00	20.00	5.07
	Customer intention to stay				
A	191	25.50	7.00	35.00	6.02
B	213	25.30	7.00	35.00	5.81
C	77	25.13	8.00	35.00	6.19
Metro	66	25.06	10.00	35.00	6.44

Note: Min. – Minimum; Max. – Maximum; SD – Standard Deviation.

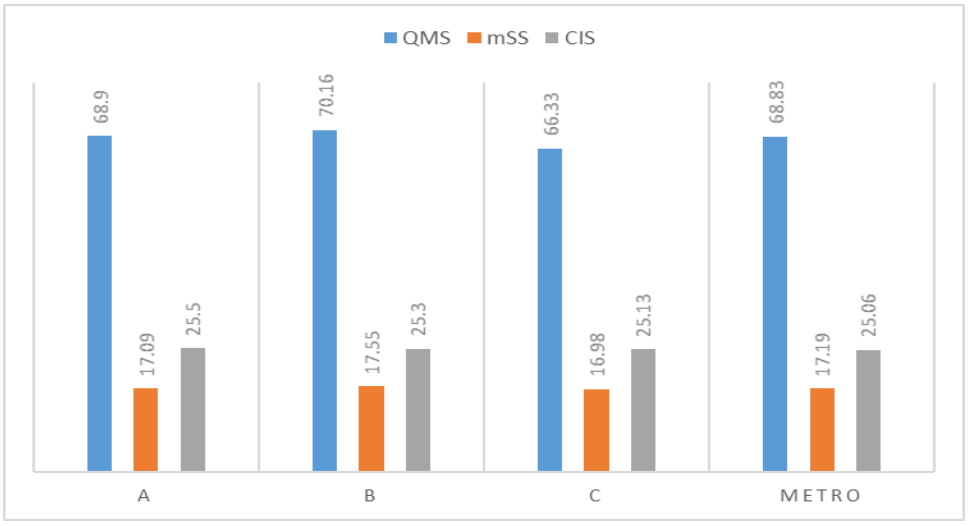

Figure 27 Comparison of QMS, CS and CIS across Indian telecom circles

4.10.5 Comparison of means of quality of mobile services, subscriber value, subscriber satisfaction, and customer intention to stay in united AP

This section tested the difference of Quality of Mobile Service (QMS), Mobile Subscriber Value (mSV), Mobile Subscriber Satisfaction (mSS) and Customer Intention to Stay (CIS) in terms of demographic (gender, age, education, occupation, state and regional area), technical (mobile technology, mobile data and type of mobile phone) and functional (type of mobile connection, multi-SIM, user group, purpose of mobile usage, experience of mobile usage, usage level of mobile services and service

provider) variables in the state of united AP. Independent sample t-test (see Table 111) and analysis of variance (one-way) (see Table 112) were performed to compare two groups and multiple comparisons respectively. The results were interpreted based on Levene's test of homogeneity of variances between the groups and multiple comparisons.

4.10.5.1 Comparison of means in terms of gender

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on gender classification (female and male). The descriptive statistics are presented in Table 91. The mean value of QMS for female and male was 65.31 (SD = 10.30) and 65.81 (SD = 10.89) respectively. Further, the mean score of mSV for female and male was 13.43 (SD = 2.96) and 13.62 (SD = 3.12) respectively. Furthermore, the mean value of mSS for female and male was 13.44 (2.91) and 13.62 (SD = 3.07) respectively. Finally, the mean value of CIS for female and male was 24.77 (SD = 5.52) and 24.86 (SD = 5.51) respectively.

The results of Levene's test indicted that there was an equal variance between male and female (for QMS: F = 1.10, p = .30; mSV: F = 1.59, p = .21; mSS: F = 1.08, p = .30; CIS: F = .00, p = .99). Accordingly, the result of independent sample t-test revealed that quality of mobile services (t = -.75, p = .45), subscriber value (t = -.98, p = .33), subscriber satisfaction (t = -.98, p = .33) and customer intention to stay (t = -.26, p = .80) have no significant difference between female and male. Therefore, the result did not support for H21a, H22a, H23a and H24a (see Table 111).

Table 91
Gender group statistics for QMS, mSV, mSS and CIS

	Gender	Mean	SD
QMS	Female	65.31	10.30
	Male	65.81	10.89
mSV	Female	13.43	2.96
	Male	13.62	3.12
mSS	Female	13.44	2.91
	Male	13.62	3.07
CIS	Female	24.77	5.52
	Male	24.86	5.51

Note: N = 1061 (female = 458; male = 603); QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

4.10.5.2 Comparison of means in terms of age

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on age group classification (youth and adulthood). The groups were classified depending on median age (23 years) of the respondents. If the age of the respondent is less than or equal to 23 years then the group was classified as youth, otherwise adulthood. The descriptive statistics are presented in Table 92. The mean value of QMS for youth and adulthood was 63.88 (SD = 10.83) and 67.79 (SD = 9.96) respectively. Further, the mean score of mSV for youth and adulthood was 13.18 (3.08) and 13.99 (SD = 2.96) respectively. Furthermore, the mean value of mSS for youth and adulthood was 13.15 (14.04) and 13.62 (SD = 2.83) respectively. Finally, the mean value of CIS for youth and adulthood was 24.28 (SD = 5.68) and 2425.51 (SD = 5.21) respectively.

The results of Levene's test indicted that there was an equal variance between youth and adulthood (for QMS: F = 4.98, p = .03; mSS: F = 5.12, p = .02; CIS: F = 5.23, p = .00) expect for mSV (F = .88, p = .35). Accordingly, the result of independent sample t-test revealed that quality of mobile services (t = -.6.10, p = .00), subscriber value (t = -.4.36, p = .00), subscriber satisfaction (t = -4.93, p = .00) and customer intention to stay (t = -3.69, p = .00) have a significant difference between youth and adulthood. Therefore, the result supported for H21b, H22b, H23b and H24b (see Table 111).

Table 92
Age group statistics for QMS, mSV, mSS and CIS

	Age group	Mean	Std. Deviation
QMS	Youth	63.88	10.83
	Adulthood	67.79	9.96
mSV	Youth	13.18	3.08
	Adulthood	13.99	2.96
mSS	Youth	13.15	3.08
	Adulthood	14.04	2.83
CIS	Youth	24.28	5.68
	Adulthood	25.51	5.21

Note: N = 1061 (youth = 591; adulthood = 470); QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

4.6.5.3 Comparison of means in terms of education

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the education of the respondents (SSC, Intermediate, Graduate, Post-Graduate and Post-PG (M.Phil/Ph.D). The descriptive

statistics are presented in Table 93. The mean value of QMS for SSC, Inter, Graduate, PG and Post-PG was 68.69 (SD = 8.32), 62.78 (SD = 11.21), 64.83 (SD = 11.37), 66.50 (SD = 9.57), and 68.36 (SD = 13.00) respectively. Further, the mean score of mSV for SSC, Inter, Graduate, PG and Post-PG was 14.25 (SD = 2.24), 13.01 (SD = 3.03), 13.20 (SD = 3.10), 13.82 (SD = 2.98), and 14.67 (SD = 3.22) respectively. Furthermore, the mean value of mSS for SSC, Inter, Graduate, PG and Post-PG was 14.88 (SD = 2.06), 12.93 (SD = 3.31), 13.25 (SD = 3.11), 13.82 (SD = 2.80), and 14.08 (SD = 3.33) respectively. Finally, the mean value of CIS for SSC, Inter, Graduate, PG and Post-PG was 26.63 (SD = 3.77), 24.01 (SD = 6.59), 24.65 (SD = 5.55), 24.94 (SD = 5.26), and 26.44 (SD = 5.20) respectively.

Table 93
Education group statistics for QMS, mSV, mSS and CIS

Construct	Education	Mean	SD
QMS	10th/SSC	68.69	8.32
	Intermediate	62.78	11.21
	Graduate	64.83	11.37
	PG	66.50	09.57
	M.Phil/Ph.D	68.36	13.00
mSV	10th/SSC	14.25	2.24
	Intermediate	13.01	3.03
	Graduate	13.2	3.10
	PG	13.82	2.98
	M.Phil/Ph.D	14.67	3.22
mSS	10th/SSC	14.88	2.06
	Intermediate	12.93	3.31
	Graduate	13.25	3.11
	PG	13.82	2.80
	M.Phil/Ph.D	14.08	3.33
CIS	10th/SSC	26.63	3.77
	Intermediate	24.01	6.59
	Graduate	24.65	5.55
	PG	24.94	5.26
	M.Phil/Ph.D	26.44	5.20

Note: N = 1061 (SSC = 16, Inter = 108, Graduate = 400, PG = 498, M.Phil/Ph.D. = 39); QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test of homogeneity of variances indicted that there is an equal variance among SSC, Inter, Graduate, PG and Post-PG (for QMS: F = 4.67, p = .001; mSS: F = 3.07, p = .016; CIS: F = 4.88, p = .001) expect for mSV (F = .64, p =

.66). Accordingly, the results of one-way ANOVA revealed that quality of mobile services (F = 4.38, p = .00), mSV (F = 4.66, p = .00), and mSS (F = 4.27, p = .00) were significantly different in terms of education, on the other hand customer intention to stay (F = 2.01, p = .09) was not significantly different. Therefore, the results supported for H21c, H22c, and H23c, and did not support for H24c (see Table 112).

Since there is a significant difference of QMS, mSV and mSS in terms of education, post-hoc test was performed to understand which groups were similar and dissimilar. The test of homogeneity of variance revealed that there was an unequal variance among the educational groups for QMS and m-SS, and it indicated that there was an equal variance for mSV. Thus, Dunnett T3 and Tukey tests were performed for unequal and equal variances respectively. The results of post-hoc tests are presented in Table 94. The results of post-hoc tests revealed that mean difference (MD) was significant for quality of mobile services between Intermediate and post-graduation (MD = -3.73, p = .01). Further, the results indicated that mean differences were significant for mSS between SSC and Intermediate (MD = 1.95, p = .03), and Graduate and PG (MD = -.57, .04) respectively. The results of Tukey test showed that mean differences were significant for mSV between intermediate and Post-PG (MD = -1.66, p = .03), graduate and PG (MD = -.613, p = .02), and graduate and Post-PG (MD = -1.46, p = .03) correspondingly.

Table 94
Results of Dunnett T3 and Tukey post-hoc tests for education

Construct	Education		Mean Difference (MD)	Sig.
QMS	Intermediate	PG	-3.73*	.01
mSS	10th/SSC	Intermediate	1.95*	.03
	Graduate	PG	-.57*	.04
		Tukey test		
mSV	Intermediate	Post-PG	-1.66*	.03
	Graduate	PG	-.613*	.02
		Post-PG	-1.46*	.03

Note: *. The mean difference is significant at the .05 level; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; mSV – mobile Subscriber Value.

4.10.5.4 Comparison of means in terms of occupation

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the occupation of the respondents (student, employee, self-employee, and others). The descriptive statistics are presented in Table 95. The mean value of QMS for student, employee, self-employee, and others was 63.78 (SD = 10.50), 67.58 (SD = 10.15), 68.05 (SD = 12.18), and 69.24 (SD = 10.38) respectively. Further, the mean score of mSV for student, employee, self-employee, and others was 13.21 (SD = 3.06), 13.83 (SD = 2.95), 14.10 (SD = 3.26), and 15.41 (SD = 2.96) respectively. Furthermore, the mean value of mSS for student, employee, self-employee, and others was 13.16 (SD = 3.01), 13.95 (SD = 2.86), 13.95 (SD = 3.43), and 14.88 (SD = 3.10) respectively. Finally, the mean value of CIS for student, employee, self-employee, and others was 24.20 (SD = 5.60), 25.45 (SD = 5.20), 25.73 (SD = 6.36), and 27.00 (SD = 3.77) respectively.

Table 95
Occupation group statistics for QMS, mSV, mSS and CIS

Construct	Occupation	Mean	SD
QMS	Student	63.78	10.5
	Employed	67.58	10.15
	Self-employed	68.05	12.18
	Others	69.24	10.38
mSV	Student	13.21	3.06
	Employed	13.83	2.95
	Self-employed	14.10	3.26
	Others	15.41	2.96
mSS	Student	13.16	3.01
	Employed	13.95	2.86
	Self-employed	13.95	3.43
	Others	14.88	3.10
CIS	Student	24.20	5.60
	Employed	25.45	5.20
	Self-employed	25.73	6.36
	Others	27.00	3.77

Note: N = 1061 (Student = 571, employee = 410, self-employee = 63, others = 17); QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test of homogeneity of variances indicted that there is an equal variance among student, employee, self-employee, and others (for QMS: F =

.47, p = .70; mSV: F = .33, p = .80; mSS: F = 1.22, p = .30) expect for CIS (F = 2.91, p = .03). Accordingly, the results of one-way ANOVA revealed that quality of mobile services (F = 12.46, p = .00), subscriber value (F = 6.40, p = .00), subscriber satisfaction (F = 7.21, p = .00) and CIS (F = 5.79, p = .00) were significantly different in terms of occupation. Therefore, the results supported for H21d, H22d, H23d and H24d (see Table 112).

Since there is a significant difference of QMS, mSV, mSS and CIS in terms of occupation, post-hoc test was performed to understand which groups were similar and dissimilar. The test of homogeneity of variance revealed that there was an equal variance among the occupational groups for QMS, mSV, and mSS expect CIS. Thus, Tukey and Dunnett T3 tests were performed for an equal and unequal variances respectively. The results of post-hoc tests are presented in Table 96. The results of post-hoc tests revealed that the mean differences between student and employee (MD = -3.79, p = .00), and student and self-employee (MD = -4.26, p = .01) were significant for quality of mobile services. Further, the results indicated that the mean differences between student and employee (MD = -.62, p = .01), and student and others (MD = -2.19, p = .02) were significant for mSV. Furthermore, the results revealed that the mean difference between student and employee (MD = -.78, p = .00) was significant for mSS. Finally, the mean differences between student and employee (MD = -1.26, p = .00), and student and others (MD = -2.80, p = .04) were significant for CIS.

Table 96
Tukey and Dunnett T3 post hoc tests for occupation

Construct	Occupation		Mean Difference (MD)	Sig.
QMS	Student	Employee	-3.79*	.00
		Self-employee	-4.26*	.01
mSV	Student	Employee	-.62*	.01
		Others	-2.19*	.02
mSS	Student	Employee	-.78*	.00
Dunnett T3 test				
CIS	Student	Employee	-1.26*	.00
	Student	Others	-2.80*	.04

Note: *. The mean difference is significant at the .05 level; QMS – Quality of Mobile Services; mSS – mobile Subscriber Satisfaction; mSV – mobile Subscriber Value; CIS – Customer Intention to Stay.

4.10.5.5 Comparison of means in terms of state

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the classification of united Andhra Pradesh into Telangana state (TS) and Andhra Pradesh (AP). The descriptive statistics are presented in Table 97. The mean value of QMS for AP and TS was 65.23 (SD = 10.46) and 66.45 (SD = 11.02) respectively. Further, the mean score of subscriber value for AP and TS was 13.52 (SD = 2.99) and 13.59 (SD = 3.18) respectively. Furthermore, the mean value of mSS for AP and TS was 13.53 (2.97) and 13.57 (SD = 3.08) respectively. Finally, the mean value of CIS for AP and TS was 24.68 (SD = 5.42) and 25.14 (SD = 5.69) respectively.

Table 97
State group Statistics for QMS, mSV, mSS and CIS

	State	Mean	SD
QMS	AP	65.23	10.46
	TS	66.45	11.02
mSV	AP	13.52	3.00
	TS	13.59	3.18
mSS	AP	13.53	2.97
	TS	13.57	3.08
CIS	AP	24.68	5.42
	TS	25.14	5.69

Note: N = 1061 (AP = 744; TS = 317); QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test indicted that there is an equal variance between AP and TS (for QMS: F = .34, p = .56; value: F = 1.26, p = .26; satisfaction: F = .52, p = .47; CIS: F = .52, p = .47). Accordingly, the result of independent sample t-test revealed that there is no significant difference between AP and TS in terms of QMS (t = -1.72, p = .09), mSV (t = -.37, p = .71), mSS (t = -.24, p = .81) and CIS (t = -1.24, p = .22). Therefore, the result did not support for H21e, H22e, H23e and H24e (see Table 111).

4.10.5.6 Comparison of means in terms of regional area

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the regional area of the respondents (rural, semi-urban and urban areas). The descriptive statistics are presented in Table 98. The mean value of QMS for rural, semi-urban and urban areas was 64.71 (SD = 10.44), 65.98 (SD = 11.00), and 65.96 (SD = 10.60) respectively. Further, the mean score of mSV for rural, semi-urban and urban areas was 13.66 (SD = 2.81), 13.44 (SD = 3.17),

and 13.51 (SD = 3.14) respectively. Furthermore, the mean value of mSS for rural, semi-urban and urban areas was 13.47 (SD = 3.02), 13.47 (SD = 3.18), and 13.61 (SD = 2.93) respectively. Finally, the mean value of CIS for rural, semi-urban and urban areas was 24.76 (SD = 5.60), 24.98 (SD = 5.79), and 24.79 (SD = 5.35) respectively.

Table 98
Regional area group Statistics for QMS, CV, CS and CIS

Construct	Area	Mean	SD
QMS	Rural	64.71	10.44
	Semi-urban	65.98	11.00
	Urban	65.96	10.6
mSV	Rural	13.66	2.81
	Semi-urban	13.44	3.17
	Urban	13.51	3.14
mSS	Rural	13.47	3.02
	Semi-urban	13.47	3.18
	Urban	13.61	2.93
CIS	Rural	24.76	5.60
	Semi-urban	24.98	5.79
	Urban	24.79	5.35

Note: N = 1061 (rural = 314, semi-urban = 208, urban = 539); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test of homogeneity of variances indicted that there is an equal variance among rural, semi-urban and urban areas (for QMS: F = .29, p = .75; mSV: F = 2.13, p = .12; mSS: F = .68, p = .51) and CIS (F = 1.77, p = .17). Accordingly, the results of one-way ANOVA revealed that QMS (F = 1.54, p = .22), mSV (F = .38, p = .69), mSS (F = .27, p = .76) and CIS (F = .12, p = .89) were not significantly different in terms of regional area. Therefore, the results did not support for H21f, H22f, H23f and H24f (see Table 112).

4.10.5.7 Comparison of means in terms of mobile technology

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the classification of type of mobile technology into CDMA and GSM. The descriptive statistics are presented in Table 99. The mean value of QMS for CDMA and GSM was 65.46 (SD = 12.38) and 65.59 (SD

= 10.59) respectively. Further, the mean score of mSV for CDMA and GSM was 13.92 (SD = 3.33) and 13.53 (SD = 3.04) respectively. Furthermore, the mean value of mSS for CDMA and GSM was 13.08 (3.65) and 13.55 (SD = 2.99) respectively. Finally, the mean value of CIS for CDMA and GSM was 24.35 (SD = 7.18) and 24.83 (SD = 5.46) respectively.

Table 99
Mobile technology group Statistics for QMS, mSV, mSS and CIS

Construct	Mobile Technology	Mean	SD
QMS	CDMA	65.46	12.38
	GSM	65.60	10.60
mSV	CDMA	13.92	3.33
	GSM	13.53	3.04
mSS	CDMA	13.08	3.65
	GSM	13.55	2.99
CIS	CDMA	24.35	7.18
	GSM	24.83	5.46

Note: N = 1061 (CDMA = 26; GSM = 1035); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test indicted that there is an equal variance between CDMA and GSM (for QMS: F = .82, p = .37; mSV: F = .02, p = .90; mSS: F = 2.35, p = .13; CIS: F = 2.49, p = .11). Accordingly, the result of independent sample t-test revealed that there was no significant difference between CDMA and GSM in terms of QMS (t = -.06, p = .95), mSV (t = .65, p = .52), mSS (t = -.80, p = .43) and CIS (t = -.44, p = .66). Therefore, the result did not support for H21g, H22g, H23g and H24g (see Table 111).

4.6.5.8 Comparison of means in terms of mobile data

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the usage of mobile data (2G, 3G, both and not using). The descriptive statistics are presented in Table 100. The mean value of QMS for 2G, 3G, both and not using was 63.98 (SD = 10.63), 66.86 (SD = 10.83), 66.77 (SD = 10.10) and 66.03 (SD = 10.72) respectively. Further, the mean score of mSV for 2G, 3G, both and not using was 13.41 (SD = 2.94), 13.63 (SD = 3.04), 13.59 (SD = 3.28) and 14.07 (SD = 2.63) respectively. Furthermore, the mean value of mSS for 2G, 3G, both and not using was 13.57 (SD = 3.09), 13.51 (SD = 3.00), 13.48 (SD

= 2.91) and 13.90 (SD = 2.62) respectively. Finally, the mean value of CIS for 2G, 3G, both and not using was 24.49 (SD = 5.56), 25.18 (SD = 5.42), 25.00 (SD = 5.63) and 24.37 (SD = 4.39) respectively.

Table 100
Mobile data group Statistics for QMS, mSV, mSS and CIS

Construct	Mobile data	Mean	SD
QMS	2G	63.98	10.63
	3G	66.86	10.83
	Both	66.77	10.10
	Not using	66.03	10.72
mSV	2G	13.41	2.94
	3G	13.63	3.04
	Both	13.59	3.28
	Not using	14.07	2.63
mSS	2G	13.57	3.09
	3G	13.51	3.00
	Both	13.48	2.91
	Not using	13.9	2.62
CIS	2G	24.49	5.56
	3G	25.18	5.42
	Both	25.00	5.63
	Not using	24.37	4.39

Note: N = 1061 (2G = 451, 3G = 317, both = 263, Not using = 30); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test of homogeneity of variances indicted that there is an equal variance among 2G, 3G, both and not using (for QMS: F = .39, p = .76; mSV: F = 1.10, p = .35; mSS: F = .71, p = .54) and CIS (F = .52, p = .67). Accordingly, the results of one-way ANOVA revealed that there was a significant difference of QMS in terms of mobile data (F = 6.14, p = .00). Therefore, post hoc test was performed to explore which groups have significant mean difference. The results of Tukey test (see Table 101) indicated that 2G was significantly differ with 3G (MD = -2.88, p = .001) and both (MD = -2.79, p = .004). On the other hand, mSV (F = .68, p = .57), mSS (F = .20, p = .90) and CIS (F = 1.18, p = .32) were not significantly different in terms of mobile data. Therefore, the results supported H21h (QMS) and did not support for H22h, H23h and H24h (see Table 112).

Table 101
Mobile data Tukey post hoc test for QMS

Groups		Mean Difference (MD)	Sig.
2G	3G	-2.88*	0.001
	Both	-2.79*	0.004

Note: *. The mean difference is significant at the 0.05 level.

4.10.5.9 Comparison of means in terms of type of mobile phone

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the classification of type of mobile phone into normal phone and smartphone. The descriptive statistics are presented in Table 102. The mean value of QMS for normal phone and smartphone was 6.12 (SD = 10.67) and 64.57 (SD = 10.52) respectively. Further, the mean score of mSV for normal phone and smartphone was 13.47 (SD = 3.06) and 13.67 (SD = 3.02) respectively. Furthermore, the mean value of mSS for normal phone and smartphone was 13.40 (2.97) and 13.81 (SD = 3.06) respectively. Finally, the mean value of CIS for normal phone and smartphone was 24.87 (SD = 5.52) and 24.71 (SD = 5.49) respectively.

Table 102
Type of mobile phone group Statistics for QMS, mSV, mSS and CIS

Construct	mtype	Mean	SD
QMS	Smartphone	66.12	10.67
	Normal phone	64.57	10.52
mSV	Smartphone	13.47	3.06
	Normal phone	13.67	3.03
mSS	Smartphone	13.40	2.97
	Normal phone	13.81	3.06
CIS	Smartphone	24.87	5.52
	Normal phone	24.71	5.49

Note: N = 1061 (smartphone = 702; normal phone = 359); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test indicted that there is an equal variance between normal phone and smartphone (for QMS: F = .01, p = .91; mSV: F = .04, p = .84; mSS: F = .04, p = .85; CIS: F = .25, p = .62). Accordingly, the result of independent sample t-test revealed that there was a significant difference between normal phone and smartphone in terms of QMS (t = 2.25, p = .02) and mSS (t = -2.10, p = .04). On the

other hand, there was no significant difference between normal phone and smartphone in terms of mSV (t = -1.00, p = .32) and CIS (t = .44, p = .66). Therefore, the result supported for H21i, and H23i, and did not support H22i and H24i (see Table 111).

4.10.5.10 Comparison of means in terms of mobile connection

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the classification of type of mobile connection into prepaid and postpaid. The descriptive statistics are presented in Table 103. The mean value of QMS prepaid and postpaid was 65.37 (SD = 10.61) and 67.71 (SD = 10.71) respectively. Further, the mean score of mSV for prepaid and postpaid was 13.50 (SD = 3.10) and 13.88 (SD = 2.57) respectively. Furthermore, the mean value of mSS for prepaid and postpaid was 13.49 (3.05) and 14.02 (SD = 2.52) respectively. Finally, the mean value of CIS for prepaid and postpaid was 24.84 (SD = 5.51) and 24.65 (SD = 5.46) respectively.

Table 103
Mobile connection group Statistics for QMS, mSV, mSS and CIS

Construct	Connection	Mean	SD
QMS	Prepaid	65.37	10.61
	Postpaid	67.72	10.71
mSV	Prepaid	13.51	3.10
	Postpaid	13.88	2.57
mSS	Prepaid	13.49	3.05
	Postpaid	14.02	2.52
CIS	Prepaid	24.84	5.51
	Postpaid	24.65	5.46

Note: N = 1061 (prepaid = 962; postpaid = 99); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test indicted that there is an equal variance between prepaid and postpaid (for QMS: F = .03, p = .86; mSV: F = 3.09, p = .08; CIS: F = .01, p = .94) expect subscriber satisfaction (F = 4.53, p = .03). Accordingly, the result of independent sample t-test revealed that QMS (t = -2.09, p = .04) and mSS (t = -1.95, p = .05) have significant difference between prepaid and postpaid mobile connection. On the other hand, there was no significant difference between prepaid and postpaid in terms of mSV (t = -1.16, p = .25) and CIS (t = .33, p = .74). Therefore, the result supported for H21j, and H23j, and did not support H22j and H24j (see Table 111).

4.10.5.11 Comparison of means in terms of usage of multi-SIM

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the classification of the usage of multi-SIM into single SIM and Dual SIM users. The descriptive statistics are presented in Table 104. The mean value of QMS for single SIM and dual SIM was 65.73 (SD = 10.67) and 65.43 (SD = 10.60) respectively. Further, the mean score of mSV for single SIM and dual SIM was 13.52 (SD = 3.07) and 13.56 (SD = 3.03) respectively. Furthermore, the mean value of mSS for single SIM and dual SIM was 13.48 (2.99) and 13.62 (SD = 3.02) respectively. Finally, the mean value of CIS for single SIM and dual SIM was 24.58 (SD = 5.65) and 25.10 (SD = 5.32) respectively.

The results of Levene's test indicted that there is an equal variance between single SIM and dual SIM (for QMS: F = .02, p = .90; mSV: F = .50, p = .48; mSS: F = .41, p = .52; CIS: F = 3.30, p = .07). Accordingly, the result of independent sample t-test revealed that QMS (t = .47, p = .64), mSV (t = -.22, p = .83), mSS (t = -.77, p = .44) and CIS (t = -1.54, p = .12) have no significant difference between single SIM and dual SIM users. Therefore, the result did not support H21k, H22k, H23k and H24k (see Table 111).

Table 104
Multi-SIM group Statistics for QMS, mSV, mSS and CIS

Construct	Multi-SIM	Mean	SD
QMS	Single	65.73	10.67
	Dual	65.43	10.60
mSV	Single	13.52	3.07
	Dual	13.56	3.03
mSS	Single	13.48	2.99
	Dual	13.62	3.02
CIS	Single	24.58	5.65
	Dual	25.10	5.32

Note: N = 1061 (Single= 579; Dual = 482); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

4.10.5.12 Comparison of means in terms of user group

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the classification of the usage of CUG into no (open user) and yes (closed user). The descriptive statistics are presented in Table

105. The mean value of QMS for open user and closed user was 65.51 (SD = 10.67) and 67.57 (SD = 9.63) respectively. Further, the mean score of mSV for open user and closed user was 13.53 (SD = 3.07) and 13.69 (SD = 2.51) respectively. Furthermore, the mean value of mSS for single open user and closed user was 13.54 (3.03) and 13.55 (SD = 2.31) respectively. Finally, the mean value of CIS for open user and closed user was 24.84 (SD = 5.53) and 24.26 (SD = 4.98) respectively.

Table 105
User group statistics for QMS, mSV, mSS and CIS

Construct	CUG	Mean	SD
QMS	No	65.51	10.67
	Yes	67.57	9.63
mSV	No	13.53	3.07
	Yes	13.69	2.51
mSS	No	13.54	3.03
	Yes	13.55	2.31
CIS	No	24.84	5.53
	Yes	24.26	4.98

Note: N = 1061 (no = 1019; yes = 42); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test indicted that there is an equal variance between single SIM and dual SIM (for QMS: F = .25, p = .62; mSV: F = .87, p = .35; mSS: F = 3.13, p = .08; CIS: F = 1.11, p = .29). Accordingly, the result of independent sample t-test revealed that QMS (t = -1.23, p = .22), mSV (t = -.35, p = .74), mSS (t = -.02, p = .99) and CIS (t = .67, p = .50) have no significant difference in terms of CUG. Therefore, the result did not support for H21l, H22l, H23l and H24l (see Table 111).

4.10.5.13 Comparison of means in terms of purpose of mobile usage

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the purpose of mobile usage (personal, business and both). The descriptive statistics are presented in Table 106. The mean value of QMS for personal, business and both was 65.38 (SD = 10.68), 70.00 (SD = 9.92), and 66.39 (SD = 10.44) respectively. Further, the mean score of mSV for personal, business and both was 13.51 (SD = 3.07), 13.43 (SD = 1.90), and 13.68 (SD = 3.00) respectively. Furthermore, the mean value of mSS for personal, business and both was 13.55 (SD = 3.01), 14.00 (SD = 2.08), and 13.49 (SD = 3.01) respectively.

Finally, the mean value of CIS for personal, business and both was 24.80 (SD = 5.53), 26.00 (SD = 5.00), and 24.87 (SD = 5.45) respectively.

Table 106
Purpose of mobile usage group Statistics for QMS, mSV, mSS and CIS

Construct	Purpose	Mean	SD
QMS	Personal	65.38	10.68
	Business	70	9.92
	Both	66.39	10.44
mSV	Personal	13.51	3.07
	Business	13.43	1.9
	Both	13.68	3
mSS	Personal	13.55	3.01
	Business	14	2.08
	Both	13.49	3.01
CIS	Personal	24.8	5.53
	Business	26	5
	Both	24.87	5.45

Note: N = 1061 (personal = 864, business = 07, both = 190); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test of homogeneity of variances indicted that there is an equal variance among personal, business and both the purposes (for QMS: F = .178, p = .837; mSV: F = 1.21, p = .29; mSS: F = .57, p = .57) and CIS (F = .45, p = .64). Accordingly, the results of one-way ANOVA revealed that QMS (F = 1.30, p = .27), mSV (F = .26, p = .77), mSS (F = .11, p = .90) and CIS (F = .18, p = .84) were not significantly different in terms of the purpose of mobile usage. Therefore, the results did not support H21m, H22m, H23m and H24m (see Table 112).

4.10.5.14 Comparison of means in terms of experience of mobile usage

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the number of years of mobile usage (mExper) into low experience (≤ 5 years) and high experience (> 5 years). The descriptive statistics are presented in Table 107. The mean value of QMS for low mExper and high mExper was 65.51 (SD = 10.67) and 67.57 (SD = 9.63) respectively. Further, the mean score of mSV for low mExper and more mExper was 13.53 (SD = 3.07) and 13.69 (SD = 2.51) respectively. Furthermore, the mean value

of mSS for low mExper and high mExper was 13.54 (3.03) and 13.55 (SD = 2.31) respectively. Finally, the mean value of CIS for less mExper and more mExper was 24.84 (SD = 5.53) and 24.26 (SD = 4.98) respectively.

Table 107
mExper group Statistics for QMS, mSV, mSS and CIS

	mExper	Mean	SD
QMS	Low Experience	63.79	10.68
	High Experience	67.65	10.21
mSV	Low Experience	13.12	3.09
	High Experience	14.02	2.93
mSS	Low Experience	13.16	3.06
	High Experience	13.97	2.88
CIS	Low Experience	24.39	5.67
	High Experience	25.30	5.29

Note: N = 1061 (less experience = 565; more experience = 496); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test indicted that there is an equal variance between low mobile usage experience and high mobile usage experience (for QMS: F = 1.76, p = .18; mSV: F = 1.65, p = .20; CIS: F = 3.47, p = .06) expect for mSS (F = 4.47, p = .03). Accordingly, the result of independent sample t-test revealed that there was a significant difference between low mExper and high mExper in terms of QMS (t = -6.00, p = .00), mSV (t = -4.85, p = .00), mSS (t = -4.40, p = .00) and CIS (t = -2.68, p = .01). Therefore, the results supported for H21n, H22n, H23n and H24n (see Table 111).

4.10.5.15 Comparison of means in terms of usage level of mobile services

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the amount spending per month (usage level) into less usage level (≤ Rs. 300) and more usage level (> Rs. 300). The descriptive statistics are presented in Table 108. The mean value of QMS for less usage and more usage was 65.12 (SD = 10.28) and 66.30 (SD = 11.13) respectively. Further, the mean score of mSV for less usage and more usage was 13.53 (SD = 2.99) and 13.55 (SD = 3.14) respectively. Furthermore, the mean value of mSS for less usage and more usage was 13.58 (2.93) and 13.48 (SD = 3.12) respectively. Finally, the mean value of CIS for less usage and more usage was 24.85 (SD = 5.37) and 24.77 (SD = 5.71) respectively.

Table 108
Usage level of mobile services group Statistics for QMS, CV, CS and CIS

Construct	Usage level	Mean	SD
QMS	Less usage level	65.12	10.28
	More usage level	66.30	11.13
mSV	Less usage level	13.53	2.99
	More usage level	13.55	3.14
mSS	Less usage level	13.58	2.93
	More usage level	13.48	3.12
CIS	Less usage level	24.85	5.37
	More usage level	24.77	5.71

Note: N = 1061 (less usage = 635; more usage = 426); QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

The results of Levene's test indicted that there is an equal variance between single SIM and dual SIM (for QMS: F = 1.91, p = .17; mSV: F = 2.54, p = .11; mSS: F = 1.78, p = .18; CIS: F = 1.85, p = .17). Accordingly, the result of independent sample t-test revealed that QMS (t = 2.54, p = .11), mSV (t = -.12, p = .90), mSS (t = .50, p = .62) and CIS (t = .26, p = .80) have no significant difference in terms of usage level of mobile services. Therefore, the result did not support for H21o, H22o, H23o and H24o (see Table 111).

4.6.5.16 Comparison of means in terms of service provider

Quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay were compared based on the service provider (Airtel, Vodafone, Idea, Reliance, BSNL, Aircel, Tata, and others). The descriptive statistics are presented in Table 109. The mean value of QMS for Airtel, Vodafone, Idea, Reliance, BSNL, Aircel, Tata, and others was 67.67 (SD = 10.34), 66.06 (SD = 9.69), 67.18 (SD = 10.45), 60.82 (SD = 12.28), 63.16 (SD = 10.24), 61.27 (SD = 10.24), 62.78 (SD = 10.15) and 57.56 (SD = 11.98) respectively. Further, the mean score of mSV Airtel, Vodafone, Idea, Reliance, BSNL, Aircel, Tata, and others was 13.35 (SD = 3.24), 13.65 (SD = 2.92), 14.1 (SD = 2.7), 12.82 (SD = 3.2), 13.45 (SD = 3.02), 12.91 (SD = 2.43), 13.18 (SD = 3.20) and 13.94 (SD = 3.12) respectively. Furthermore, the mean value of mSS for Airtel, Vodafone, Idea, Reliance, BSNL, Aircel, Tata, and others was 13.49 (SD = 2.88), 13.72 (SD = 2.87), 14.05 (SD = 2.91), 12.70 (SD =

3.39), 13.30 (SD = 3.03), 12.91 (SD = 2.63), 13.24 (SD = 3.49) and 13.19 (SD = 3.51) respectively.

Table 109
Service provider group Statistics for QMS, mSV, mSS and CIS

Construct	Operator	Frequency	Mean	SD
QMS	Airtel	255	67.67	10.34
	Vodafone	212	66.06	9.69
	Idea	170	67.18	10.45
	Reliance	109	60.82	12.28
	BSNL	92	63.16	10.24
	Aircel	79	61.27	10.24
	Tata	85	62.78	10.15
	Others	59	57.56	11.98
mSV	Airtel	255	13.35	3.24
	Vodafone	212	13.65	2.92
	Idea	170	14.1	2.7
	Reliance	109	12.82	3.2
	BSNL	92	13.45	3.02
	Aircel	79	12.91	2.43
	Tata	85	13.18	3.2
	Others	59	13.94	3.12
mSS	Airtel	255	13.49	2.88
	Vodafone	212	13.72	2.87
	Idea	170	14.05	2.91
	Reliance	109	12.7	3.39
	BSNL	92	13.3	3.03
	Aircel	79	12.91	2.63
	Tata	85	13.24	3.49
	Others	59	13.19	3.51
CIS	Airtel	255	25.47	5.39
	Vodafone	212	24.87	5.45
	Idea	170	25.61	5.32
	Reliance	109	21.61	6.89
	BSNL	92	24.53	5.17
	Aircel	79	22.27	3.38
	Tata	85	23.22	5.37
	Others	59	22.44	6.54

Note: QMS - Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; SD – Standard Deviation.

Finally, the mean value of CIS for Airtel, Vodafone, Idea, Reliance, BSNL, Aircel, Tata, and others was 25.47 (SD = 5.39), 24.87 (SD = 5.45), 25.61 (SD = 5.32), 21.61 (SD = 6.89), 24.53 (SD = 5.17), 22.27 (SD = 3.38), 23.22 (SD = 5.37) and 22.44 (SD = 6.54) respectively.

The results of Levene's test of homogeneity of variances indicted that there was an equal variance among the mobile operators (for QMS: F = .80, p = .59; mSV: F = 1.46, p = .18; mSS: F = 1.31, p = .24) and CIS (F = 1.58, p = .14). Accordingly, the results of one-way ANOVA revealed that QMS (F = 9.39, p = .00) and CIS (F = 5.43, p = .00) were significantly different among the mobile service providers. Therefore, post hoc test was performed to explore which groups have significant mean difference. The results of Tukey test (see Table 110) indicated that quality of mobile services was significantly different between Airtel and Reliance (MD = 6.85, p = .01), BSNL (MD = 4.50, p = .00), Tata (MD = 4.88, p = .00) and others (MD = 10.11, p = .00). Similarly, Vodafone significantly differ with others (MD = 8.51, p = .00). Likewise, Idea significantly differ with Reliance (MD = 6.36, p = .03), BSNL (MD = 4.01, p = .01), Tata (MD = 4.39, p = .03) and others (MD = 9.62, p = .00). The results also indicated that CIS was significantly differ between Airtel and Reliance (MD = 3.87, p = .00), Tata (MD = 2.25, p = .02) and others (MD = 3.03, p = .03). Similarly, Vodafone significantly differ with Reliance (MD = 3.26, p = .04). Finally, Idea significantly differ with Reliance (MD = 3.99, p = .00), Tata (MD = 2.39, p = .02) and others (MD = 3.16, p = .03). On the other hand, mSV (F = 1.81, p = .08) and mSS (F = 1.69, p = .11) were not significantly different in terms of mobile operators. Therefore, the results supported 21p and 24p and did not support 22p and 23p (see Table 112).

Table 110
Service provider Tukey post hoc test for QMS and CIS

Construct	Operator		Mean Difference (MD)	Sig.
QMS	Airtel	Reliance	6.85	**
		BSNL	4.50	***
		Tata	4.88	***
		Others	10.11	***
	Vodafone	Others	8.51	***
	Idea	Reliance	6.36	*
		BSNL	4.01	**
		Tata	4.39	*
		Others	9.62	***
CIS	Airtel	Reliance	3.87	***
		Tata	2.25	*
		Others	3.03	*
	Vodafone	Reliance	3.26	*
	Idea	Reliance	3.99	***
		Tata	2.39	*
		Others	3.16	*

Note: QMS – Quality of Mobile Services; CIS – Customer Intention to Stay; *Significant at .05 level; **Significant at .01 level; ***Significant at .001 level.

This chapter presented the results of the study, i.e., descriptive statistics, assumptions of the study, socio-demographic and usage characteristics of the respondents, mTelQual scale development and validation, mediation analysis, moderation analysis, integrated model of QMS and CIS, evaluation of QMS, MSV, MSS and CIS in AP, TS and India, and comparison of means in terms of demographic, usage characteristics and service providers. The next chapter will provide the detailed discussion of the results, conclustion, implications, limitations of the study and future direction for the research.

Table 111

Independent sample t test for comparing groups

	Quality of Mobile Services (QMS)				Mobile Subscriber Value (mSV)				Mobile Subscriber Satisfaction (mSS)				Customer Intention to Stay (CIS)			
	Levene's test				Levene's test				Levene's test				Levene's test			
Variable	F	Sig.	t	sig.	F	Sig.	t	sig.	F	Sig.	t	sig.	F	Sig.	t	sig.
a. Gender	1.10	.30	-0.75	.45	1.59	.21	-.98	.33	1.08	.30	-.98	.33	.00	.99	-.26	.80
b. Age	4.98	.03	-6.10	***	0.88	.35	-4.36	***	5.12	*	-4.93	***	5.23	*	-3.69	***
e. State	0.34	.56	-1.72	.09	1.26	.26	-.37	.71	0.52	.47	-.24	.81	.52	.47	-1.24	.22
d. mTech	0.82	.37	-0.06	.95	0.02	.90	.65	.52	2.35	.13	-.80	.43	2.49	.11	-.44	.66
i. mType	0.01	.91	2.25	*	0.04	.84	-1.00	.32	0.04	.85	-2.10	*	.25	.62	.44	.66
j. Connection	0.03	.86	-2.09	*	3.09	.08	-1.16	.25	4.53	*	-1.95	*	.01	.94	.33	.74
k. Multi-SIM	0.02	.90	0.47	.64	0.50	.48	-.22	.83	0.41	.52	-.77	.44	3.30	.07	-1.54	.12
l. User group	0.25	.62	-1.23	.22	0.87	.35	-.33	.74	3.13	.08	-.02	.99	1.11	.29	.67	.50
n. mExper	1.76	.18	-6.00	***	1.65	.20	-4.85	***	4.47	*	-4.40	***	3.47	.06	-2.68	**
o. Usage level	1.91	.17	-1.78	.08	2.54	.11	-.12	.90	1.78	.18	.50	.62	1.85	.17	.26	.80

Note: *Significant at .05 level; **Significant at .01 level; ***Significant at .001 level; mTech – mobile technology, mType – mobile type; mExper – mobile usage experience

Table 112

ANOVA (one-way) results for comparing groups

	c. Education		d. Occupation		f. Area		h. Mobile data		m. Purpose of mobile usage		p. Service provider	
Variable	**F**	**Sig.**	**F**	**Sig.**	**F**	**Sig.**	**F**	**Sig.**	**F**	**Sig.**	**F**	**Sig.**
QMS	4.38	.00	12.46	.00	1.54	.22	6.14	.00	1.30	0.27	9.39	.00
mSV	4.66	.00	6.40	.00	0.38	.69	0.68	.57	0.26	0.77	1.81	.08
mSS	4.27	.00	7.21	.00	0.27	.76	0.20	.90	0.11	0.90	1.69	.11
CIS	2.01	.09	5.79	.00	0.12	.89	1.18	.32	0.18	0.84	5.43	.00

Note: ***Significant at .001 level; QMS – Quality of Mobile Services; mSV – mobile Subscriber Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay.

CHAPTER V

DISCUSSION AND CONCLUSION

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DISCUSSION AND CONCLUSION

The major objective of this study is to examine the structural relationship between quality of mobile services and customer intention to stay. This study is the first one to explore the underlying dimensionality of quality of mobile services by developing a measurement scale mTelQual and conceptualizing customer retention from the customer perspective i.e., customer intention to stay in India.

One of the specific purpose of the study is to develop and validate a mobile telephone service quality scale - mTelQual in Indian context. This study contributes to the body of the knowledge by establishing the reliability and validity of the scale items which can be used for assessing quality of mobile services. The subscribers' view point related to the assessment of quality of mobile services offered by Indian mobile telecom service providers gives an edge to this study, as there is limited understanding of customer perspective considered in the literature. The analysis carried out for purification of the measurement scale (mTelQual) and the statistical analysis provides the rigor to the study. The study developed mTelQual in the Indian context with a sample size of 547 and examined its reliability (construct reliability) and validity (content, convergent, discriminant, nomological, construct and predictive). Further, the mTelQual was re-examined to check its reliability and validity with a large sample size (1061) in the context of united Andhra Pradesh. The results indicated that the mTelQual has achieved all the psychometric properties in terms of its reliability and validity in both contexts. Thus, mTelQual is a robust scale for measuring quality of mobile services in Indian context. Therefore, mTelQual is a multi-dimensional scale, which consists of four dimensions related to network aspects and customer care aspects. The four dimensions identified and validated are - network service, data service, customer care service and accessibility. After the rigorous exploratory and confirmatory factor analysis, the purified scale of 19 items obtained, can be considered as a reliable and valid scale for the subsequent analysis. The study which captures the view point of subscribers can open up new avenues for practitioners to improve quality of mobile services.

Another specific purpose of the study is to conceptualize customer retention as customer intention to stay. In the literature, customer retention was conceptualized

from company's perspective i.e., how a company can retain its customers. It can be possible either by switching barrier or customer relationship. If the company has control over the market, then the switching barrier is more appropriate strategy to retain its customers. On the other hand, customer relationship is more suitable strategy to retain customers. Indian mobile operators have no control over the market and the subscribers have flexibility to switch from one operator to another. In this context, customer retention can be achieved by relationship perspective with superior service delivery. Mobile service sector is highly homogeneous, competitive and regulated by the government, therefore, customer retention has been viewed as customer perspective in this study. The study attempted to measure customer retention by combining both relationship and favourable behavioural intentions perspectivies. It is conceptualized as customer intention to stay based on "*behavioural consequences of service quality*" (Zeithaml et al., 1996), "*theory of reasoned action*" (Ajzen, & Fishbein, 1977; Ajzen, & Fishbein, 1980) and "*customer retention as a relationship problem*" (Wilson, Soni & O'Keeffe, 1995).

The study also aimed to test the relative effect of mTelQual dimensions (network service, data service, customer care service and accessibility) on overall Quality of Mobile Services (overall QMS), Mobile Subscriber Value (mSV), Mobile Subscriber Satisfaction (mSS), overall subscriber satisfaction and Customer Intention to Stay (CIS). Further, the study tested the mediation effect (serial, parallel and combined) of mSV and mSS on the relationship between QMS and CIS. Furthermore, the study examined the moderation effect of price, expectations of mobile subscribers, and demographic, technical and functional variables on the relationship between QMS and CIS. Finally, the study evaluated the service quality, value, satisfaction and CIS in the contexts of united Andhra Pradesh and India.

5.1 Socio-demographic and usage characteristics of mobile subscribers

This section explains the socio-demographic and usage characteristics of mobile subscribers in India and united AP. The valid sample size was 547 and 1061 for India and united AP respectively. Indian sample size was used to develop and validate the scales and measurement models. The same scales and models were re-examined and studied using united AP sample. Therefore, the study has done multi-level

investigation for accurate results. The description of the sample profiles are given as follows.

5.1.1 Socio-demographic and usage characteristics of mobile subscribers (India)

The sample consisted of 27% female and 73% male. Most of the respondents were in the age group of 31 to 45 years (43%) followed by 21 to 30 years (40%) and 46 years and above (15%). The lowest age group of the respondents was under 20 years (02 percent). Majority of the respondents qualified post-PG (50%) followed by PG (41%) and Graduate (8%). Employees were the major respondents (63%) in the sample followed by students (27%). The majority of the respondents were from urban region (75%) followed by semi-urban (14%) and rural (11%). Also, the sample consisted of highest proportion of mobile subscribers from the telecom circle B (40%) followed by circle A (36%). The lowest proportion of the respondents were form metro circle (10%).

The sample consisted of 11% CDMA and 89% GSM users. Most of the respondents were spending a monthly expenditure on mobile services less than or equal to ₹. 300 (68%) followed by an expenditure between ₹. 301 to ₹. 600 (36%). Majority of the respondents were prepaid subscribers (69%) followed by postpaid (31%). The mobile data usage of the sample was more for 2G (32%) followed by 3G (23%) and both 2G and 3G (22%). There were 23% of the respondents who were not using the data services. Majority of the respondents were using a smartphone (65%) followed by normal phone (35%) in the chosen sample.

The sample consisted of highest proportion of Airtel subscribers (31%) followed by Vodafone (18%), Idea (14%) and BSNL (19%). The sample included lowest proportion of Aircel (03 percent) subscribers. The operator proportions were slightly higher than the market share proportion for Airtel and BSNL. The samples were proportionate to the subscriber base in terms of telecom circle. The operator proportion was slightly different from the initial quota, and circle wise quota was similar to the initial quota

5.1.2 Socio-demographic and usage characteristics of mobile subscribers (united Andhra Pradesh)

The sample consisted of 43 % female and 57 % male. Most of the respondents were in the age group of 21 to 30 years (58%) followed by under 20 years (24%). The lowest among the sample were the age group of the respondents 46 years and above (3%). The sample dominated by youth (age less than 23 years) by 56%. Majority of the respondents qualified PG (47%) followed by Graduation (37%). Students were the major respondents (53%) in the sample followed by employees (39%). The majority of the respondents were from urban region (51%) followed by rural (30%) and semi-urban (19%).

The sample consisted of 3 percent CDMA and 97 % GSM users. Most of the respondents were spending monthly expenditure on mobile services less than or equal to ₹. 300 (60%) followed by between ₹. 301 to ₹. 600 (27%). The sample was dominated by the respondents (60%) who were spending less than or equal to ₹. 300 per month for mobile services. Majority of the respondents were prepaid subscribers (91%) followed by postpaid (9%). The mobile data usage of the sample was more for 2G (42%) followed by 3G (30%) and both 2G and 3G (25%). There were only 3 percent of the respondents who were not using the data services. Majority of the respondents were using smartphone (66%) followed by normal phone (34%) in the sample. The sample consisted 45% of the dual SIM. CUG users who were included in the sample are 4%. The majority of the respondents in the sample were using mobile phone for personal use (81%) followed by for both (personal and business) purposes 18%. The sample was dominated by the respondents (53%) who were having less experience of mobile usage (less than or equal to 5 years).

The sample consisted of highest proportion of Airtel subscribers (24%) followed by Vodafone (20%), Idea (16%) and Reliance (10%). The sample included lowest proportion of other mobile subscribers (06 percent). The other operators included Loop, Videocon, Telewings, Sistema, MTNL, and Quadrant. The sample proportion was in proportion to the market share of the mobile operators. The sample proportion was highest for urban area (51%) followed by rural area (30%) and semi-urban (19%). The proportion of operator and regions were similar to the initial quota.

5.3 Results of hypotheses testing

Table 113
Summary of results of hypotheses testing

Purpose	Hypotheses	Results
To validate mTelQual dimensions with 2nd order construct quality of mobile services	1. Each dimension of mTelQual has a significant positive relationship with Quality of Mobile Services (QMS).	Supported
	1a. Network Service (NS) has a significant positive relationship with QMS.	Supported
	1b. Data Service (DS) has a significant positive relationship with QMS.	Supported
	1c. Customer Care Service (CCS) has a significant positive relationship QMS.	Supported
	1d. Accessibility (Acc) has a significant positive relationship with QMS.	Supported
To examine the relative effect of mTelQual dimensions on OQMS, mSV, mSS, OSS and CIS, and mTelQual dimensions, OQMS, mSV, mSS, and OSS on CIS	2. Each dimension of mTelQual has a significant positive effect on Overall Quality of Mobile Services (OQMS).	Supported
	2a. NS has a significant positive effect on OQMS.	Supported
	2b. DS has a significant positive effect on OQMS.	Supported
	2c. CCS has a significant positive effect on OQMS.	Supported
	2d. Acc has a significant positive effect on OQMS.	Supported
	3. Each dimension of mTelQual has a significant positive effect on Mobile Subscriber Value (mSV)	Supported
	3a. NS has a significant positive effect on mSV.	Supported
	3b. DS has a significant positive effect on mSV.	Supported
	3c. CCS has a significant positive effect on mSV.	Supported
	3d. Acc has a significant positive effect on mSV.	Supported
	4. Each dimension of mTelQual has a significant positive effect on Mobile Subscriber Satisfaction (mSS).	Supported
	4a. NS has a significant positive effect on mSS.	Supported
	4b. DS has a significant positive effect on mSS.	Supported

	4c. CCS has a significant positive effect on mSS.	Supported
	4d. Acc has a significant positive effect on mSS.	Supported
	5. Each dimension of mTelQual has a significant positive effect on Overall Mobile Subscriber Satisfaction (OmSS)	Supported
	5a. NS has a significant positive effect on OmSS.	Supported
	5b. DS has a significant positive effect on OmSS.	Not Supported
	5c. CCS has a significant positive effect on OmSS.	Supported
	5d. Acc has a significant positive effect on OmSS.	Supported
	6. Each dimension of mTelQual has a significant positive effect on Customer Intention to Stay (CIS).	Supported
	6a. NS has a significant positive effect on CIS.	Supported
	6b. DS has a significant positive effect on CIS.	Supported
	6c. CCS has a significant positive effect on CIS.	Supported
	6d. Acc has a significant positive effect on CIS.	Supported
To test the structural relationship and to examine mediation role of mSV and mSS between QMS and CIS	7. Quality of mobile services has a significant positive (structural) relationship with customer intention to stay.	Supported
	8. Quality of mobile services has a significant direct positive effect on CIS.	Supported
	9. There is a significant positive direct effect of quality of mobile services on mobile subscriber value.	Supported
	10. Mobile subscriber value has a significant positive direct effect on mobile subscriber satisfaction.	Supported
	11. There is a significant positive direct effect of mobile subscriber satisfaction on customer intention to stay.	Supported
	12. Mobile subscriber value has a significant positive direct effect on CIS	Supported
	13. Mobile service value and subscriber satisfaction have serial mediation effect on the relationship between quality of mobile services and customer intention to stay.	Supported
	14. Mobile service value and subscriber satisfaction have parallel mediation effect on the relationship between quality of mobile services and customer intention to stay.	Supported

	15. Mobile service value and subscriber satisfaction have both serial and parallel mediation effect on the relationship between quality of mobile services and customer intention to stay.	Supported
To examine the moderation effect of demographic, technical and functional variables, price and expectations between the relationship QMS and CIS	16. The relationship between quality of mobile services and customer intention to stay is moderated by demographic variables of mobile subscribers (a. gender, b. age, c. education, d. occupation).	Partially supported (a and c not supported)
	17. The relationship between quality of mobile services and customer intention to stay is moderated by technical variable of mobile services (a. mobile technology, b. mobile data, and c. type of mobile phone).	Not supported
	18. The relationship between quality of mobile services and customer intention to stay is moderated by functional variables of mobile services (a. type of mobile connection, b. multi-SIM, c. user group, d. purpose of mobile usage, e. experience of mobile usage, f. usage level of mobile services).	Partially supported (no support for a, b, and f)
	19. Expectations of mobile subscribers moderate the relationship between quality of mobile services and customer intention to stay.	Supported
	20. Price of mobile services moderates the relationship between quality of mobile services and customer intention to stay.	Supported
To test the significant difference of QMS, mSV, mSS and CIS in terms of demographic, technical and functional variables	21. Quality of mobile services significantly differ in terms of demographic variables of mobile subscribers (a. gender, b. age, c. education, d. occupation, e. state, f. regional area, g. mobile technology, h. mobile data, i. type of mobile phone, j. type of mobile connection, k. multi-SIM, l. user group, m. purpose of mobile usage, n. experience of mobile usage, o. usage level of mobile services and p. service provider).	Partially supported (no support for a, e, f, g, k, l, m and o)
	22. Mobile subscriber value significantly differ in terms of technical variable of mobile services (a. gender, b. age, c. education, d. occupation, e. state, f. regional area, g. mobile technology, h. mobile data, i. type of mobile phone, j. type of mobile connection, k. multi-SIM, l. user group, m. purpose of mobile usage, n. experience of mobile usage, o. usage level of mobile services and p. service provider).	Partially supported (no support for a, e, f, g, h, i, j, k, l, m, o and p)
	23. Mobile subscriber satisfaction significantly differ in terms of functional variables of mobile services (a. gender, b. age, c. education, d. occupation, e. state, f. regional area, g. mobile technology, h. mobile data, i. type of mobile phone, j. type of mobile connection, k. multi-	Partially supported (no support for a, e, f, g, h, k, l, m, o

	SIM, l. user group, m. purpose of mobile usage, n. experience of mobile usage, o. usage level of mobile services and p. service provider).	and p)
24.	Customer intention to stay significantly differ in terms of functional variables of mobile services (a. gender, b. age, c. education, d. occupation, e. state, f. regional area, g. mobile technology, h. mobile data, i. type of mobile phone, j. type of mobile connection, k. multi-SIM, l. user group, m. purpose of mobile usage, n. experience of mobile usage, o. usage level of mobile services and p. service provider).	Partially supported (no support for a, c, e, f, g, h, i, j, k, l, m, and o)

Note: QMS – Quality of Mobile Services; NS – Network Service; DS – Data Service; CCS – Customer Care Service; Acc – Accessibility; mSV – mobile Service Value; mSS – mobile Subscriber Satisfaction; CIS – Customer Intention to Stay; OQMS – Overall Quality of Mobile Services; OmSS – Overall mobile Subscriber Satisfaction.

5.4 Dimensions of mTelQual

The scale mTelQual was developed and validated in Indian context, further it was re-examined in the context of united AP with a large sample size. The scale also tested for psychometric properties and it passed all the reliability and validity tests. Thus, mTelQual is a robust measurement scale for assessing the quality of mobile telephone services. It is found that mTelQual is a multi-dimensional scale which included four dimensions – network service, data service, customer care service and accessibility.

- **Network service:** This dimension covers the network aspects of Quality of Mobile Services (QMS) which consists of 7 manifest variables as follows: network coverage, signal strength, connectivity, voice clarity, reliable network, message delivery, and coverage in roaming.
- **Data service:** This dimension deals with the aspects of mobile data which consists of 3 manifest variables as follows: speed of 2G, speed of 3G and up-to date advanced applications.
- **Customer care service:** This dimension provides the customer service aspects which consists of 6 manifest variables as follows: executive's attentiveness to listen, helpful to get necessary services, quick service, knowledgeable, clear information, and resolve most of the complaints.
- **Accessibility**: This dimension accounts for the convenience aspects of mobile services which consists of 3 manifest variables as follows: easy ways to recharge/pay bills, different support systems and easy ways to access mobile services needed.

The results of second-order CFA for mTelQual revealed that each dimension of mTelQual is positively correlated with quality of mobile services. Therefore, quality of mobile services is a multi-dimensional construct which includes network service, data service, customer care service and accessibility.

5.5 Relative effect of mTelQual dimensions, mSV, mSS on CIS

The results of multiple regression analysis revealed that each dimension of mTelQual significantly effects overall QMS, Mobile Subscriber Value (mSV), Mobile Subscriber Satisfaction (mSS), overall mSS and Customer Intention to Stay (CIS). It

was found that data service has no significant effect on overall mSS. The results of hierarchical multiple regression analysis revealed that the total contribution of all the above constructs carry 60.1% of variance to CIS. It was found that QMS alone explained 43.3% of the variance to CIS. Network service and data services are the major dimensions of mTelQual which are consistently significant in the model in the presence of all the constructs. Further, it was found that QMS, mSS, and mSV are the key drivers of CIS. This results is in line with the study conducted by Gustafsson, Johnson, & Roos, (2005). Thus, it is evident that quality of mobile services is important to retain the mobile subscribers by achieving mobile subscriber value and subscriber satisfaction.

5.5 Mediation analysis

The study examined the structural relationship between QMS and CIS in the presence of mediating variables (mSV and mSS). Based on the theoretical support, the study developed a serial mediation model, parallel mediation model and a combined (both serial and parallel) model. The measurement model was tested for its reliability and validity in both the contexts i.e., India and united AP and found that the model is fit for further analysis. The results of the measurement models revealed that QMS, mSV, mSS and CIS have a significant positive relationship, all these constructs were reliable and valid for the study. The results of mediation models are discussed as follows.

5.5.1 Serial mediation effect

The results revealed that QMS and CIS have a significant structural relationship and QMS has a significant positive direct effect on mSV and CIS. Also, mSV has a direct significant positive effect on mSS which in turn has a direct significant effect on CIS. The bootstrap results revealed that mSV partially mediates the relationship between QMS and mSS, and mSS partially mediates the relationship between mSV and CIS. Since, both direct and indirect effects are significant, it is found that mSV and mSS have partial serial mediation effect on the relationship between QMS and CIS. The total direct and indirect effect of QMS on CIS are .49 and .084 respectively. The direct effect of QMS on CIS (.58 in the direct model) is decreased to .49 in the serial

mediation model. The total variance of CIS improved from 33% (in the direct model) to 47% (serial mediation model).

5.5.2 Parallel mediation effect

In the next step, the study examined the parallel mediation effect of mSV and mSS between QMS on CIS. Similar to the results of serial mediation model, all the paths were significant in parallel mediation also. All the direct effects and indirect effects were significant. The results revealed that mSV and mSS partially mediates the relationship between QMS and CIS respectively. Since, both direct and indirect effects were significant and based on the results of bootstrap, it was found that both mSV and mSS parallelly have partial mediation effect on the relationship between QMS and CIS. The indirect effect of QMS on CIS is more through mSS (.086) than through mSV (.067). The direct effect of QMS on CIS (.58 in the direct model) decreased to .45 in the parallel mediation model. The total variance of CIS improved from 33% (in the direct model) to 46% (parallel mediation model). Thus, mSV and mSS have parallel mediation effect between QMS and CIS.

5.5.3 Both Serial and parallel mediation effects

In the next step, the study examined the combined (both serial and parallel) mediation effect of mSV and mSS on the relationship between QMS and CIS. Similar to previous results, all the paths were significant in combined mediation model also. All the direct effects and indirect effects were significant. The results revealed that mSV and mSS partially mediates the relationship between QMS and CIS respectively. Since, both direct and indirect effects were significant and based on the results of bootstrap, it was found that both mSV and mSS have partially combined (both serial and parallel) mediation effect on the relationship between QMS and CIS. It was found that both mSV and mSS have partial mediation effect on the relationship between QMS and CIS respectively. The indirect effect of QMS on CIS was found to be more through mSV (.544) than through mSS (.027). The direct effect of QMS on CIS (.58 in the direct model) decreased to .45 in the combined mediation model also. The total variance of CIS improved from 33% (in the direct model) to 47% (parallel mediation model). Thus, the model has both serial and parallel mediation effects on the relationship between QMS and CIS.

5.6 Moderation analysis

The study examined the structural relationship between QMS and CIS with 15 moderating variables which were classified as follows:

- Demographic - a. gender (female and male), b. age (youth and adulthood), c. education (intermediate, graduate, PG and post-PG), d. occupation (Student, employee and self-employee)
- Usage characteristics of mobile services
    - Technical - a. mobile technology (CDMA and GSM), b. mobile data (2G, 3G and Both 2G and 3G), and c. type of mobile phone (normal phone and smartphone).
    - Functional - a. type of mobile connection (prepaid and postpaid), b. multi-SIM (single SIM and Dual SIM), c. user group (CUG and non-CUG), d. purpose of mobile usage (personal and business), e. experience of mobile usage (less experience and high experience), f. usage level of mobile services (low usage and high usage).
- Price of mobile services and
- Expectations of mobile subscribers.

The results of moderation analysis revealed that age and occupation moderate the relationship between QMS and CIS. It was found that age and occupation have significant moderation effect on the relationship in demographics. Further, it was found that technical variables have no moderation effect on the relationship. Finally, mobile usage experience, purpose of mobile usage and user group have moderating effect on the relationship between QMS and CIS.

The age of the respondents was classified as youth and adulthood based on the median age (23 years) of the sample. It was found that the strength of the relationship is stronger for youth than adulthood and also, the relationship is stronger for self-employees followed by employees and students in the demographics.

The strength of the relationship was stronger for single user than closed user (CUG). Similarly, users of mobile phone for the business purpose are strengthening the relationship between QMS and CIS. Finally, the relationship was stronger for low

mobile experience than high mobile experience. Therefore, length of mobile usage negatively moderates the relationship between QMS and CIS in functional characteristics.

The results also revealed that both price and expectations individually have moderation effect, and price has more moderation effect than the expectations on the relationship between QMS and CIS.

5.7 Integrated model of quality of mobile services and customer intention to stay

The study also examined the structural relationship between QMS and CIS by incorporating moderation effect of both price and expectations in the combined mediation model. The results revealed that mSV has no significant effect on CIS in the presence of moderating variables. All the direct and indirect paths were significant except mSV. Quality of mobile services has a direct positive effect on mSV, mSS and CIS. It implied that parallel mediation was not significant in the model. It was found that mSS partially mediating the relationship between QMS and CIS. This result supported the model ("mediator model of customer satisfaction") developed by Dabholkar, Shepherd & Thorpe, (2000) in pictorial directory industry. On the other hand, this result contradicted with a study conducted by Olorunniwo & Hsu, (2006) which proved that customer satisfaction fully mediates the relationship between service quality and behavioural intentions in service typology. The total variance of CIS improved from 47% (in the combined mediation model) to 51% in the presence of moderating variables (price and expectations). Thus, the study found that only serial mediation was significant in the integrated model as shown in Figure 28.

Thus, the study found that mobile subscriber value and subscriber satisfaction have partial serial mediation effect on the relationship between quality of mobile services and customer intention to stay. It was found that QMS has stronger direct effect on mSV followed by CIS and indirect effect on mSS. Further, it was found that mSV has stronger effect on mSS. Furthermore, QMS has stronger total effect (both direct and indirect) on CIS followed by mSV and mSS. This result is in line with the study conducted by Baker & Crompton, (2000) which proved that "perceived performance quality has a stronger total effect on behavioural intentions than satisfaction" in

tourism industry. The study results also supported the model ("*behavioural consequences of service quality*") developed by Zeithaml, Berry, Parasuraman, (1996) in retail chain, automobile insurance and life insurance industries. Also, it was found that mSV has significant indirect effect on CIS. The study results were consistent with the existing studies in various service sectors, indicating that the operational measures of the study were reliable and valid.

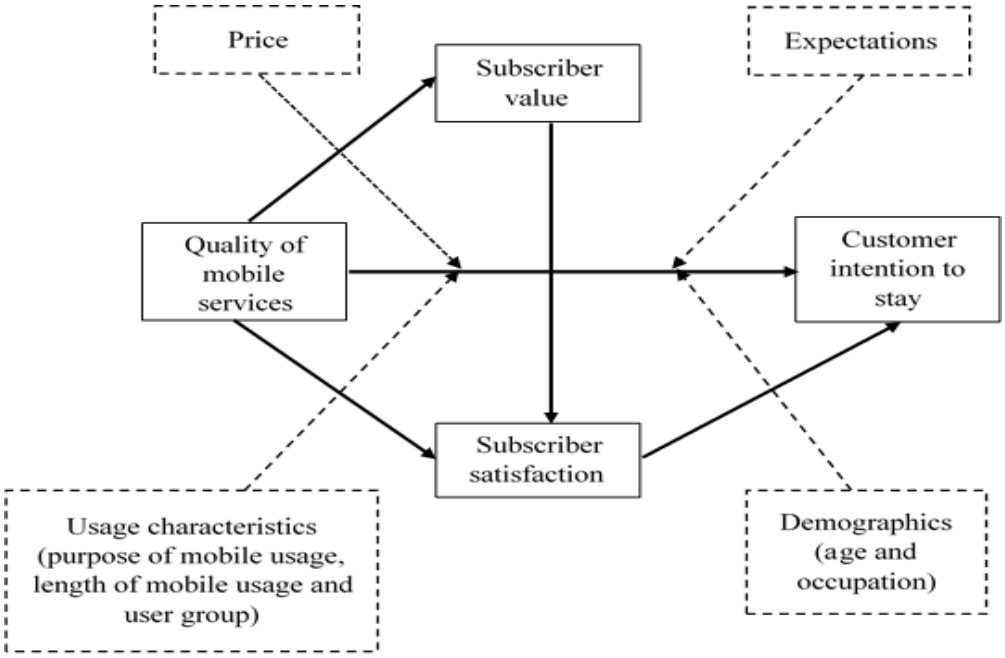

Figure 28 Integrated model of QMS and CIS

Finally, price, expectations, usage characteristics (purpose of mobile usage, length of mobile usage and user group) and demographics (age and occupation) moderate the relationship between quality of mobile service and customer intention to stay. Based on the results, the integrated model of the study is shown in Figure 28.

5.7 Evaluation of QMS, mSV, mSS and CIS in India and united AP

The study also evaluated the quality of mobile services (QMS), mobile subscriber value (mSV), mobile subscriber satisfaction (mSS) and customer intention to stay (CIS) in the context of AP, Telangana state (TS) and India. The study found that the level of QMS is 68.66%, 69.95% and 72.51% in AP, TS and India respectively. Further, the level of mSS was 67.65%, 67.85% and 85.9% in AP, TS and India respectively. Furthermore, the level of CIS was 70.51%, 71.83% and 72.51% in AP, TS and India respectively. The study revealed that Quality of mobile services,

subscriber satisfaction and customer intention to stay are comparatively high in India followed by TS and AP respectively. Also, the study found that 75.4% of the respondents were reported that they would like to stay with the present mobile network operator in united AP.

The study also revealed that QMS was comparatively high in the telecom circle B followed by circle A, Metro circle and circle C. Also, mSS was high in the circle B followed by metro circle, circle A and circle C. Finally, CIS was high in the circle B followed by circle B, C and metro circle. The study found that 82.6% of the respondents reported that they would like to stay with the present mobile network operator in India.

The study found that QMS was significantly different in terms of age (youth and adulthood), type of mobile phone (normal and smartphone), mobile connection (prepaid and postpaid), length of mobile usage (less experience and more experience), mobile data (2G, 3G and Both), education (Intermediate, graduate, PG and post-PG) and service provider (Airtel, Vodafone, Idea, Reliance, BSNL, Aircel, Tata and others). The study also found that QMS has no difference in terms of gender (female and male), state (Andhra Pradesh and Telangana), regional area (rural, semi-urban and urban), mobile technology (CDMA and GSM), multi-SIM (single SIM and dual SIM), user group (CUG and single user), purpose of mobile usage (personal, business and both) and usage level of mobile services in the context of united AP.

Further, the study indicated that mSV was significantly different in terms of age, length of usage, education and occupation. The study also found that mSV has no difference in terms of gender, state, regional area, mobile technology, mobile data, type of mobile phone, mobile connection, multi-SIM, user group, purpose of mobile usage, usage level of mobile services and service provider.

Furthermore, the study revealed that mSS was significantly different in terms of age, type of mobile phone, mobile connection, experience of mobile usage, education and occupation. The study also found that mSS has no difference in terms of gender, state,

regional area, mobile technology, mobile data, multi-SIM, user group, purpose of mobile usage, usage level of mobile services and service provider.

Finally, CIS was significantly different in terms of age, length of mobile usage, occupation and service provider. The study also found that CIS has no difference in terms of gender, education, state, regional area, mobile technology, mobile data, type of mobile phone, mobile connection, multi-SIM, user group, purpose of mobile usage and usage level of mobile services.

5.8 Practical implications

The study has following practical implications.

- Mobile operators could measure quality of mobile services using mTelQual. The score ranged from 19 to 95. Higher score indicates the higher quality.
- Each dimension of mTelQual (network service, data service, customer care service and accessibility) has direct significant effect on overall QMS, subscriber value, subscriber satisfaction, overall satisfaction (except data service) and customer intention to stay. Thus, the dimensions of mTelQual play a major role to improve quality of services. Thus, the operators could improve quality of mobile services through these four dimensions.
- Customer intention to stay will develop over a period of time based on quality of services particularly through network service and data service dimensions. Therefore, the operators could focus more on quality by improving network and data services.
- The relationship between quality of mobile services (QMS) and customer intention to stay (CIS) was strongly moderated by price. Therefore, the operators could develop an affordable tariff rates to avail mobile services particularly for mobile data.
- The relationship between QMS and CIS was strongly mediated by value and satisfaction in serial. Therefore, the operators could focus on value driven services which leads to subscriber satisfaction to enhance the relationship.
- The relationship between QMS and CIS was stronger for youth, self-employees, single user (non-CUG), business purpose of usage, less experience

in using mobile phone. Accordingly, the operators can segment the market to retain their subscribers with a focus on improving quality.

- Based on the integrated model of QMS and CIS the mobile operators could formulate competitive strategies to enhance quality with a focus on retaining the present subscribers and attracting the new.
- The mobile operators could enhance subscriber service delivery by offering consistent mobile network and data services to access mobile value added services (MVAS).

5.9 Theoretical implications

- The scale mTelQual is a robust scale for measuring quality of mobile services in Indian context. This is the first scale in India to measure the quality of mobile telephone services. Thus, mTelQual is a major contribution to the existing body of knowledge in services marketing.
- Quality of mobile services is a multi-dimensional construct which can be reflected in four dimensions: network service, data service, customer care service and accessibility.
- Customer retention can be conceptualized as customer intention to stay from the perspective of favorable behavioral intentions.
- Customer value and customer satisfaction have partial serial mediation effect between the relationship quality of mobile services and customer intention to stay. Parallel mediation effect of mSV and mSS was not there on the relationship between QMS and CIS.
- Price, customer expectations, demographics (age and occupation), and usage characteristics (purpose of mobile usage, length of mobile usage and user group) moderated the relationship between service quality and customer retention.
- The study implied that service quality has more direct effect on customer intention to stay than customer satisfaction in case of technology-based services where technology plays a major role than human interface in service delivery.

5.10 Conclusion

Based on the theoretical support, results of the data analysis and discussion, the study conclude as follows.

- The mTelQual is a robust scale for measuring quality of mobile services in Indian context. It is a 19 item scale with four dimensions: network service, data service, customer care service and accessibility.
- Each dimension of mTelQual has a positive relationship with quality of mobile services. Also, each dimension has a significant effect on overall quality of mobile services (QMS), mobile subscriber value (mSV), mobile subscriber satisfaction (mSS), overall mSS, customer intention to stay (CIS).
- Network service, data service, overall QMS, mSV, mSS, and overall mSS are the key drivers of customer intention to stay.
- QMS has a structural relationship positively with CIS and it has a significant positive direct effect on CIS.
- Mobile subscriber satisfaction partially mediates the relationship between QMS and CIS. Also, both mSV and mSS have partial serial mediation effect, no parallel mediation effect on the relationship between QMS and CIS.
- The relationship between QMS and CIS is strongly moderated by price, expectations of mobile subscribers, age, occupation, purpose of mobile usage, length of mobile usage and user group.
- QMS significantly differ in terms of age, type of mobile phone, mobile connection, experience of mobile usage, mobile data, education, and service provider.
- Mobile subscriber value significantly differ in terms of age, length of usage, education and occupation.
- Mobile subscriber satisfaction significantly differ in terms of age, type of mobile phone, mobile connection, length of mobile usage, education and occupation.
- CIS significantly differ in terms of age, length of mobile usage, occupation and service provider.

5.11 Contribution of the study

- Exploring the dimensions of quality of mobile services i.e., network service, data service, customer care service and accessibility.
- Developing and validating a robust measurement scale mTelQual in the mobile telephone service sector. This is the first study which has developed and validated the scale for measuring quality of mobile services in Indian context.
- Conceptualization of customer retention as customer intention to stay from the perspective of favorable behavioral intentions.
- Exploring mediation effects of mobile subscriber value and mobile subscriber satisfaction as a serial mediation effect.
- Exploring moderation effects of price, expectations of mobile subscribers, demographics (age and occupation) and usage characteristics (purpose of mobile usage, length of mobile usage and user group) of mobile services on the relationship between quality of mobile services and customer intention to stay.
- The study examined reliability and validity of the models at two stages i.e., India and united AP. The models were initially developed and validated in Indian context and the same were re-examined in the context of united AP. Thus, results of the study are valid and they can be generalizable.

5.12 Limitations of the study and directions for the future research

- The study adopted quota and purposive sampling methods which are non-random and there may be a chance of sampling bias. Therefore, future study can adopt random sampling methods for further validating the study results.
- This study was done in a single time due to cost and time constraints. Longitudinal studies are more important to understand the behaviour of mobile subscribers. Thus, future study can adopt longitudinal approach.
- The study was dominated by GSM prepaid mobile subscribers, therefore, these results cannot be generalizable to CDMA prepaid and postpaid, and GSM postpaid subscribers. Therefore, future study can be conducted by focusing

only CDMA mobile subscribers or only GSM postpaid subscribers or only postpaid subscribers of both CDMA and GSM.

- The sample of the study was mostly from urban area, therefore, the future study can focus only semi-urban and/or rural areas.
- The study was limited to inter-relationships among quality of mobile services, subscriber value, subscriber satisfaction and customer intention to stay. Therefore, future study can add other related constructs like corporate image in the model.
- The study was limited to positive aspects of mobile services i.e., the factors that influence customer intention to stay. Therefore, the future study can focus on negative aspects of mobile services i.e., the factors that influence switching behaviour.
- The study developed and validated mTelQual in Indian context and re-examined the same in the context of united AP with a large sample size. Even though, the mTelQual is robust in nature by fulfilling all the psychometric properties the future study can be tested the scale for further validation in other parts of the country.
- The integrated model of QMS and CIS can be tested further by adding mediating and moderating variables like income, marital status, customer trust etc. in the future study.
- The measurement of QMS is a reflective construct in this study. Thus, any future study can measure the QMS as a reflective – formative or formative – formative construct.

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APPENDICIES

Appendix - I

SCALES

	mTelQual (a scale for quality of mobile telephone services)
N1	My mobile network provides sufficient coverage in the locations required for me
N2	My mobile network provides consistent signal strength
N3	Call connectivity is good for my mobile network
N4	My mobile network offers undisturbed voice clarity during my calls.
N5	My mobile network is always dependable (reliable network)
N6	My mobile network coverage is good in other states (in Roaming)
N7	My mobile network provides good message services
D1	Mobile network speed is comparatively good (for 2G Internet based applications).
D2	Mobile network speed is comparatively good (for 3G Internet based applications).
D3	My mobile network is up-to date to access latest advanced mobile applications
C1	Customer care executives are attentive to listen me.
C2	Customer care executives are very helpful to provide me necessary services.
C3	Customer care executives offer quick services to me
C4	Customer care executives are knowledgeable to answer my queries.
C5	Customer care executives give clear information to me.
C6	Most of my complaints are resolved by the customer executives.
A1	My network operator provides easy ways to recharge my mobile (*Prepaid users*) /to pay bills (postpaid users). (e.g., Online recharge, online payment)
A2	My network service provider has different customer support systems (toll free numbers, outlets, websites, etc.).
A3	My network operator provides easy ways to active or deactivate any service when I need.

	Scale for Customer Intention to Stay (CIS)
CIS1	My present mobile network operator has earned my trust—I feel that I can trust the operator completely.
CIS2	I say positive things about my network operator to other people
CIS3	I recommend my present network operator to those who seek my advice about such matters.
CIS4	My present network operator is my first preference when I need mobile services
CIS5	I would like to strengthen my relationship with the present mobile network operator.
CIS6	Pay a higher price than competitors charge for the benefits I currently receive from my mobile network operator.
CIS7	My present network has a strong network coverage compared to other network operators.

Scale for Expectations of mobile subscribers (mExp)	
Ex1	Speed of mobile data/internet/VAS and other services
Ex2	Social media/internet based applications (with free voice calls, video calls/Multimedia files)
Ex3	Consistent Network across all geographical locations (rural /urban areas, Indoor/outdoor etc.)
Ex4	Customer care services (e.g., Speed of resolving technical problems, customer complaints)
Ex5	Special packages for unlimited internet/mobile data at a reasonable price
Ex6	Quality of mobile services (superior services than any other competitor)
Ex7	Value for money

Scale for mobile Subscriber Value (mSV)	
V1	My mobile network operator always delivers superior service.
V2	It is economical to use the services of my mobile network operator.
V3	The overall value I receive from the network operator is worth my time, money, and efforts.
V4	Overall, the service I receive from the network operator is valuable compared with other operators.

Scale for mobile Subscriber Satisfaction (mSS)	
S1	I am satisfied with my mobile network (e.g., coverage)
S2	I am satisfied with my operator's tariffs (price structure)
S3	I am satisfied with my operator's customer care services
S4	I am satisfied with my operator's complaint handling
OS5	Overall, I am satisfied with my mobile network operator

Scale for tariffs (price)	
P1	Mobile network operator offers reasonable price schedules that meets my needs
P2	Mobile network operator has transparent price structure

Appendix - II

SURVEY INSTRUMENT

Suresh Kandulapati, Scholar
Prof. B. Raja Shekhar, Supervisor

School of Management Studies,
University of Hyderabad.

Quality of mobile service providers i.e., Network operators (e.g., Airtel, BSNL etc.)

Dear Sir/Madam, The purpose of this survey is to examine the structural relationship between quality of mobile services and customer intention to stay. The questionnaire is designed to collect data which will be used purely for the academic (Doctoral Research) purpose. Please mark own personal feelings about the statements below that best describes the quality of mobile services, price, perceived value, satisfaction, intention to stay, and expectations. There are no right or wrong answers.

Section A: Quality of mobile services
Direction: For each of the following statements, please circle the number which best reflects your opinion of such service. The opinion survey scale ranges from 1 to 5.
1-Strongly Disagree 2-Disagree 3-Neither-nor 4-Agree 5-Strongly Agree.

Please rate PRESENT Mobile Network operator (most preferred network in case of dual SIM user)

Item	Description	Response
N1	My mobile network provides sufficient coverage in the locations required for me	1 2 3 4 5
N2	My mobile network provides consistent signal strength	1 2 3 4 5
N3	Call connectivity is good for my mobile network	1 2 3 4 5
N4	My mobile network offers undisturbed voice clarity during my calls.	1 2 3 4 5
N5	My mobile network is always dependable (reliable network)	1 2 3 4 5
N6	My mobile network coverage is good in other states (in Roaming)	1 2 3 4 5
N7	My mobile network provides good message services	1 2 3 4 5
N8	Premature termination of calls (sudden call drop) is low for my mobile network.	1 2 3 4 5
D1	Mobile network speed is comparatively good (for 2G Internet based applications).	1 2 3 4 5
D2	Mobile network speed is comparatively good (for 3G Internet based applications).	1 2 3 4 5
D3	My mobile network is up-to date to access latest advanced mobile applications	1 2 3 4 5
ON12	Overall, the performance of my mobile network is comparatively good.	1 2 3 4 5
A1	My network operator provides easy ways to recharge my mobile (*Prepaid users*) /to pay bills (postpaid users). (e.g., Online recharge, online payment)	1 2 3 4 5
A2	My network service provider has different customer support systems (toll free numbers, outlets, websites, etc.).	1 2 3 4 5
A3	My network operator provides easy ways to active or deactivate	1 2 3 4 5

	any service when I need.	
A4	My network operator is flexible enough for lodging complaints/queries.	1 2 3 4 5
OA5	Overall, my network operator provides flexibility to access any mobile services that I require.	1 2 3 4 5
C1	Customer care executives are attentive to listen me.	1 2 3 4 5
C2	Customer care executives are very helpful to provide me necessary services.	1 2 3 4 5
C3	Customer care executives offer quick services to me	1 2 3 4 5
C4	Customer care executives are knowledgeable to answer my queries.	1 2 3 4 5
C5	Customer care executives give clear information to me.	1 2 3 4 5
C6	Most of my complaints are resolved by the customer executives.	1 2 3 4 5
C7	Customer care executives are very eager to help me.	1 2 3 4 5
C8	I feel assured that service requests are duly follow-up by the mobile network operator.	1 2 3 4 5
C9	My mobile network operator provides accurate billing (for *POSTPAID users*) or My mobile network operator deducts amount accurately (for PREPAID users)**.**	1 2 3 4 5
C10	My mobile network operator says apology for the inconvenience caused to me and pay compensation. (e.g., Extra talk time/discount on bill/free minutes, free SMS offer etc.)	1 2 3 4 5
C11	Customer care executives are attentive to my calls at my mobile network operator's call center.	1 2 3 4 5
C12	Customer care executives continually attempt to understand what I say.	1 2 3 4 5
C13	Customer care executives offer relevant information to the questions I ask.	1 2 3 4 5
C14	Customer care executives are consistently friendly and polite with me.	1 2 3 4 5
C15	The waiting time to get a service is very low when I need service from the executives.	1 2 3 4 5
C16	Waiting time on call on hold is low when calling customer care number.	1 2 3 4 5
OC17	Overall, my experience with customer care services of my mobile network operator is pleasant.	1 2 3 4 5
OQMS	Please rate **overall service quality** of present mobile network operator Very poor **1 2 3 4 5 6 7 8 9 10** Excellent	

Section B: Price, value and satisfaction

Direction: The following statements are related to your feelings about the price, value of services and satisfaction. Please circle the appropriate number.

1-Strongly Disagree 2-Disagree 3-Neither-nor 4-Agree 5-Strongly Agree.

Item	Description	Opinion
P1	Mobile network operator offers reasonable price schedules that meets my needs	1 2 3 4 5
P2	Mobile network operator has transparent price structure	1 2 3 4 5
V1	My mobile network operator always delivers superior service.	1 2 3 4 5
V2	It is economical to use the services of my mobile network operator.	1 2 3 4 5

V3	The overall value I receive from the network operator is worth my time, money, and efforts.	1 2 3 4 5
V4	Overall, the service I receive from the network operator is valuable compared with other operators.	1 2 3 4 5
S1	I am satisfied with my mobile network (e.g., coverage)	1 2 3 4 5
S2	I am satisfied with my operator's tariffs (price structure)	1 2 3 4 5
S3	I am satisfied with my operator's customer care services	1 2 3 4 5
S4	I am satisfied with my operator's complaint handling	1 2 3 4 5
	Please rate **overall satisfaction** with present mobile network operator	
OS5	Very dissatisfied **1 2 3 4 5 6 7 8 9 10** Very satisfied	

Section C: Customer intention to stay and expectations of mobile subscribers

Direction: The following statements are related to your intention to stay with Please circle the appropriate number. 1-Strongly Disagree 2-Disagree 3-Neither-nor 4-Agree

5-Strongly Agree. Also, the importance of certain attributes of mobile services listed, please indicated how much they are important to you. 1-Not at all important 2-Slightly important 3-Moderately important 4-Important 5-Very important.

Item	Description	Opinion
CIS1	My present mobile network operator has earned my trust—I feel that I can trust the operator completely.	1 2 3 4 5
CIS2	I say positive things about my network operator to other people	1 2 3 4 5
CIS3	I recommend my present network operator to those who seek my advice about such matters.	1 2 3 4 5
CIS4	My present network operator is my first preference when I need mobile services	1 2 3 4 5
CIS5	I would like to strengthen my relationship with the present mobile network operator.	1 2 3 4 5
CIS6	Pay a higher price than competitors charge for the benefits I currently receive from my mobile network operator.	1 2 3 4 5
CIS7	My present network has a strong network coverage compared to other network operators.	1 2 3 4 5
CIS8	My network operator is the operator that takes the best care of its customers.	1 2 3 4 5
CIS9	I use my present network operator's services as regularly as I do now	1 2 3 4 5
CIS10	It pays off economically to be a customer of my present network operator.	1 2 3 4 5
CIS11	Continue to use my present mobile network operator if its prices increase somewhat.	1 2 3 4 5
CIS12	I take pleasure in being a customer of the present mobile operator	1 2 3 4 5
CIS13	There would be some real costs for me to stop using my present mobile network operator as a marketing option (economic loss/monetary	1 2 3 4 5

	cost/psychological burden etc.).	
CIS14	The probability to switch to another mobile network in the long-run (after 5 years) is low.	1 2 3 4 5

Rating scale for following statements: 1-Not at all important 2-Slightly important 3-Moderately important 4-Important 5-Very important

Ex1	Speed of mobile data/internet/VAS and other services	1 2 3 4 5
Ex2	Social media/internet based applications (with free voice calls, video calls/Multimedia files)	1 2 3 4 5
Ex3	Consistent Network across all geographical locations (rural /urban areas, Indoor/outdoor etc.)	1 2 3 4 5
Ex4	Customer care services (e.g., Speed of resolving technical problems, customer complaints)	1 2 3 4 5
Ex5	Special packages for unlimited internet/mobile data at a reasonable price	1 2 3 4 5
Ex6	Quality of mobile services (superior services than any other competitor)	1 2 3 4 5
Ex7	Value for money	1 2 3 4 5
Ex8	How far quality of mobile services is more important to me than price/tariffs	1 2 3 4 5
Ex9	Up-to-date mobile technology (e.g., 4G)	1 2 3 4 5
Ex10	Modern mobile applications (M-Banking, M-Shopping, Booking tickets, etc.)	1 2 3 4 5

Section D: Profile of the respondent and usage characteristics

1. Age: …….	**12**. Qualification: 10^{th}/SSC□ 10+2/Inter□ UG□ PG□ M. Phil/Ph.D. □
2. Gender: Female□ Male□	
3. Residence area: Rural□ Semi-Urban□ Urban□	**13.** Occupation: Student/Scholar□ Employed□ Self-employed □ Others □
4. State:…….. (e.g., AP)	
5. Mobile technology: GSM□ CDMA□	**14.** Using mobile phone since: ……. (which Year)
6. Type of mobile: Smartphone□ Non-smart phone□	**15.** My first mobile network: …… (e.g., Airtel)
7. Mobile Internet: 3G□ 2G□ Both□ not using □	**16.** My present mobile network: (e.g., Idea) ……
8. Mobile connection: Prepaid□ Postpaid□	**17.** Using present network since: (which Year) ……..
9. Purpose of using mobile: Personal□ Business□ Both□	**18.** Why did I change first network to present network?
10. Dual SIM user: Yes□ No□ SIM 1: SIM 2: (eg, Airtel, Idea)	

11. CUG Connection: Yes□ No□	**19.** Average monthly bill/spending: Amount ₹. ……...

Like to change present mobile network**:** Yes□ No□ **Reason:**
In what circumstances, do I change my mobile network? (Please write possible reasons)
What would be my possible reasons for staying with the same mobile network?
Any suggestions/observations/comments for improving quality of mobile service providers.
Name: Location: E-Mail ID: Mobile No.

Thanking you so much for your time and support. Contact me at
hcu.ksuresh@gmail.com

Development of a Measurement Scale for Assessing the Quality of Mobile Services in India: Subscribers' Perspective

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Abstract

The study seeks to present the results of pilot testing aimed at conceptualizing and developing a measurement scale for assessing the quality of mobile services in India. Field research is conducted by administering a structured questionnaire to fulfil the stated purpose. Network aspects and customer care aspects are measured from the variables identified in the literature. The pilot testing of the scale is performed through exploratory and confirmatory factor analysis; reliability and validity analysis using SPSS and Amos statistical packages. The results of the study indicate that operational measures developed for measurement scale satisfy the criteria for multi-dimensionality, reliability and validity.

Keywords

Service quality, Mobile services, Measurement scale, Indian telecom

Introduction

Mobile service providers play a major role in giving subscribers access to the latest advanced applications which make their life simpler than ever before. The service providers are expected to offer a consistent and reliable network with strong customer care support systems.

The objective of the study, therefore is *to develop and validate a measurement scale for assessing the quality of mobile services offered by mobile telephone service providers exclusively from the subscribers' viewpoint.*

Theoretical background

The term 'service quality' is a multi-dimensional construct. It can be defined as 'the overall evaluation of a specific service firm that results from comparing that firm's performance with the customers' general expectation of performance of firms in that industry.' (Parasuraman, Zeithaml, and Berry, 1988). The review of the literature shows

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that most of the previous studies adopted and modified the SERVQUAL scale developed by Parasuraman, et al., (1988) in the context of mobile telephone services. Few studies are focused on the major aspects such as network quality, call quality, transmission quality, customer service, value-added services, billing, and pricing issues as applicable to the sector.

Research approach

This study has taken SERVQUAL (Parasuraman, et al. 1988) as a theoretical basis for assessment of the quality of mobile telephone services in India. As already stated, SERVQUAL predominantly examines the service quality from two perspectives, i.e., customer expectations and customer-perceived service performance of the service providers. This study adopted performance-based measure of service quality (SERVPERF) model as suggested by Cronin and Taylor, 1992. The study reviewed many scholarly articles in both the international and national contexts for identifying attributes of mobile telephone service quality. The dimensions of mobile service quality generated from this analysis are:

Network aspects:

- Network performance
- Accessibility

Customer care aspects:

- Customer service
- Complaint handling

These four dimensions have been taken as four constructs for developing the measurement scale. For pilot testing of the questionnaire and scale items, a sample size of 132 has been chosen. Reliability and validity tests have been performed for scale purification. Internal consistency and reliability have been examined through Cronbach's alpha. Content or face validity has been established through expert reviews, and construct validity has been examined through factor analysis (Hair, Black, Babin, Anderson, and Tatham, 2006).

Summary of the results

The results of confirmatory factor analysis are shown in Table 1 and Table 2. The chi-square statistic ($\chi^2 = 186.91$, df = 146, $\chi^2/df = 1.28$) shows the overall fit. The majority of the standardized loading estimates are more than 0.7 thresholds (Hair, et al., 2006) which indicates item reliability. The construct reliability for each dimension ranges from 0.89 to 0.95. Therefore, the scale has construct validity (Gerbing and Anderson, 1988; Hair, et al., 2006). The model fit summary indicates the overall fit (see Table 2). The results in Table 1 show that the average variance extracted (AVE) is greater than the squared correlations for each pair of constructs. It shows discriminant validity (Fornell and Larcker, 1981). The correlations between each pair of constructs are significant, and it indicates that the scale has nomological validity. Overall, the results supported for adequate fit, reliability, and validity of the scale. Thus, the scale is reliable and valid for measuring quality of mobile telephone services.

Table 2: Model fit summary of the scale

		Absolute fit indices			Incremental fit indices				Parsimony fit indices	
χ^{2*}	df	χ^2/ df	GFI	RMSEA	NFI	TLI	CFI	RFI	AGFI	PNFI
186.91	146	1.280	0.874	0.046	0.825	0.947	0.954	0.795	0.836	0.704

Note: *p = 0.013; df-degrees of freedom, GFI-Goodness of fit, RMSEA-Root mean square error of approximation; NFI-Normed fit index; RFI-Relative fit index, TLI-Tucker-Lewis index, AGFI-Adjusted goodness of fit; PNFI-Parsimonious normed fit index.

Discussion and conclusion

This study aimed to develop a measurement scale for assessing the quality of mobile services in India. The study contributes to the knowledge base by establishing the reliability and validity of the scale items which can be used for measuring quality of mobile services. The subscribers' view point related to the assessment of quality of mobile services offered by Indian telecom service providers gives an edge to this study, as there is limited understanding of customer perspective considered in the literature.

The analysis carried out for purification of the measurement scale and the statistical analysis provides rigour to the study. Thus, the scale for measuring the quality of mobile services is a multi-dimensional scale, which consists of four dimensions related to network aspects and customer care aspects. The four dimensions identified and validated are: network performance, customer service, accessibility, and complaint handling. After rigorous exploratory and confirmatory factor analysis, the scale of 19 items can be considered as a reliable and valid scale for the subsequent analysis.

The study has been conducted from the customers' point of view. The validated scale can be applied to a large sample data collection. Confirmatory factor analysis can be carried out using structural equation modelling (SEM) for further validation of the scale. This paper reports the results of the pilot study of measurement scale development, reliability and validity. The study can prove valuable for mobile telephony service providers who want to improve the quality of their mobile services.

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Publications in Journals

1. Kandulapati, S., & Bellamkonda, R. S. (2014). E-service quality: a study of online shoppers in India. *American Journal of Business*, *29*(2), 178-188. (Emerald publishers)
2. Kandulapati, S., & Bellamkonda, R. S. (2014). Examining the structural relationships of service recovery, customer satisfaction and image in online retailing. *Operations and Supply Chain Management*, *7*(2), 70-78.

Publications in Conference proceedings

1. Kandulapati, S., & Bellamkonda, R. S. (2014). Development of a measurement scale for assessing the quality of mobile services in India: subscribers' perspective. *Conference proceedings of the Second PAN-IIM World Management Conference, Indian Institute of Management Kozhikode (IIMK)*, 1-4 (Emerald publishers).
2. Kandulapati, S., & Bellamkonda, R. S. (2014). Impact of service quality on customer satisfaction: A study of mobile subscribers in Hyderabad. Trends in Management Research. *Doctoral Research Conference proceedings by Institute of Management, Nirma University, Ahmedabad* (ISBN: 978-81-923049-2-2).
3. Kandulapati, S., & Bellamkonda, R. S. (2014). Key determinants of customer satisfaction: A study of mobile subscribers in India. *Changing Global Economic Perspectives. International conference proceedings by Jaipuria Institute of Management, Ghaziabad* (ISBN: 978-93-8326-307-3).
4. Kandulapati, S., & Bellamkonda, R. S. (2013). Service Quality of Mobile Telephone Services in AP. *Innovations in service quality management. National conference proceedings by Chaitanya Bharathi Institute of Technology, Hyderabad*, (ISBN: 978-81-907052-9-5).

Appendix – IV

CONFERENCE PAPERS

1. Kandulapati, S., & Bellamkonda, R. S. (2015). "*Examining the inter-relationships among quality of mobile services, satisfaction, value and loyalty: a study of mediation analysis*" in the Doctoral Research Conference in Management (ANVESH – 2015), organized by Institute of Management, Nirma University, Ahmedabad during 3rd and 4th of April, 2015.
2. Kandulapati, S., & Bellamkonda, R. S. (2015). "*Examining the mediation role of satisfaction on the relationship between perceived quality and behavioral intentions of mobile subscribers*" in the international conference on Evidence Based Management (ICEBM – 2015), organized by Birla Institute of Technology & Science (BITS), Pilani during 20th and 21st of March, 2015.
3. Kandulapati, S., & Bellamkonda, R. S. (2015). "*A study of subscriber's intention to stay with a cellular operator in India*" in the 2nd international conference INNOSERVE - 2015, organized by ITM University, Gwalior during 13th and 15th of January 2015.
4. Kandulapati, S., & Bellamkonda, R. S. (2014). "*Development of a measurement scale for assessing the quality of mobile services: Subscribers' perspective*" in the 2nd PAN IIM World Management Conference 2014, organized by Indian Institute of Management Kozhikode (IIMK) during 5th and 8th of November, 2014.
5. Kandulapati, S., & Bellamkonda, R. S. (2014). "*Impact of network and customer care aspects on overall mobile telephone service quality: A comparative study of rural and urban subscribers*" in the XLRI Doctoral Colloquium 2014, organized by Xavier School of Management, XLRI, Jamshedpur during 18th and 19th of October, 2014.
6. Kandulapati, S., & Bellamkonda, R. S. (2014). "*Impact of service quality on customer satisfaction: A study of mobile subscribers in Hyderabad*" in the Doctoral Research Conference in Management, organized by Institute of Management (ANVESH – 2014), Nirma University, Ahmedabad during 11th and 12th of April, 2014.

7. Kandulapati, S., & Bellamkonda, R. S. (2014). "*Key determinants of customer satisfaction: A study of mobile subscribers in India*" in the International Conference on Changing Global Economic Perspectives: Managing Sustained and Inclusive Growth by Jaipuria Institute of Management, Ghaziabad during 08th and 09th of February, 2014.
8. Kandulapati, S., & Bellamkonda, R. S. (2013). "*E-Service Recovery: A study on e-tailing in India*" in 7th ISDSI and 5th OSCM the International Conference organized by ISDSI at International Management Institute (IMI), New Delhi, during 28th and 30th of December, 2013.
9. Kandulapati, S., & Bellamkonda, R. S. (2013). "*A measurement scale for Indian mobile telephone services: linking service quality and customer retention*" in the 7th IIMA Doctoral Colloquium by Indian Institute of Management, Ahmedabad during 09th and 10th of December, 2013.
10. Kandulapati, S., & Bellamkonda, R. S. (2013). "*Mobile Service Quality: using multivariate analysis*", Two Day National Seminar on Multivariate Analysis for Management Research, organized by Department of Business Management, Osmania University, Hyderabad during 14th and 15th of September, 2013.
11. Kandulapati, S., & Bellamkonda, R. S. (2013). "*Service Quality of Mobile Telephone Services in AP"* in National Conference on Innovations in Services Quality Management organized by Chaitanya Bharathi Institute of Technology, Hyderabad held during 31th of January and 1st of February, 2013.
12. Kandulapati, S., & Bellamkonda, R. S. (2013). "*Critical factors of Mobile Service Quality*" in the AICTE sponsored two day International Conference on Consumer Dynamics and Marketing Strategies in the Globalized Economic Era – Perspectives and Challenges organized by, GRIET, Hyderabad during 29th and 30th of October, 2013.
13. Kandulapati, S. (2012). "*An emerging business of Digital Marketing in Asia: The role of Internet"* in International Conference on Business Opportunities in Emerging Asia organized by Acharya Bengalore B School held at SRILANKA during 22th and 23rd of August, 2012.

Appendix – V

WORKSHOPS

1. Attended ***Prof. Joseph F. Hair's two days workshop*** on "Partial Least Squares Structural Equation Modelling (**PLS-SEM**)" organized by ITM University, Gwalior during 15th and 16h of January, 2015.
2. Attended 6th 7 day National workshop on "Research Methodology for Management and Statistical Analysis using IBM SPSS Statistics 22.0" organized by ITM University, Gwalior during 8th and 14th of December, 2014.
3. Attended 3rd IIMA summer school workshop on "Qualitative Research Methods" organized by Indian Institute of Management, Ahmedabad during 2nd and 7th of June, 2014.
4. Attended ***Prof. A. Parasuraman's workshop*** titled "*Achieving Competitive Superiority through Service Excellence and Customer – Centric Technology*" held on 6th January, 2014 organized by K. J. Somaiya Institute of Management Studies & Research, Mumbai.
5. Attended the ten day "Research Methodology Course in Social Sciences for Ph.D. Research Scholars" organized by Indian Council of Social Science Research, Southern Regional Centre (ICSSR-SRC) in association with PVP Siddhartha Institute of Technology, Vijayawada during 03rd and 12th of September, 2013.
6. Participated 21 days Refresher Course on Research Methodology (Social Sciences) conducted by UGC-Academic Staff College, University of Hyderabad during 23rd May and 12th of June, 2013.
7. Attended 2nd IIMA summer school workshop on "Multivariate Analysis" organized by Indian Institute of Management, Ahmedabad during 6th and 11th of May, 2013.
8. Attended one-day Doctoral workshop and participated in the 6th IIMA Doctoral Colloquium organized by Indian Institute of Management, Ahmedabad during 7th and 9th of January, 2013.

9. Participated in "Building Efficient Retail Supply Chain" Biennial Supply Chain Management Conference 2012 organized by Indian Institute of Management, Bangalore (IIMB) during 14th and 15th of December 2012.
10. Attended a workshop on "*Advanced Structural Equation Modeling***"** organized by Center for Management Development, IBS Hyderabad during 6th and 7th of December, 2012.
11. Attended a workshop on "*Quantitative Research Methods for Publications***"** organized by IBS Hyderabad during 9th and 10th of November, 2012.
12. Attended a workshop on "Data Analysis using Advanced Excel and Advanced SPSS" organized by RK Business School, Hyderabad 3rd January, 2015.