EFFECT OF SERVICE QUALITY ON CUSTOMER SATISFACTION IN PHARMACEUTICAL SUPPLY CHAIN: A STUDY OF A MAJOR INDIAN PHARMACEUTICAL COMPANY

A thesis submitted during May, 2015 to the University of Hyderabad in partial fulfillment of the award of a

DOCTOR OF PHILOSOPHY

In

MANAGEMENT

By

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DECLARATION

I, Uma Maheswari Devi P, hereby declare that the thesis entitled, “Effect of Service Quality on Customer Satisfaction in Pharmaceutical Supply Chain-A Study of A Major Indian Pharmaceutical Company”, submitted by me under the guidance and research 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 Institution 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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Uma Maheswari Devi

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ABBREVIATIONS

AMOS	Analysis of Moment Structures
AGFI	Adjusted Goodness of Fit Index
AVE	Average Variance Extracted
CFI	Comparative Fit Index
CR	Construct Reliability
CAGR	Compound Annual Growth Rate
DiPSQ	Distributor Perceived Service Quality
DPSQ	Doctor Perceived Service Quality
EFA	Exploratory Factor Analysis
ERP	Enterprise Resource Planning
GFI	Goodness of Fit Index
GOF	Goodness of Fit Index
IT	Information Technology
NFI	Normed Fit Index
PNFI	Parsimony Normed Fit Index
PR	Parsimony Ratio
PPSQ	Pharmacist Perceived Service Quality
RFI	Relative Fit Index
RMR	Route Mean Square Residual
RMSEA	Route Mean Square Error of Approximation
SPSS	Statistical Package for Social Sciences
SPMR	Standardized Root Mean Residual
SEM	Structural Equation Modelling
SMC	Squared Multiple Correlations
SCM	Supply Chain Management
SCOR	Supply chain Operations References Model
TLI	Tucker Lewis Index
WHO	World Health Organisation

ABSTRACT

In the current competitive environment induced by globalisation and advancement in technology, service quality became a powerful strategic weapon in any industry. The goal of every company is to provide customer service that is not just the best, but legendary and pharmaceutical industry is no exception to this. Though extensive research has been done in service quality in service industries but very few are focussed on service aspects in the supply chain. In this scenario we made an attempt to examine the service quality at different interfaces of the pharmaceutical supply chain where anything less than 100 percent customer service is not acceptable in this sector as it has direct effect on the health of the people.

The primary objective of this study is to identify the critical factors effecting service quality at different phases – (Manufacturer-Distributor, Distributor-Retailer, Retailer-Consumer and Manufacturer-Doctor Interface) of the Pharmaceutical supply chain, to confirm and test the Customer Perceived Service Quality variables and to examine the relationships between Customer Perceived Service Quality and Satisfaction.

"Quality in a service or product is not what you put into it. It is what the client or customer gets out of it." – Peter Drucker.

"*The customer's perception is your reality*" -(Kate Zabriskie) .

Quality is actually judged by the customer,hence the perceptions of manufacturers, distributors, chemists, doctors and consumers at each phase of the suppychain was considered to examine the service quality in the pharmaceutical supply chain.

The widely used service quality measurement scale (SERVQUAL) was modified and refined to the pharmaceutical context to identify the factors influencing service quality at different phases of the supply chain.The confirmatory factor analysis was used to test and confirm the measurement models.The models were further tested for reliability and validity.

Our study identified that "Service Quality is a major contributor to Customer Satisfaction". The indirect effects of Service Quality on Loyalty (doctor prescribing behaviour) through satisfaction were also examined using Structural Equation Modeling.Thus this research provides an empirical evaluation of relationship between service quality and satisfaction at different phases of the pharmaceutical supplychain.

CHAPTER-I

1.1: INTRODUCTION

Pharmaceutical industry is distinctive from other industries in various ways. It plays a vital role in maintaining the health of people. Unlike other goods and services, access to health care services is often considered as an individual right.One of the best way for good health and avoiding costly treatments and repeated visits to hospitals is through Pioneering drugs. Every extra dollar paid on innovative medicines saves $4.44 on hospitalizations (PhRMA, 2004) and almost 40 percent of the two-year gain in life expectancy was achieved in 52 countries during 1986 and 2000 is due to new drugs (PhRMA, 2004).Logistics in the Pharmaceutical Industry is precarious for providing the right medicine to the accurate patient at the exact time, place and dosage and most significantly at the correct price.

CII Institute of Logistics mentioned the importance of proficient logistics for the pharmaceutical space with two facts: - (i) If the Drugs get delayed by one day to reach the market it costs the companies about $1 million. (ii)Logistics costs shares 45 - 55 percent amidst additional costs in pharmaceutical supply chain. Forrester Research calculates that each day delay for a $1 billion drug costs the manufacturer $2.74 million per day in lost sales. These logistics and supply chain challenges faced by the pharmaceutical sector in India represent a very clear and definitive improvement opportunity for this sector and country at large. The pharmaceutical industry is macro-economically placed as the fastest growing sectors with a CAGR of 12 percent since the last five years. Thus India’s share in the global pharmaceutical market can be accelerated if the required state-of-the-art logistics infrastructure is available in India. But the Pharmaceutical industry in India has not fully exploited their supply chains because of its profitable heritage and low cost of goods and the only strategy they adopt is linking all problems with intern inventory. Because of these causes many of the internal issues are not being appropriately addressed in the pharmaceutical supply chain. Thus, there is an urgent need to provide more supply chain solutions as it poses much superior intricacies owing to matters like timeliness, expiry, storage and distribution. The regularity and good condition decide the worth and significance of the medicines. Therefore, an extremely subtle pharmaceutical supply chain is necessary to protect the health of the people.

1.1.1: Service Quality in Pharmaceutical Supply Chain:

The Pharmaceutical Supply Chain is the means by which prescribed medicines are distributed to patients. Drugs are created at manufacturing spots, transported to wholesalers, stored at retail outlets, distributed by druggist's and eventually provided to end consumers.(Fig:1) There are various changes in this elementary structure, as the performers in the chain are regularly evolving, and viable relations differ noticeably by location, kind of drug and other factors (The Health Strategies Consultancy (LLC), 2008). The Products of the drug industry are very different compared to other sectors. Hence, this industry's primary dynamic forces are distinctive, resulting in strategic and operational variances with the rest of the market. So quality of service provided in supply chain plays a very important part in effecting performance, hence effective management of the quality of service can address these issues.

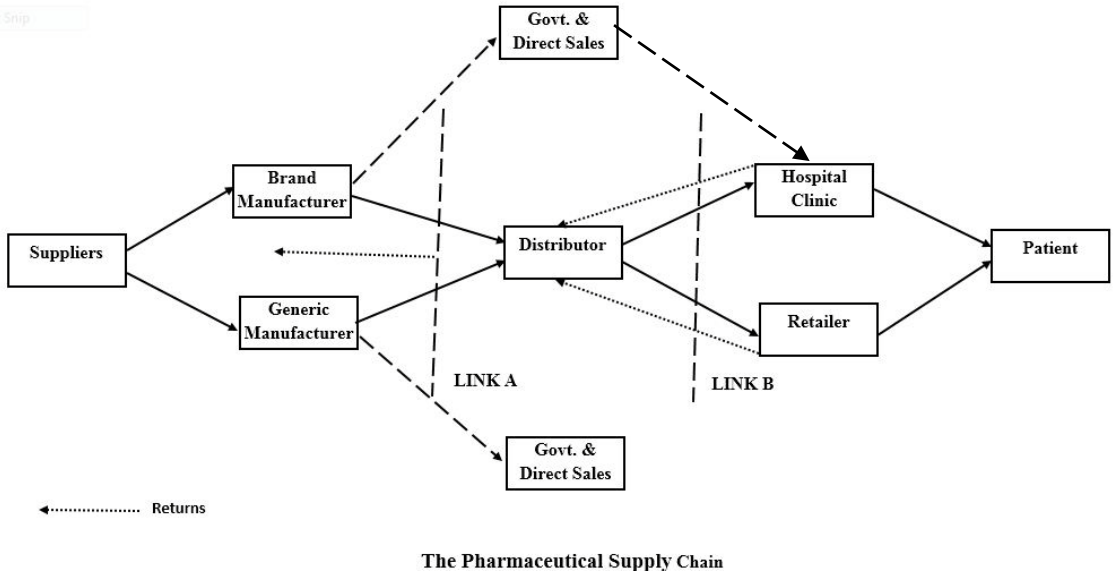

Figure 1: The Pharmaceutical Supply Chain

1.1.2: Importance of Service Quality in Supply Chain:

The loss due to poor sale can be easily assessed, but it is very challenging to compute the loss caused by poor service quality. Hence, Service quality influences not only on suppliers, distributors, employees and customers, nevertheless it touches the whole business and development of organization. The logistics industry currently is a typical illustration of service-based industry enlargement (Chapman, Soosay & Kandampully, 2003). In the current International scenario, Individual firms are no longer operating as independent bodies but are competing as primary part of supply chain links (Seth, Deshmukh & Vrat, 2006). Hence the competiton is between supply chains and not companies (Christopher, 2012). According to Waters and Waters (2003), when organizations work together they serve as customers when purchasing supplies from individual suppliers and as suppliers when supplying materials to personal customers. Hence, every member of the supply chain needs to be satisfied. There is a variation in the background of supply chain management in present years and satisfaction of every participant of the supply chain can be improved only by placing away the outmoded arms-length association and by developing faster partnership type arrangements (Christopher & Lee, 2004). In the expansion of these arrangements, service quality plays a vital role and the association of service quality with enhanced supply chain performance is extensively recognized (Mentzer,Flint & Kent, (1999); Mentzer, DeWitt, Keebler, Min, Nix, Smith & Zacharia, (2001); Perry & Sohal, (1999)). Kuei, Madu and Lin (2001), also proved that organizational performance could be enhanced through improved supply chain quality management and suggested for further research in understanding quality practices along the supply chain and about the association between quality practices and a system's overall performance.

Irrespective of the worldwide appreciation of the position of quality of service in supply chains, nevertheless it is slightly investigated (Nix, 2001). Hence there is more need for empirical research of business to business customers in service quality (Madaleno, Wilson & Palmer, 2007). Maximum studies in service quality research are focussed on end-use customer (Faulds & Mangold, 1995; Perry and Sohal, 1999). Further comprehensive studies of logistics are required with the perspective of supply channel interactions (Lambert, 2004). Only limited studies are done in the development of service quality measurement scales in supply chains (Bienstock,

Mentzer & Bird, 1996; Mentzer *et al.* 1999; Rafele, 2004). And these studies are confined to special sectors in developed countries. Additional experimental research is required for generalising the conclusions of these studies in the International economy (Rafele, 2004). To decrease this research gap our research is focused on identifying the critical factors effecting service quality at all phases of of the supply chain: *Manufacturer–Distributor -Retailer –Doctor -Consumer*.

Concept of Supply chain:

A supply chain is a business process which links manufacturers, retailers and customers. The supply chain processes are defined as "a structured and measured set of activities planned to produce a particular output for a specific customer or market" (Davenport, 2013). None of the supply chain procedures are certain or are the sole concern of one individual member of chain. The supply chain network consists of Customers, Retailers, Distributors, Manufacturers and Suppliers who are interdependent on each other. This overlapping of responsibility across each supply chain process results in four critical interfaces namely, *Customer-Retailer Interface, Retailer-Distributor Interface, Distributor-Manufacturer Interface and Manufacturer-Supplier Interface,* in a five stage supplychain.(Fig: 2).My Study has focussed on three interfaces except the Manufacturer –Supplier Interface of the Pharmaceutical SupplyChain.

Concept of Logistics Service Quality (LSQ):

The Quality of service in the supply chain context is defined as "the variance amid the expectations and perceptions at every level within the supply chain and for the chain as a whole". The notion of Logistics Service Quality (LSQ) is explained from two perspectives: objective and subjective quality. The first approach relates quality with adapting the service to service provider defined specifications (Thai, 2013). This industrial view of service sees quality as an accurate evaluation of all the stages and operations necessary to deliver the service, likening the process to that of manufacturing a product by considering the service as a physical object which can be observed and with attributes that can be evaluated (Garvin, 1984). The other approach transfers estimation of quality to customer that is subjective quality. From this perspective, service quality is "an International judgment or attitude, regarding the superior nature of the service".

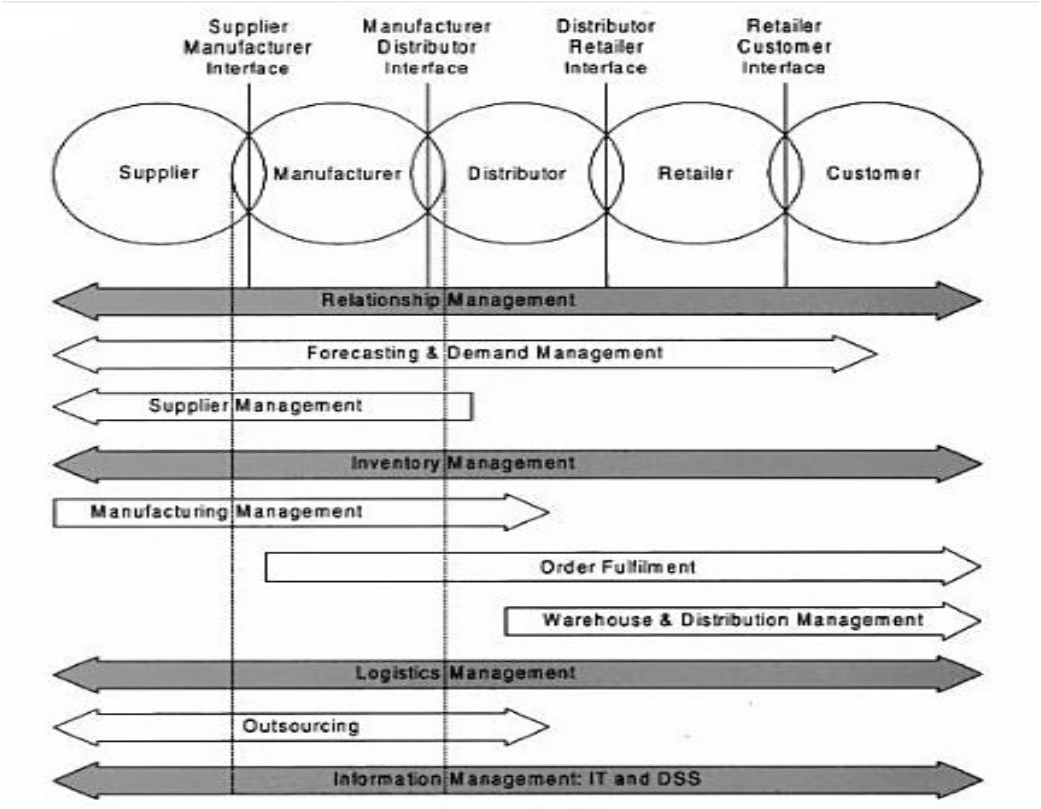

Figure 2: The Supply Chain Manaagement

The emphasis is related to specific feature of movement of products, i.e., how participants identify quality of product at diverse phases in a distribution chain. This is very important as the way things are perceived signifies performers "reality", inferring that the way members of the chain perceive the actual quality and requirements of quality will affect the quality they want to attain. Gupta and Singh (2012), defined Service quality in supply chain as how well an organization meets or exceeds the customer expectations in unidirectional or bidirectional for each element of a supply chain i.e. supplier, manufacturer, distributor, retailer and customer or end consumer. The service provider behavior effects the consumer's perception of quality so, what the company expects to provide is completely different from what consumer receives. Inspite of vast research on distribution chains in supply chain literature few research works have inspected the way the members perceive quality of products at diverse phases in distribution chain (Stern, El-Ansary & Coughlan, 1996).

In this scenario our study made an attempt to understand how members at different stages perceive the quality of service delivered in the supply chain. The main

consequences of quality are satisfaction and loyalty. The studies in logistics research have proved ability of logistics in delivering quality and consequently more customer satisfaction and loyalty (Mentzer, 2004; Tokman, Banu Elmadag, Uray& Glenn Richey Jr, 2007). The quality of physical distribution activities results in satisfaction of customers (Va´zquez Casielles *et al.* 2002). Logistics Service Quality results in enhancing the customer satisfaction (Sohal, Millen, Maggard & Moss, 1999). Hence, in my study the impact of service quality on satisfaction at each phase of the pharmaceutical supply chain was also examined. The pharmaceutical sector is economically very prominent but few researchers have studied about quality of service in Indian pharmaceutical supply chain. This is one of the reasons which motivated me to choose Pharmaceutical supply chain.

1.1.3: Significance of the Study:

The Pharmaceutical Supply Chain is very composite and extremely answerable to ensure that the right drug reaches the right person at the right time and in the right condition. Hence this is a highly sensitive supply chain where anything less than 100% customer service level is intolerable as it directly affects the health and welfare. So many Pharmaceutical industries maintain huge inventory in supply chain to reach 100 percent fill rate. But it is really difficult to ensure 100 percent availability of product at the optimum cost, unless processes of supply chain are focussed on needs and demands of customers. Hence the quality of service provided in the supply chain plays a major role in addressing these issues. Service Quality proved its positive effect on performance of business, Customer Satisfaction and Loyalty (Silvestro and Cross, 2000; Newman, 2001; Sureshchandar, Rajendran & Anantharaman, 2002; Gurau, 2003). But very few studies have been done addressing service quality of supply chains especially in the pharmaceutical sector. This research will thus contribute significantly to reduce the gap existing in the literature. This study mainly identifies the factors influencing quality of service and its impact on customer satisfaction at each interface of the supply chain in the pharmaceutical sector. Hence the outcome of this research will be very helpful to the pharmaceutical companies to evaluate quality of service at different phases of the supply chain and thus improve supply chain performance and consequently, the profitability of the firms.

1.1.4: Structure of the Thesis:

The whole thesis is structured into six chapters.

Chapter-I Introduction: The first section discusses about the basic issues in pharmaceutical supply chain and the significance of service quality in pharmaceutical supply chain. The evolution of pharmaceutical sector, current scenario and its role in the present economy is described in the second section.

Chapter II-Review of Literature: The summary of earlier works done in the area of Service Quality, Customer Satisfaction and Supply Chain are discussed in this Chapter.

Chapter III - Research Methodology: This chapter describes the methodology followed in carrying the entire research work. It discusses the research problem, objectives, and hypotheses, research questions, followed by methodology, sampling plan, analysis and limitations.

Chapter IV- Data Analysis: This chapter is split into five sections.

Section 4.1: Service Quality at the Manufacturer- Distributor Interface of the Supply Chain: First part of the section discusses the perceptions of distributors about the quality of service provided by manufacturers, the development of service quality scale and its validation and the last part of the section discusses about the supply chain management practices followed in the company.

Section 4.2: Service Quality at the Distributor-Retailer Interface of the Supply Chain
This section discusses the perceptions of retailers about the quality of service
provided by Distributors in the chain and the impact of service quality on satisfaction.

Section 4.3: Service Quality at the Retailer –Consumer Interface of the Supply Chain: The importance of pharmacist, the critical factors of service quality perceived by pharmacists, the scale development and revalidation of the pharmacist perceived service quality scale and impact of service quality on satisfaction were discussed in this section. This section also discusses the perceptions of Consumers about the quality of service provided by Retailers and the last part of the section highlights the role of organized and unorganized pharmacies.

Section 4.4: Service Quality at the Manufacturer-Doctor Interface of the Supply chain: The first section describes the role of doctors in pharmaceutical supply chain. The perceptions of doctors, scale development, revalidation of the doctors perceived service quality scale and the relationship between service quality, satisfaction and loyalty are presented.

Chapter V: Summary and Suggestions: The major findings and conclusions are explained in the last chapter.

1.2: PROFILE OF THE PHARMACEUTICAL INDUSTRY

1.2.1: History of the Pharma Sector

The Pharmaceutical industry traces back only half a century, pharmaceutical practice evolved slowly over thousands of years of practical use of herbs, minerals, and other compounds. The word pharmacy derives from the Greek term "pharmakon," used by Homer in the *Odyssey* to describe a drug or charm. The discoveries of opium and hemlock have also been traced to ancient Greece. In spite of the spread of pharmaceutical knowledge throughout the Roman Empire, that civilization's decline and the onset of the middle Ages suppressed pharmacological progress in the Western world. While Asian and Middle Eastern medical knowledge continued to develop during the ensuing 12 centuries, little of that information made its way to the West. The Renaissance revived pharmaceutical discovery beginning in the late fifteenth century. The discovery of the "New World" brought new plant-based medicaments, such as belladonna, ipecacuanha, Jesuit's bark, and cocoa. The sixteenth century witnessed the publication of the world's first pharmacopoeia, or guide to the preparation of known drugs and medicinal chemicals, in Germany. Pharmaceutical practices were professionalized with the 1617 establishment of the Society of Apothecaries in London. Some of the modern industry's largest companies grew from modest beginnings as small apothecaries, preparing treatments one dose at a time.

The current industry can be traced to isolation and development of several potent medicinal compounds that could be mass-produced in the nineteenth century. The first of these were the alkaloids, which were derived from plant sources. Many of the powerful drugs in this group, including morphine, strychnine, quinine, nicotine, and cocaine, were still in use in the late twentieth century. The isolation of these compounds permitted for correct dosing and testing of purity. Discernment of these drugs' chemical structure stimulated efforts at laboratory synthesis, and those experiments often produced valuable related compounds.

1.2.2 Current Status of the Indian Pharmaceutical Industry:

The Pharmaceutical industry in India is the second most fastest emerging industry with revenue of Rs. 25,196.48 crore and growth of 27.32 percent. Pharmaceutical

sector is one of the world's leading market standing fourth in terms of volume and thirteen in terms of value. The sector is leading in product development and creating new records in medicine research worldwide. Development of local market is principal driver for the evolution of the Indian pharmaceuticals market. It directed to the growth of bulk drugs market. Gujarat is hub of Pharmaceutical formulations and has more than 3000 Manufacturing Licensees. The government is practicing restrictive drug pricing policy for bulk drugs in India and also delivers favorable patent policy and regulatory climate for bulk drug producers in the country. The sector derives 70 percent of its sales from the domestic market with bulk drugs accounting for 85percent of sales.

India leads in the manufacture of certain pharmaceutical products such as ibuprofen, ciprofloxacin, rifampicin and ethambutol. The country is also a major supplier of ranitidine, diltiazem, naproxen and amoxicillin. Pharmaceutical outsourcing services in India are progressively growing. The pharmaceutical industry is growing at record levels in current years and has extraordinary prospects to broaden. The industry has proven its position as a leader in producing superior generic medicines. Both multinational and local drug manufacturers have ultimately profited from the market potential of India's population of over one billion.

The pharmaceuticals and medical products practice of McKinsey& Company, estimates that Indian pharmaceutical market (domestic) will top the US$ 20 billion-mark by 2015, up from US$ 6.3 billion in 2005. Significantly, the incremental growth during the 2005-15 decade, of US$ 14 billion, would drive this industry to be among the top-three, after the US and China.

1.2.3 Growth Drivers of the Pharma Industry:

Population of India is expected to rise to 1.6 billion by 2050 making it the world’s most populated country. Hence the demand for pharmaceutical drugs is expected to rise in coming years. The government had guaranteed to raise public outflow on healthcare. More than 96 generic group drugs are manufactured in India. The government of India has made a policy to increase foreign investment in this sector. Tax holidays to industrial operations in specified Special Economic Zone, deduction of profits from exports and R&Dexpenditure, depreciation allowances, and relief on all contributions to permitted domestic research institutions are note worthy. Foreign Direct Investment up to 100 per cent is allowed and

approval for Foreign Technology Agreements also is perimitted for all bulk drugs, intermediates and formulations approved by Drug Controller General (India), except those controlled by the Indian Government. Exceptionally trained and sophisticated manpower are present in India.

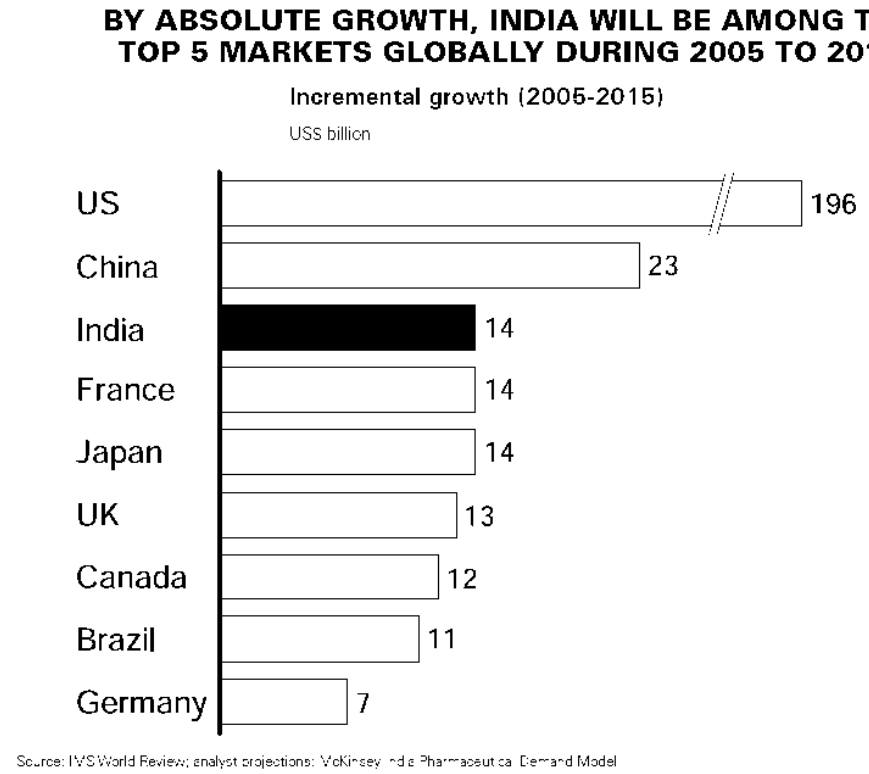

Fig: 3- Indian Pharmaceutical Demand Model (2005-15)

Almost about 115,000 scientists and 12,000 doctorates pass yearly. Over 40 per cent of the costs for developing a new drug are attributed to Clinical trials. Indian Companies have the Maximum US FDA approvals. The overall pharmaceutical sector in India will increase to US$ 40 billion by 2015.A report by Credit Suisse research projects that Indian generics manufacturers will see annual growth of nearly 20per cent over the coming years. “India stands fourth in generic production and seventeenth in export value of bulk actives and dosage, globally.(Fig:3)

CHAPTER-II

REVIEW OF LITERATURE

A lot of Research work done is done In Service Quality, Customer Satisfaction and Supply Chain Management. Here we are mentioning some of them based on the relevance to our study. The first part highlights the significant works done by different researchers in service quality. The second part focuses on Customer satisfaction and the last section deals with supply chain management.

2.1 Service quality

Service quality is defined as “the gap between consumers’ expectations and perceptions of the actual service performance” (Parasuraman, Zeithaml & Berry, 1985). It is ‘a measure of how well the service level delivered matches customer expectations (Lewis & Booms, 1983). Many studies have also identified that service quality is directly related to the perceptions of customers. Service quality is attracting practitioners and academic researchers, due to its significant role in business. Research in Service quality commenced in the year 1980s. Parasuraman, Berry & Zeithaml (1988), developed a 22 item instrument (called SERVQUAL) for evaluating perceptions of customers about service quality in service and retail organizations. Scale’s reliability, factor structure and validity were tested. Carman (1990), described the replication and testing of the SERVQUAL battery and mentioned some suggestions for its use by Retailers. Bishop Gagliano and Hathcote (1994), examined the dissimilarities between consumers' expectations and perceptions using SERVQUAL scale in apparel specialty stores. Personal Attention factor showed the maximum disparity. Pratibha A.Dabholkar (1995), developed a scale for measuring retail service quality using Confirmatory factor analysis. Becker, Behe, Johnson, Townsend and Litzenberg (1997), measured perceptions and expectations of customers used modified SERVQUAL instrument. The result revealed that florists better met customer expectations than supermarket floral departments. Holdford and Patkar (2003), studied the perceptions of students about the quality of education. A 37-item educational service quality instrument was used. They identified five factors of service quality which showed significant relationship with overall satisfaction. The scale satisfied validity and reliability tests. Bienstock et al.,(1996), introduced a tool

for assessing purchasing managers perceptions of physical distribution service quality(PDSQ). Sinha and Babu (1998), developed DSI (Depot Service Index) to measure service quality from factory to distribution network. Mentzer et al., (1999, 2001), identified major factors of logistics service quality.

Johnson and Garbarino (2001), investigated the customers of a performing arts organization of a New York City repertory theatre company and found that the most critical customers are low-loyalty customers with high category experience and high perceptions of risk. Stanley and Wisner (2002), recognized the service quality factors for purchasing in manufacturing and service organizations. Kim and Jin (2002), confirmed the retail service quality scale of retail stores and found differences between USA and Korean consumers perceptions. Lee-Kelley, Davies and Kangis (2002), confirmed the affirmative relationship between perceived service quality and loyalty in UK steel industry. Chaoprasert and Elsey (2004), identified the major initiatives taken by Thailand banks and revealed that personal counter services and electronic services are playing the major role in improving quality of service. Abu (2004), identified the major factors of service quality important to urban grocery shoppers using the scale developed by Dabholkar *et al.,* (1996). Kaul (2005), evaluated the Retail Service Quality Scale (RSQS) developed in the U.S. and considered it's validity across a variety of formats and cultural contexts. Parikh (2005), used the Dabholkar et al., (1995), retail service quality instrument in evaluating the quality gap in Indian retail context. They found that reliability is the most vital dimension among all the dimensions.

Panayides and So (2005), examined empirically the impact of relationship orientation in third-party logistics and its influence on logistics service quality and performance. Results revealed that relational exchange is positively related to logistics service quality and performance and integration. McKenzie (2006), presented the empirical findings of two qualitative studies of Estonian consumers and revealed that within Estonia, there is a requirement for a better understanding of retail consumer behavior theory and practice. Seth et al., (2006a, 2006b), proposed a model for evaluating the quality of service using third party logistics at various interfaces of the supply chain. Huang and Feng (2007), developed the Logistics Service Quality scale for electronic commerce and specified that service provider have to emphasise

on information quality and ordering procedures. Saravanan and Rao (2007), recognized the critical factors of service quality in automobile service stations. Choudhury (2007), explored the quality dimensions- attitude, competence, tangibles and convenience perceived by customers in four Indian major banks. Nguyen and Le Nguyen (2007), recognized Service Personnel, Physical Aspects, Policy and Reliability as the components of retail service quality in Vietnamese Supermarkets with 440 shoppers in various supermarkets and found that, service personnel has the strongest impact and Physical Aspects as the weakest one. Clark and Clark (2007), measured service quality in health care settings and showed that customers decrease their expectations when confronted with poor quality of service.

Gil Saura, Servera Frances, Berenguer Contri and Fuentes Blasco (2008), highlighted the prevalence of information and communication technologies (ICT) and its importance in logistic service delivery context in 194 companies. Bakar, Seval Akgün and Al Assaf (2008), assessed the functional quality of the hospitals in Baskent University Hospitals Network, Turkey with 472 patients through SERVQUAL scale. Udo, Bagchi and Kirs (2008), recognized the important dimensions of web service quality. Ladhari (2009), reviewed twenty years of work done in service quality using SERVQUAL scale during the period 1988-2008. Ahmad, Usman Awan, Raouf and Sparks (2009), developed a scale for measuring service quality in supply chains in pharmaceutical context in Pakistan.

Prasad and Shekhar (2010), developed the RAILQUAL instrument for measuring service quality of rail passengers. Maruvada and Bellamkonda (2010) assessed the service quality in the Railway sector. Prakash (2011), developed a scale for assessing service quality in the supply chain at supplier-manufacturer interface in the automobile sector. Yeap Ai Leen and Ramayah (2011), confirmed the scale developed by Dabholkar et al.,(1995), in apparel stores and proved that the instrument is applicable in the Malaysian culture. Annamdevula and Bellamkonda (2012), developed HiEdQUAL to assess the service quality in education sector.

2.2 Customer Satisfaction

Customer satisfaction is generally accepted as a dynamic input for improvement of organisation performance. It is a person's feelings of pleasure or disappointment resulting from comparing a product's perceived performance (or outcome) in relation to his or her expectations (Kotler, 2003).

Jones (1996), reports the findings from analysis of data collected at a large health and fitness center located in the Midwest. In this research, they determined whether the multidimensional-multiobject model is the best configuration to comprehensively capture the satisfaction construct even within a service object. The findings confirmed the overall superiority of this model compared to other representations. Bowen and Chen (2001), identified that the relation between satisfaction and loyalty is non-linear, based on survey of hotel guests. Pather, Erwin and Remenyi (2003), derived an appropriate model for measuring e-customer satisfaction in the South African context. They suggested a merger of previous gap measurement theories that incorporate both user-satisfaction and service quality concepts. Bennett and Rundle-Thiele (2004), in their study of an advertising service indicated that satisfaction and loyalty in a business services setting are diverse concepts and the association between them is positive. Homburg and Stock (2005), proved that the link between work satisfaction and customer satisfaction is scientifically moderated by the salesperson characteristics and customer characteristics and the significance of product/service to the customer. Cheung and Lee (2005), reported that information system and service quality are the main factors of consumer satisfaction for Internet shopping. Terblanche and Boshoff (2006), developed a instrument to measure customer satisfaction through regulated components of in-store shopping experience involving 11063 respondents.

Vukmir (2006), presented a study of the literature regarding the customer service in current medical practice. Johnson, Garbarino and Sivadas (2006), examined whether customer differences influence customer satisfaction ratings. They focused on the impact of three types of customer experience on satisfaction ratings. The first type of experience is the customer's previous history of positive experiences with the organization. The second type of experience is negative encounters with the organization that may lead to a customer's perceptions of risk in the offerings of the

organization. The third type of experience is a customer's experience with similar or competing organizations in the service category. In this study they proposed that these Influences of customer differences on customer satisfaction ratings may be either critical or lenient in their satisfaction ratings. Lenient customers may be expressing high satisfaction scores but may be 'at risk' in their future support of the organization. Critical customers may be expressing low satisfaction, but they still may be likely to continue in their patronage. Huili and Jing (2012), proved that perceived quality has indirect effect on student loyalty through student satisfaction.

Loyalty is defined as "*an intended behavior caused by the service and operationalized loyalty as a repurchase intention and willingness to provide positive word-of-mouth*". Anderassen and Lindestad (1998), recommends a firm relationship among customer satisfaction, behavioral intentions and, in turn, profitability (Yi, 1990). Customer satisfaction level can be increased by refining product and service features (Mittal, Ross & Baldasare, 1998; Wittink & Bayer, 1994) which also results in customers' retention (Zeithaml, Berry & Parasuraman, 1996; Anderson, Fornell & Lehmann, 1994). Accordingly, enhanced customer retention yields added profits (Anderson & Mittal, 2000). Despite its significance, limited works have been done to measure this intricate relationship.

Relationship between Service quality and Customer satisfaction and Loyalty:

There is confusion as to the nature and causal direction of the relationship between service quality and consumer satisfaction in the literature (Cronin Jr & Taylor, 1992). Teas (1993); Parasuraman, Zeithaml and Berry (1994), and many researchers (e.g. Parasuraman et al., 1988; Carman, 1990; Cronin et al., 1992) however, agree that service quality is a complete evaluation or a universal value assessment, whereas customer satisfaction is a transaction specific assessment. Based on this distinction, Bolton and Drew (1991b), claimed that an accumulation of transaction-specific assessments lead to a universal assessment (i.e. customer satisfaction is a precursor of service quality). Based on theoretical and empirical evidence by Parasuraman et al. (1988) and Cronin et al.,(1992), it is alleged that service quality is a forerunner of customer satisfaction. Furthermore, it is inferred that both service quality and consumer satisfaction are antecedents of purchase intentions. According to Oliver (1980), perceived service quality transforms a consumer's purchase intentions. In

addition, Oliver (2010), stated that “satisfaction soon decays into one’s overall attitude towards purchasing products”. Parasuraman et al., (1988) and Cronin et al., (1992), have proven that both service quality and consumer satisfaction affect purchase intentions. Cronin et al., (1992), deliberated that consumer satisfaction employs a tougher impact on purchase intentions than does service quality. Hence, Customer satisfaction plays a specifically critical role in particularly competitive industries, where there is an unbelievable variation between the loyalties of merely satisfied and totally satisfied - or pleased customers.

2.3: Supply chain Management (SCM)

The studies relating to Supply chain collaboration are discussed in the first part followed by supply chain performance. Close collaborative linkages in the entire supply chain, help in reducing costs and increase profits. Interdependence and information sharing are main requirements in an integrated supply chain whose aim is customer satisfaction, (Spekman, Kamauff Jr & Myhr, 1998). Supply chain collaboration has a vital part in improving quality of service and enhacing customer satisfaction. Hence, the various studies addressing Supply Chain collaboration have been presented.

Supply chain collaboration: Boubekri (2001), defined the current business requirement to be integrated for enhancing supply chain performance. Simatupang, Wright and Sridharan (2004), applied the theory of constraints approach to avoid problems in realizing the advantages of supply chain collaboration. Barratt (2004), suggested the need for a wider understanding of the essentials involved in supply chain collaboration specifically how the relevant cultural, strategic and implementation elements inter-relate with each other. Simatupang and Sridharan (2005), indicated trust and commitment lead to satisfaction in supply chain. Mohamed Udin, Khan and Zairi (2006), recommended a planning stage for a collaborative supply chain management framework. Matopoulos, Vlachopoulou, Manthou and Manos (2007), examined the concept of supply chain collaboration in agri-food industry and provided an overall framework that can be used as a theoretical milestone for further empirical research. Their study identified the importance of the elements of trust, power, dependence, and risk/reward sharing in establishing and maintaining supply chain relationships. Rajagopal, Zailani and Sulaiman (2009), examined empirically the important factors

for supply chain partnering (SCP) and its effect on performance through a sample of 584 companies in Malaysia.

Glenn Richey Jr, Chen, Upreti, Fawcett and Adams (2009), examined moderators effecting supply chain integration. Jüttner, Christopher and Godsell (2010), developed a structure for incorporating marketing and supply chain strategies. Boon-itt and Yew Wong (2011), tested the impact of technological and demand uncertainties in the integration of supply chain and customer delivery performance. Guan and Rehme (2012), explored the major factors leading to vertical integration, and its consequences in a manufacturer-distributor-reseller chain.

Supply chain Performance: Stewart (1997) used the Supply-Chain Operations Reference model (SCOR) for assessing and refining organisation's supply-chain performance and management. Gilmour (1999), evaluates the features of the individual supply chain elements and observes the suitability for assimilation of these elements. Kuei, *et al.*, (2001), suggested that organizational performance can be enriched by enhancing quality in supply chain management. Pitta and Laric (2004), examined the major components which affect the success of the healthcare process. Burgess and Singh (2006) developed a united framework for supply chains. Saad and Patel (2006), recognized performance measure sets for supply chain performance for developing countries. Aissa Fantazy, Kumar and Kumar (2009), examined the associations between strategy, flexibility, and performance in the supply chain context. Vanichchinchai and Igel (2009), examined TQM and SCM from the literature and explored how the philosophical perspectives, goals, evolution, and integration of these concepts could be further developed. Singh, Sandhu, Metri and Kaur (2010), tested the relations between supply chain practices and organizational performance. Elwan Ibrahim and Ogunyemi (2012), supports the positive outcome of supply chain management practices on firm performance.

Service Quality Studies: Few of the selected studies conducted using SERVQUAL Instrument have been shown in Table 1

Table.1

Studies conducted using SERVQUAL Instrument

Study	Sector	Sample Size	Country
Carman,(1990)	Customers of a dentalclinic, a business schoolplacement center, a hospital, and a tire store	Ranged from 74 to 600 +across settings	USA
Parasuraman, Berry & Zeithaml, (1991)	Customers of telephonecompany, insurance company and bank	Ranged from 290 to 487 across companies	USA
Finn & Lamb (1991)	Customers of retailstores	Ranged from 58 to 69 across settings	USA
Babakus, E., & Boller, G. W. (1992)	Customers of utility company	689	USA
Cronin Jr et al., (1992)	Customers of fast foodrestaurant, banking, pest control, and drycleaning	Ranged from 175 to 189	USA
Headley and Miller, (1992)	Customers of medicalservices	159	USA
Cronin Jr & Taylor (1994)	Individuals in shoppingmalls	116 (study 1) 227 (study 2)	USA
Kettinger & Lee(1994)	Undergraduate and graduate students in several courses	342	USA
Pitt, Watson & Kavan, (1995)	Users of onlineproduction systems	237 (sector 1) 181(sector 2) 267(sector 3)	UK, USA, and South Africa
Webster & Hung, (1994)	Hotel Sector	100	Taiwan
Soutar & McNeil (1996)	Education Sector	109 students	Australian
Asubonteng, McCleary & Swan, (1996)	Previous literature		
Nitecki (1996)	Library users	351	USA
Duffy, Duffy & Kilbourne, (1998)	Nursing home residents	206 (USA) 100 (UK)	USA and UK
Lam, (1997)	Patients	82	HongKong
Grapentine, (1998)	Previous literature		
Durvasula, Lysonski & Mehta, (1999)	Shipping managers of various organizations(B2B)	114	Singapore
Morales Espinoza (1999)	Customers of supermarkets	149 (Canada) 169 (Peru)	Canada and Peru
Cook & Thompson, (2000)	library users	697	USA

Study	Sector	Sample Size	Country
Engelland, Workman & Singh, (2000)	students	267	USA
Kim & Jin, (2001)	Education	214 U.S. students and 217 Korean students in University	U.S. and Korean
Zhou, Zhang & Xu, (2002)	banking	373 bank customers	China
Gefen (2002)	Students Amazon.com	211	USA
Lee-Kelley et al., (2002)	University Employees	120	Korea
Lam (2002)	Bank customers	229	
Van der Wal, Pampallis & Bond, (2002)	Cellular phoneusers/Customers	583	SouthAfrica
Baldwin & Sohal (2003)	Dental patients	354	Australia
Chi Cui, Lewis & Park, (2003)	Bank customers	153	SouthKorea
O'Neill & Palmer, (2003)	Visitors	238	Australia
Jain & Gupta, (2004)	fast food restaurants	400	India
Kilbourne, Duffy, Duffy & Giarchi, (2004)	Nursing home residents	195 (USA) 99 (UK)	USA and UK
Arasli, Mehtap-Smadi & Turan Katircioglu, (2005)	Customers of bank	260	Greek
Badri, Abdulla & Al-Madani, (2005)	Users of informationtechnology services,decision makers, and service providers in higher education institutions	2,221	United Arab Emirates
Gounaris, (2005)	Companies from different industries (B2Bservices)	515	Greece
Kaul, (2005)	Retail sector	144	India
Rajagopalan & Heitmeyer,(2005)	Apparel sector	254 Asian-Indian consumers	United States
Mostafa, (2006)	Students	508	Egypt
Landrum, Prybutok & Zhang, (2007)	Customers	385	USA
Yu Sum & Leung Hui, (2009)	Retail Sector	232	Hong Kong.
Das, Kumar & Saha,(2010)	Retail Sector	220 shoppers	
Zaim, Bayyurt & Zaim, (2013)	Health Care Industry	265	Turkey

Study	Sector	Sample Size	Country
Ghasemi, Kazemi & Esfahani, (2012)	Education Sector	107	Iran
Tazreen, (2012)	Banking Sector	40	Chittagong
Jiang, Klein, Parolia & Li, (2012)	Information technology	412 managers	USA
Nimako, (2012)	Telecommunication (mobile)	1000customers	Ghana
Soita, (2012)	Health and Fitness Centre	486 customers	Uganda
Hirmukhe, (2012)	Administrative sector	33 Tehsildars	India
Jiewanto, Laurens & Nelloh, (2012)	Education	140 students	Surabaya Jakarta
Huili et al., (2012)	Education	486students	china
Koni, A., Zainal, K., & Ibrahim, M. (2012)	Education	375 respondents	Palestine
Fotiadis & Vassiliadis, (2013)	Health(Hospitals)	patients	Greece
Ilyas, Nasir, Hussain, Malik, Munir & Sarwar, (2013)	Education	306 students	Lahore
Adil, Al Ghaswyneh & Albkour, (2013)	Banking Sector	review	
Bose, Sarker & Hossain, (2013)	Banking Sector	100 customers	Bangladesh
Mauri & Minazzi, (2013)	Literature review		
Aghamolaei et al.,(2014)	Health (hospitals)	96 patients	Iran
Rahman, Yusof, Yahaya & Osman, (2010)	Tourism	127 tourists	Malaysia
Vassiliadis, Fotiadis & Tavlaridou,(2014)	Health (hospitals)	Patients	Greece
Rahman, Jamil & Iranmanesh, (2014)	Tourism	127 students	Malaysia
Yousapronpaiboon, (2014)	Education	350 students	Thailand
Mursaleen, Ijaz & Kashif, (2014)	Newschannels	318	Pakistan

CHAPTER-III

RESEARCH METHODOLOGY

This chapter explains the rationale of the research approach and describes how this study was performed. The chapter begins with the research questions, objectives, the conceptual model and the hypothesis used. The methods used for collecting data, sample size, sampling method and the data analysis techniques were also described.

3.1 Research Questions

Based on the previous literature it is understood that little empirical research has been done in examining the service quality of supply chain especially in the pharmaceutical sector. Depending on the gaps found in the conceptual and contextual literature the following research questions have been formulated that led to the motivation of this present study.

- What are the perceptions of distributors, retailers, doctors and consumers about service quality in the pharmaceutical supply chain?
- What is the most appropriate modeling and measurement method for measuring service quality in pharmaceutical supply chain?

3.2 Research Objectives

Based on the research questions the broad objective is to evaluate service quality and satisfaction at different interfaces of the pharmaceutical supply chain. The broad objective has been further divided into the following sub objectives. They are

1. To identify the critical factors of service quality as perceived by Distributors, Chemists, Doctors and Consumers at different Interfaces of the Pharmaceutical Supply Chain.
2. To confirm and test the identified service quality factors by developing the measurement models at different Interfaces of the Pharmaceutical Supply Chain
3. To study the effect of service quality factors on Customer Satisfaction at different phases of the Pharmaceutical Supply Chain.

4. To examine the relationship between “Doctor Perceived Service Quality, Satisfaction and Doctor’s Prescription Behavior” at Doctor –Manufacturer Interface of the Supply Chain.

3.3 Conceptual Model and Hypothesis

Research hypothesis: Based on the above research objectives the following hypotheses have been formulated.

1. Service quality at the Manufacturer-Distributor Interface of the Pharmaceutical supply chain-: (Figure 4 DiPSQ Model): The following Hypothesis is framed to be tested:

a. Responsiveness has a significant effect on Distributors perceived service quality (DiPSQ)

b. Assurance has a significant effect on DiPSQ

c. Reliability has a significant effect on DiPSQ

d. Communication has a significant effect on DiPSQ

e. Distributors perceived service quality has a significant effect on Customer Satisfaction.

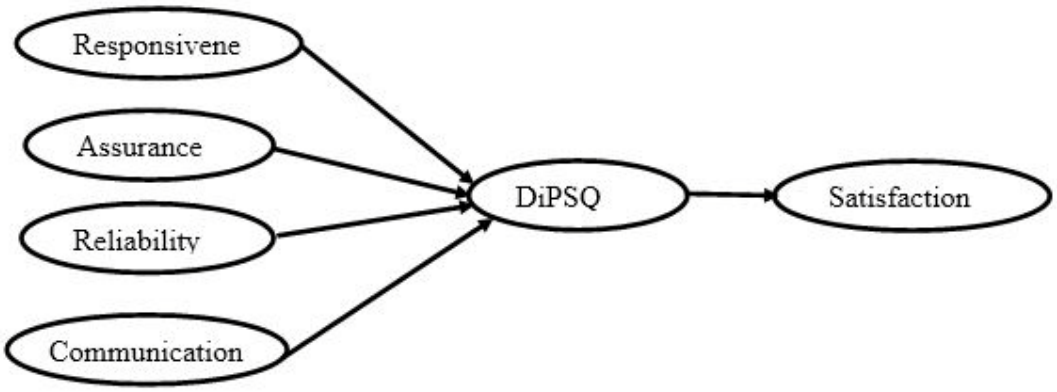

Figure 4- DiPSQ Model

2. Service quality at the Distributor-Retailer Interface of the Pharmaceutical supply chain-: (Figure 5 RPSQ Model). The following Hypothesis is framed to be tested:

a. Responsiveness has a significant effect on Retailers Perceived Service Quality (RPSQ)

b. Tangibles has a significant effect on RPS

c. Empathy has a significant effect on RPSQ

d. RPSQ has a significant effect on Customer Satisfaction

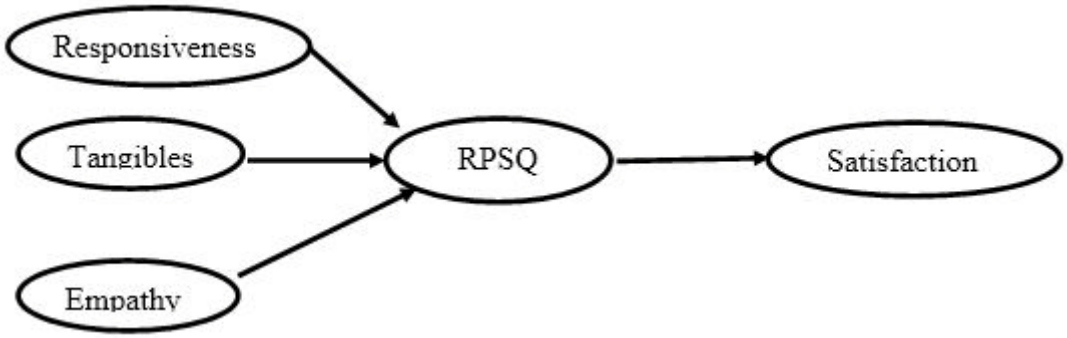

Figure 5- RPSQ Model

3. Service quality at the Retailer – Consumer Interface of the Pharmaceutical supply chain; The following Hypothesis is framed to be tested: (Figure 6) PPFSQ Model)

a. Empathy has a significant effect on Pharmacist perceived functional service quality (PPFSQ)

b. Assurance has a significant effect on PPFSQ

c. Reliability has a significant effect on PPFSQ

d. Pharmacist perceived functional service quality has a significant effect on customer satisfaction

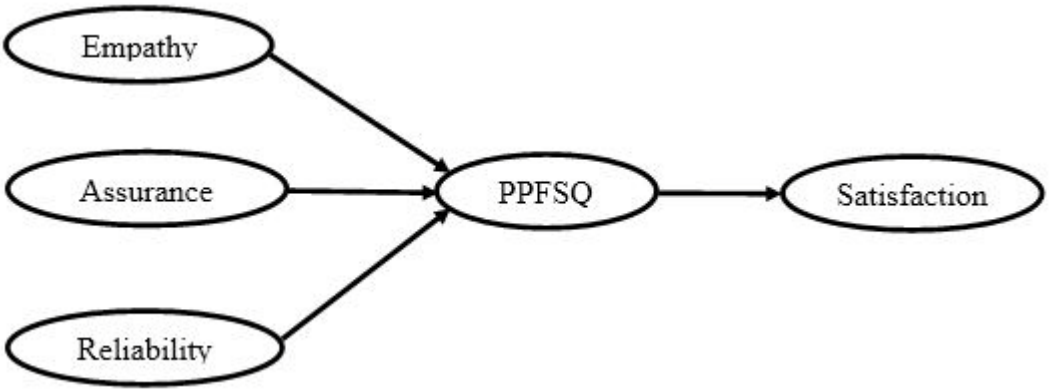

Figure 6- PPFSQ Model

4. Service quality at the Manufacturer-Doctor Interface of the Pharmaceutical supply chain; The following Hypothesis is framed to be tested: (Figure 7) DPSQ Model)

a. Responsiveness has a significant effect on Doctors' Perceived Service Quality (DPSQ)

b. Assurance has a significant effect on DPSQ

c. Reliability has a significant effect on DPSQ

d. Doctor's Perceived Service Quality has a significant effect on Satisfaction

e. Doctor's Satisfaction has a significant effect on Doctor's Prescribing Behavior

f. Doctor's Perceived Service Quality has a significant effect on Satisfaction

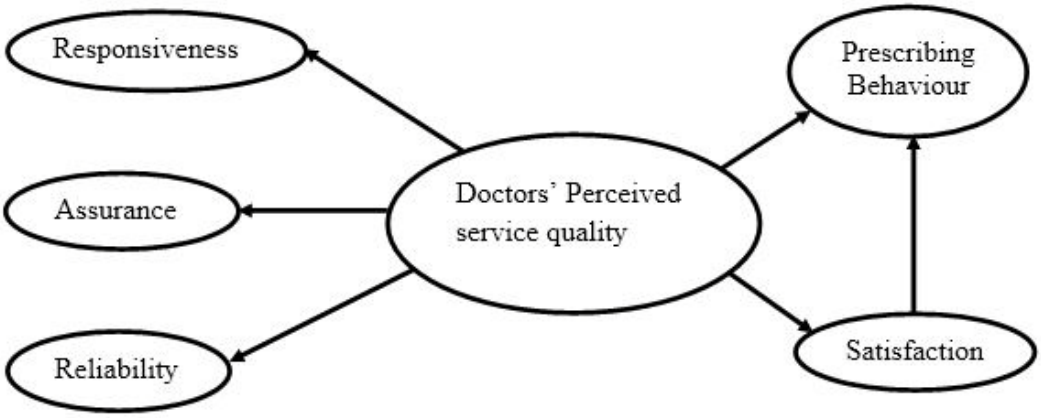

Figure 7- DPSQ Model

Statement of Originality of the Research:

During the last three decades a lot of research has been done in the area of service quality leading to development of various theories and concepts. However, limited research is done in the area of service quality in the supply chain. In the pharmaceutical sector anything less than 100% customer service is not acceptable as it causes a direct impact on the health of the people so service quality is very essential in the Pharmaceutical supply chain. In the previous research there were no models developed in this area using Structural Equation Modelling especially relating service quality and satisfaction in pharmaceutical supply chain in India so this has actually motivated the researcher to take up this study. This study will be very helpful for pharmaceutical manufacturers to measure the service quality and improve the supply chain performance. This study will lead to development of new concepts and models in the area of service quality in the manufacturing sector.

3.4 Research Design and Methodology:

The present study follows both quantitative and qualitative approach. In this research, initially, discussions were held with doctors, chemists, supply chain managers, academicians and the general consumers to know their opinion about service quality issues in the pharmaceutical company. It was then followed by interviews. Taking their suggestions and ideas into consideration and with relevant literature the survey instruments were prepared which were used in the quantitative stage of the research. The Research Design is descriptive and cross-sectional in nature.

Data Collection Methods:

The survey research method was used to gather primary data in this study because the purpose of this research was to understand the attitudes of distributors, Chemists, Doctors and consumers (Patients) about service quality and satisfaction. Two surveys a pilot survey and main survey were conducted in the study and purposive sampling method was applied.Initially indepth interviews and focused group discussions were held with academicians and experts to identify the service quality variables. The formal Pilot Study was conducted with ten percent of the sample at all phases of the chain to finalize and ensure feasibility for large study. Research Investigators were used to collect data at the hospitals and medical shops, it almost took 20 months

duration and the response rate was nearly 85 percent in all the cases. Secondary Data was collected from various pharmaceutical reports and journals.

Survey Instrument:

For measuring service quality the widely used service quality measurement scale, SERVQUAL scale (Parasuraman *et al.,* 1988, 1991) was used at the Manufacturer-Distributor Interface, Distributor-Retailer Interface and the Doctor-Manufacturer Interphase. The questionnaire was modified according to the context (pharmaceutical sector) after discussions with experts and academicians. In case of Pharmacists only the World Health Organisation Reports on pharmacists and other health reports were taken as the base for preparing the questionnaire.It was finalised after discussions with experts and academecians. The Satisfaction dimension was measured by four observed variables satisfaction with quality of the drugs, quality of the service, relationship with the company and overall satisfaction with the company at three phases and at two phases overall satisfaction was measured in terms of facilities goals accomplishment and the problems. The Loyalty dimension was evaluated through five items- I will continue prescribing the company products in the future, I may not switch to a competitor even when there are offers; I have good relationship with the company, I recommend the company products to others, I feel proud to be associated with this company.Both the satisfaction and loyalty dimensions were identified through literature review. The Questionnaire was divided into three parts consisiting of questions related to demographic variables, followed by service quality and satisfaction.A five point Likert scale range from 1=Strongly disagree to 5=Strongly Agree was used to know the different attitudes of respondents in all the situations. Research scholars and experienced marketing executives administered the questionnaires.

Respondents and Sample Distribution:

The Indian drug distribution system consists of: the pharmaceutical manufacturers; clearing (or carrying) and forwarding agents (CFAs)/depots/super stockiest; stockists; wholesalers and retailers. In principle, each of the larger pharmaceuticals producers has one CFA in each of India's States; in practice, especially in the case of a larger company, there may be several in each of the larger States: Stockists typically market products of 6-8 pharmaceutical companies, only a few distribute products of more

than 50 companies.: The remainder of the market is made up of a large number of small-scale suppliers, who often act as prescribers as well as retailers. Hence the pharmaceutical supply chain consists of manufacturers, distributors, retailers (pharmacists), Doctors and Consumers. The sample and methods used in my study are shown in Table: 2

Manufacturer: India is now among the top five pharmaceutical emerging markets of the world.One of the top ten pharmaceutical companies, was selected for my study. The company with a turnover of Rs 4,162.25 crore, is India's second largest drug firm by sales, 2007, third lagest in India by Net Profit (1932.80 Rs.cr.). It is more than a 200 million dollar venture with presence in almost all major therapeutic areas.(Appendix –V)

Distributors and Retailers: The All India Organisation of Chemists and Druggists (AIOCD Ltd.) is a very powerful organization representing Chemists: both retailers and wholesalers having 750,000 to 10, 00,000 pharmacies. Andhra Pradesh Pharmacy Council has got over 86000 registered pharmacists practicing in the state. For this study, a sample of 350 chemists, members of AIOCD Ltd in (proportion of 150-Hyderabad, Rajahmundry-100, and Visakhapatnam-100) has been purposively selected from three major cities of Andhra Pradesh. A sample of 220 distributors (Hyderabad- 100, Visakhapatnam -60, and Rajahmundry- 60) was selected purposively.

Doctors: The Indian Medical Association (IMA), is the national organization of "Doctors of Modern Scientific System of Medicine", It has around 250,000 members with more than 1700 local branches in India. Under this, every state has state IMA bodies. There are 164 branches in Andhra Pradesh consisting of about 20000 doctors as its members. Out of the total 20000 registered members in Andhra Pradesh,only one percent of the population was selected as my sample .i.e 200 doctors from three selected cities- (Hyderabad-100, Rajahmundry -50 and Visakhapatnam-50) through purposive sampling method.

Consumers: A Sample of 300 Consumers (End users/Patients) from three major Indian cities (Hyderabad-150, Visakhapatnam-75, Rajahmundry -75 were selected based on purposive sampling method.

Table: 2

Sampling and Data Collection Methods

Particulars	**Manufacturer**	**Distributors**	**Retailers**	**Customers**	**Consumers**
Sample Respondents	Pharmaceutical Company	Stockists	Druggists	Doctors	Patients
Sampling Method	Judgement Sampling Method	Purposive Sampling Method	Purposive Sampling Method	Purposive Sampling Method	Purposive Sampling Method
Sample size	Supply chain managers of the selected company	220	350	200	300
Data collection Method	Interview method	Survey & Observation	Survey& Observation	Survey& Observation	Survey& Observation
Research Instrument	Structured questionnaire	Structured questionnaire	Structured questionnaire	Structured questionnaire	Structured questionnaire
Instrument Reliability	0.91 (DiPSQscale)	0.749 (RPSQ scale)	0.774 (PPFSQ scale)	0.850 (DPSQ scale)	0.712

Demographic Details of Respondents: Most of the respondents at all phases are having more than three years of experience or association were purposively selected in my study. The details are shown in Table: 3. Age, Education Qualification, no.of patients per day in case of doctors was the other criteria used in selecting respondents. The total sample at each phase was divided taking three major cities as the basis.These cities were selected because Hyderabad is pharmaceutical and biotechnology hub known as India's pharmaceutical capital, Visakhapatnam known as Jawaharlal Nehru Pharma City (JNPC) is the only pharmaceutical Special Economic Zone in India, with 38 pharmaceutical companies and Rajahmundry is the eighth most populous city having huge patients from godavari districts.(Appendix-VI)

Table:3

Demographic Details of the Respondents

Respondents	Distributors			Retailers			Customers			Doctors	
Experience /Association	F	P		F	P		F	P		F	P
< 3 Years	16	7.3		2	.57		3	1		27	13.5
3-6 Years	25	11.4		80	22.8		150	50		72	36.0
6-9 Years	51	23.2		100	28.6		72	24		41	20.5
> 9 Years	128	58.2		168	48		75	25		60	30.0
Total	220	100.0		350	100		300	100		200	100.0
Region	F	P		F	P		F	P		F	P
Hyderabad	100	45.5		150	42.9		100	50		150	50.0
Visakhapatnam	60	27.3		100	28.6		50	25		75	25.0
Rajahmundry	60	27.3		100	28.6		50	25		75	25.0
Total	220	100.0		350	100.0		200	100.0		300	100.0
Age	F	P	E.Q	F	P	E.Q	F	P	NPD	F	P
< 25years	13	5.9	PE	11.4	40	PG	161	53.7	0-29	129	64.5
26-35years	138	62.7	BP	18.9	66	G	112	37.3	30-59	38	19.0
36-45years	49	22.3	DP	49.7	174	I	25	8.3	60-89	18	9.0
< 45 Years	20	9.1	NPE	20.0	70	NE	2	.6	>89	15	7.5
Total	220	100.0		100.0	350	Total	300	100.0	Total	200	100.0

Note:F-Frequency,P-Percent,EQ-Education Qualification,PE- Pharmaceutical Education,BP- Bachelor Of Pharmacy,DP- Diploma In Pharmacy,NPE- No Pharmaceutical Education,PG-Post Graduate, G-Graduate,*I*- Intermediate,NE- No Education, NPD:No of Patients per day

Sample Justification:

According to suggestion of Hair, Black, Babin and Anderson (2010), "Five subjects for one variable" was used for determination of total number of subjects for the sample of the explorative factor analysis. In the study 220 distributors, 350 chemists, 200 doctors and 300 consumers were selected purposively from the three major cities (Visakhapatnam, Hyderabad, and Rajahmundry) shown in Table: 4

Distributors: There are 21 attributes identified for the study, the ideal sample size should be 105(= 21*5). The present sample, n=220 distributors exceeds this requirement.

Retailers: There are 22 attributes identified for the study, the ideal sample size should be 110 (=22*5)). The present sample n=350 retailers exceeds this requirement.
Consumers: There are 31 attributes identified for the study, the ideal sample size should be 155 (=31*5). The present sample n=300 consumers exceeds this requirement.

Doctors: There are 22 attributes identified for the study, the ideal sample size should be 110 (=22*5). The present samples n=200 doctors exceed this requirement.

Table: 4

Proposed vs. Actual Sample of Research (figures are in numbers)

Respondents	Distributors	Chemists	Consumers	Doctors	Total
Proposed Sample (Five subjects for one attribute)	105	110	155	110	480
Actual Sample	220	350	300	200	1070

Another justification: Harris & Schaubroeck (1990), proposed a sample size of 200 at least to guarantee robust structural equation modelling. A sample of 200 doctors, 220 distributors and 350 retailers was used to develop the Structural Equation Model. The samples are adequate to represent the population of interest.

3.5: Data Analysis:

The collected data was analysed using multivariate data analysis tests with the help of Software tools such as Statistical Package for Social Sciences (SPSS-19) and Analysis of Moment Structures (AMOS-20). Exploratory Factor analysis was conducted using SPSS to identify the critical factors of service quality at the Pharmaceutical Company-Distributor-Chemist-Doctor-Patient Interface of the pharmaceutical supply chain. EFA was used to develop the theoretical model. Then Confirmatory Factor Analysis was used to test the theoretical models and confirm the dimensions and attributes developed in this research. Consequently, Distributor Perceived Service Quality scale, Retailer Perceived Service Quality Scale, Pharmacist Perceived functional Service Quality Scale and Doctor Perceived Service Quality scales were developed using AMOS software. The Cronbach alpha for the resultant scales was calculated to ensure scale reliability. Cronbach alpha is widely used as a means of assessing the reliability of a scale (Churchill Jr, 1979; DeVellis, 2003; Hair et al., 1998; Tabachnick & Fidell, 2001). Structural models were developed to test the hypothesized relationships between the constructs of

Distributor Perceived Service Quality and Satisfaction,

Retailer Perceived Service Quality and Satisfaction,

Pharmacist Perceived functional Service Quality and Satisfaction and

Doctors' Perceived Service Quality, Satisfaction and Doctor's Prescribing Behavior (Loyalty) Using SEM.

3.6: Assessing Measurement Model Validity:

The validity of the measurement model depends on the results of model fit indices. Most Structural Equation Modeling (SEM) programs provide multiple fit indices; the following section discusses the commonly used fit indices which were used in this study.

Absolute fit indices: These indices directly measure how well the specified model reproduces the observed or sample data. Commonly used measures are $\chi 2$, GFI, RMSEA. Incremental fit indices (Comparative fit indices): The most widely used incremental fit measures are TLI and CFI.

Validity of Measurement Model:

Validity is defined as the extent to which it measures what is intended to be measured". Wainer & Braun (2013), describe the validity in quantitative research as "construct validity". Construct validity is the extent to which a set of measured items actually reflects the theoretical latent construct those items are designed to measure (Hair et al., 2010). Construct validity is measured by establishing the face validity, convergent validity and discriminant validity. The face (content) validity is not measured numerically, but through general agreement among the respondents and experts that the measurement instrument covered all aspects of the variable being measured (Saraph, Benson & Schroeder, 1989). Convergent validity refers to the items that are indicators of a specific construct which ought to converge (Hair et al., 2010). Three ways are used to assess convergent validity: Factor loadings, Variance Extracted (VE) and Construct Reliability (CR) (Fornell & Lacker, 1981; Hair et al., 2010). The standardized loadings estimates should be 0.5 or higher, and ideally 0.7 or higher. A good rule of thumb is an AVE of 0.5 or higher indicates adequate convergent validity. The rule of thumb for a construct reliability estimate is that 0.7 or higher suggests good reliability. For Discriminant validity variance extracted ought to be greater than the squared correlation estimate. All the tests were conducted to ensure the validity of the models in my study.

Research Process

The steps followed in carrying out the research were described briefly

Step 1: The Research problem was stated. (I.e. the effect of service quality and satisfaction at different interfaces of the pharmaceutical supply chain)

Step 2: The various studies were reviewed to identify factors of service quality and satisfaction

Step3: A total sample of 1070 consisting of distributors, Retailers, doctors and Consumers from three major Indian cities were selected through nonprobability purposive sampling method.

Step4: Questionnaires were developed for various interfaces of the supply chain, after discussions and interviews with experts and academecians.

Step5: EFA technique was employed to identify the underlying dimensions of service quality.

Step6: CFA was applied. The framed hypothesis were tested using SEM

CHAPTER-IV

DATA ANALYSIS

4.1 Service Quality at the Manufacturer-Distributor Interface of the Pharmaceutical Supply Chain

Medicines are distributed to patients through the pharmaceutical supply chain. Drugs are produced at the manufacturing plants and are moved to wholesale distributors, stocked at retailers and eventually disseminated to consumers. Manufacturers manage the real delivery of drugs. Very limited drugs are dispersed straight to consumers. Manufacturers play a very vital role in ensuring that drug reaches customers securely and perfectly in the pharmaceutical supply chain. Hence, this section mainly studies about the factors influencing service quality at the manufacturer– distributor interface, development of the Distributor perceived service quality scale and examines the impact of service quality on customer satisfaction. The SCM Practices followed in the selected company and the problems of distributors are discussed. From the literature review and discussions with experts and academicians a questionnaire (Appendix 1) was developed based on one of the most accepted service quality models, namely (SERVQUAL- Parasuraman *et al*., 1988, 1991). A sample of 220 distributors of one major Indian pharmaceutical company from three major cities Pradesh, India were selected purposively.

4.1.1 Critical Factors of Service Quality as perceived by Distributors about Manufacturers

To identify the important dimensions of service quality at the Manufacturer-Distributor interface, EFA techinque was employed. The factor analysis identified four critical factors (Table: 7) which were named as Responsiveness, Assurance, Reliability and Communication (based on Eigen values>1). Kaiser-Meyer-Olkin (KMO), a measure of sampling adequacy must exceed 0.50 and the value above 0.8 is considered meritorious (Hair et al., 2010). Table: 5 shows the value of KMO is 0.905. The total variance explained by all these four factors was 62 percent (Table:6). The results were significant at 0.05, $\chi 2$ =2028.577 (p = 0.000) which clearly indicate the suitability of factor analysis.

Table 5

Results of KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.905	
Bartlett's Test of Sphericity	Approx. Chi-Square	2028.577
	df	171
	Sig.	.000

Table:6

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.66	40.32	40.328	7.66	40.32	40.32	4.48	23.57	23.57
2	1.98	10.43	50.761	1.98	10.43	50.76	2.84	14.94	38.52
3	1.17	6.16	56.930	1.17	6.16	56.93	2.79	14.72	53.251
4	1.04	5.47	62.404	1.040	5.474	62.40	1.739	9.15	62.40
5	.866	4.55	66.960						
6	.810	4.26	71.225						
7	.757	3.98	75.209						
8	.663	3.48	78.697						
9	.549	2.88	81.585						
10	.513	2.70	84.285						
11	.449	2.36	86.646						
12	.430	2.262	88.908						
13	.404	2.125	91.033						
14	.344	1.808	92.841						
15	.330	1.737	94.578						
16	.304	1.599	96.177						
17	.255	1.342	97.519						
18	.251	1.323	98.842						
19	.220	1.158	100.000						

Note: Extraction Method: Principal Component Analysis.

Table 7

Rotated Component Matrix

Items	Components			
	RE	AS	RL	C
Company has customer's interest at heart-D1	.737			
The company shows keen interest in solving your complaints relating to drugs-D2	.714			
The company takes regular feedback about the product Performance-D3	.710			
The Company provides information about potential drug diversion or inappropriate use –D4	.687			
The company informs you of the changing market requirements regularly –D5	.686			
The company regularly interacts with you to understand your requirements-D6	.645			
The Company informs about new drugs, dosages and distribution systems related with alternative products –D7	.638			
Medical Representatives of the company visit frequently D8	.521			
The Company works regularly with distributors to jointly solve problems –D9		.725		
The Company possesses the necessary information technology –D10		.657		
The Company works with distributors to jointly plan future activities –D11		.654		
The Company has good relationships with distributors –D12		.618		
All distribution members are familiar with the Marketing Code of Ethics –D13		.578		
Medical Representatives give you reliable information –D14			.719	
The Company shares demand-related information with distributors-D15			.696	
The company established supply chain performance rates against competitors –D16			.616	
The Company puts serious effort in building trust and commitment with all members –D17			.567	
The company takes your suggestions into consideration with regard to improvement of the product quality-D18				.848
There is no uncertainty involved in the promotion of Company's Products-D19				.595

Note: Factor Loadings based on Principal Component Analysis and Varimax Rotation with Kaiser Normalization (Rotation converged in 4 iterations)RE-Responsiveness,AS-Assurance,RL-Reliability,C-Communication

Reliability test for the data collection instrument indicated that the Cronbach alpha is 0.914 satisfying the reliability criteria (acceptable standard is 0.5). Reliability for all the constructs surpassed the recommended level of 0.60 shown in Table-8 which indicates the strong reliability of the instrument.

Table 8

Reliability Statistics

	Scale Mean If Item Deleted	Scale Variance If Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha If Item Deleted	Cronbach's Alpha of 19 Items
D1	52.53	97.64	.763	.903	0.91
D2	52.43	101.36	.657	.907	
D3	52.65	100.69	.619	.907	
D4	52.62	98.70	.635	.907	
D5	52.75	98.59	.649	.906	
D6	52.60	102.04	.512	.910	
D7	52.65	100.81	.665	.906	
D8	52.30	100.82	.602	.908	
D9	52.12	99.935	.616	.907	
D10	51.86	108.05	.286	.914	
D11	52.17	100.12	.604	.908	
D12	52.18	99.60	.618	.907	
D13	52.04	110.67	.102	.918	
D14	52.44	99.59	.628	.907	
D15	52.31	99.59	.588	.908	
D16	51.88	106.68	.519	.911	
D17	52.42	98.93	.658	.906	
D18	52.55	105.17	.399	.913	
D19	52.49	100.43	.608	.908	

4.1.2: Scale Development and Validation

The study used AMOS 20.0 to run the CFA for all the constructs by means of structural equation modeling which was used to evaluate the underlying four factor model where individual items in the model were examined to understand how closely they represent the same construct. The output of explorative factor analysis was considered as underlying measurement model for CFA. The process started with preliminary analysis of the data and developing individual CFA model for each factor of the theoretical factor structure that was identified in EFA. (Table 7).Several runs of CFA were conducted until satisfactory goodness of fit statistics was obtained. During this process, four items with low variance were removed. After deletion of four items,

a valid scale with four dimensions and fifteen items emerged which is shown in Fig: 8 the scale emerged after CFA was assessed for goodness of fit statistics.

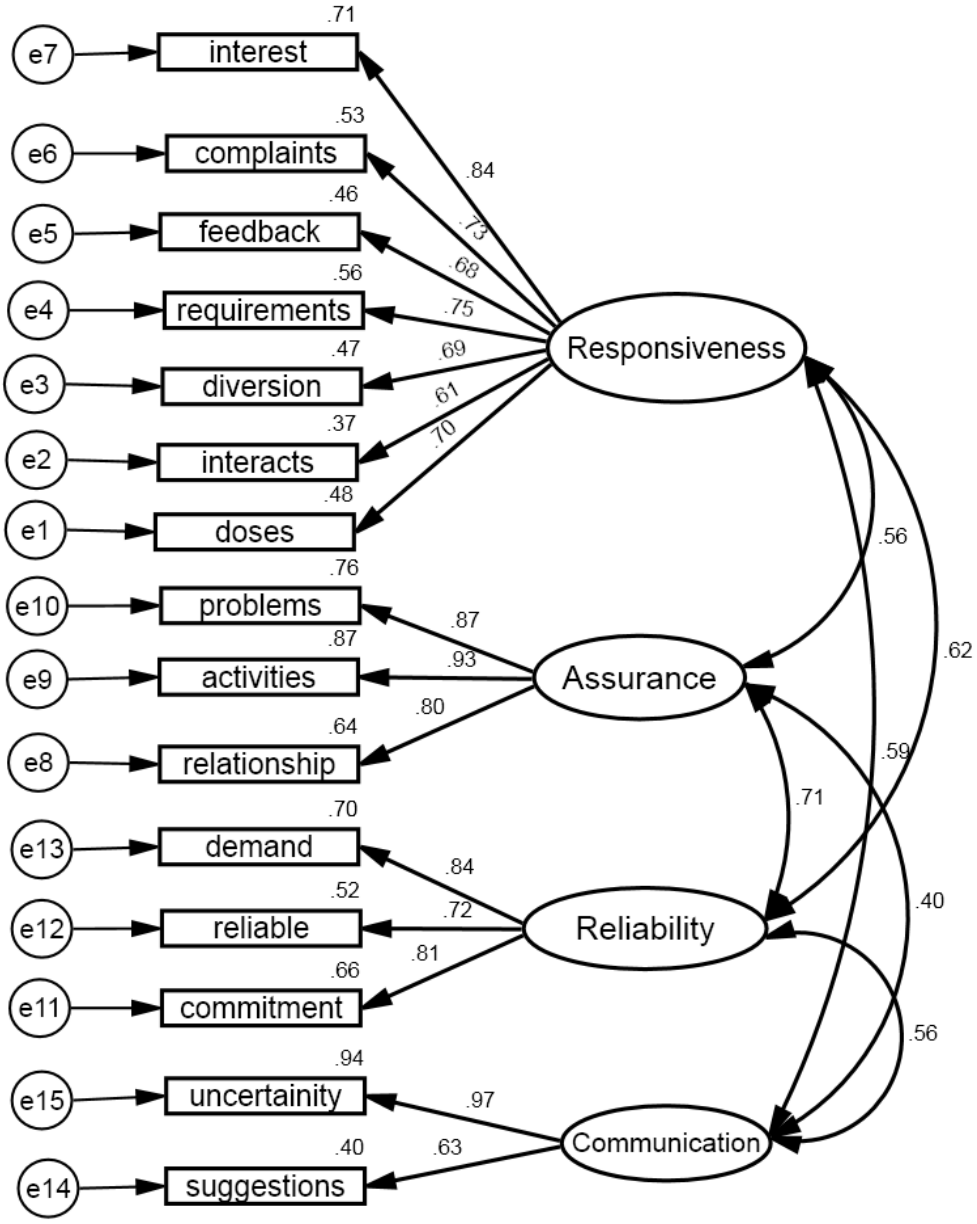

Figure: 8 -Distributor Perceived Service Quality Scale

Model Fit*:* The scale was examined in terms of goodness of fit statistics. The p-value of 0.00 for the Chisquare statistics implies good absolute model fit. RMSEA value (0.076) is between 0.03 and 0.08, indicates an acceptable level of internal consistency (Hu and Bentler, 1999) and also implies that the model theory fits the sample data (Hair et al., 2010). The fit indices RMR(0.047),NFI(0.901),IFI(0.942),CFI (0.941),TLI(0.926) are all within the

recommended tolerances except for GFI(0.897) and AGFI(0.852). The normed Chi-square (191.433) is also within the broader recommended range. The amount of squared multiple correlations for all dimensions in the model are more than 0.5 thus indicating acceptable squared factor loadings. All the factor loadings in the CFA model developed are statistically significant at level of significance of 0.001. The fit indices reflect acceptable level of fit and all the indices are within recommended tolerances. (See Table -9).

Table 9

The CFA Goodness of Fit Indices of Scale

	Model value	Key goodness of fit indices/level of acceptable fit
Chi square-191.433 df=84	2.27	If chisquare /df => 0.05 = good fit,< 2 = over fit,≤ 5= Good fit, >5 = adequate fit
P	0.00	P < 0.001
GFI	0.897	≥ 0.9 indicates Good fit
AGFI	0.852	≥ 0.9 indicates Good fit
NFI	0.901	≥ 0.9 indicates Good fit
CFI	0.941	≥ 0.9 indicates Good fit
RMR	0.047	0.05 = Good fit,Between0.05 to 0.1,Reasonable fit
RMSEA	0.076	≤ 0.05 = Good fit,Between0.05 to 0.1,Reasonable fit
IFI	0.942	≥ 0.9 is Good fit
TLI	0.926	≥ 0.9 is Good fit, Between 0.850 to 0.9 Reasonable fit

Validity of Measurement Model:

All validity tests were conducted to validate the four service quality constructs.

Face (Content) Validity: The Questionnaire was developed based on broadly used service quality measurement -SERVQUAL scale (Parasuraman et al., 1988, 1991). The necessary modifications were made in the questionnaire based on suggestions from various experts and academecians thus satisfying the validity criteria.

Convergent validity: Factor Loadings, Variance Extracted (VE) and Construct Reliability (CR) (Fornell & Larcker, 1981; Hair et al., 2010) are used to test Convergent validity. The standardized loadings estimates should be 0.5 or higher, and

ideally 0.7 or higher. A good rule of thumb is an AVE of 0.5 or higher indicates adequate convergent validity. The rule of thumb for a construct reliability estimate is that 0.7 or higher suggests good reliability. The results of the study (table-10) show that AVE is above 0.5 and C.R is above 0.7 satisfying the above criteria. The CFA standardized factor loadings of each variable in this study is above 0.50. In addition, all Eigen values of constructs are greater than 1.0 also confirm convergent validity (Hair et al., 2010). The study identified that all the extracted variance estimates are greater than squared inter-construct correlations, satisfying discriminant validity (Table-11).Thus, the measurement model reflects good model fit, construct validity and reliability.

Table 10

CFA Results of Distributors Perceived Service Quality Scale

Constructs	Attributes	SE	C.R	alpha	AVE
Responsiveness	The Company educates about new drugs, doses or delivery systems related with alternative products	.695	0.874	0.845	0.51
	The company regularly interacts with you to understand your requirements	.606			
	The Company provides information about potential drug diversion or inappropriate use	.688			
	The company informs you of the changing market requirements regularly	.746			
	The company takes regular feedback about the product Performance	.682			
	The company shows keen interest in solving your complaints relating to drugs	.725			
	Company has customer's interest at heart	.843			
Assurance	The Company has good relationships with distributors	.801	0.903	0.899	0.759
	The Company works with distributors to jointly plan future activities	.933			
	The Company works regularly with distributors to jointly solve problems	.874			
Reliability	The Company puts serious effort into building trust and commitment with all members	.811	0.833	0.829	0.627
	Medical Representatives give you reliable information	.721			
	The Company shares demand-related information with distributors	.839			
Communication	The company takes your suggestions into consideration with regard to improvement of the product quality	.629	0.793	0.756	0.668
	There is no uncertainty involved in the promotion of Company's Products	.970			

Note : S.E-Standardised Estimates,A.V.E-Average Variance Extracted,C.R-Construct Reliability

Table-11

AVE and Squared Inter-Construct (covariance) Correlations (SIC) for Discriminant Validity Analysis

Dimensions	Responsiveness	Assurance	Reliability	Communication
Responsiveness	0.51			
Assurance	.220*.220=0.05	0.759		
Reliability	.264*.264=0.07	350*.350=0.12	0.63	
Communication	0.179*.179=0.03	.143*.143=0.02	218*.218=0.05	0.67

Note: AVE in the diagonal and squared correlations off-diagonal

Assessment of unidimensionality using goodness of fit statistics, scale reliability and construct validity therefore confirmed that the scale which emerged during CFA (Figure 1) is a good model. It has four dimensions (reliability, assurance, responsiveness and communication) and fifteen items. This model constitutes a service quality scale for measurement of service quality at the manufacturer (company) – distributor (customer) interface of pharmaceutical supply chain.

CFA of Customer Satisfaction:A four item scale was used to measure customer satisfaction derived from the literature. The Satisfaction dimension consisted of four indicators namely satisfaction with quality of the drugs, quality of the service, relationship with the company and overall satisfaction with the company. Fig: 9 presents the schematic representation of the CFA model for satisfaction. It can be seen that the factor loadings are significantly loaded to the dimension. The fit indices of the CFA model of satisfaction are in the accepted level. The absolute fit indices -GFI (0.937), RMR (0.01)) and incremental fit indices -NFI (0.948) and CFI (0.950) are all above the recommended minimum value indicating an acceptable level of fit (Table-12). In the same way, the AVE and CR values are 0.66 and 0.88 respectively (Table:13) that meet the minimum level 0.50 for AVE and 0.70 for CR (Hair et al., 2010). It indicates the dimension of satisfaction has construct validity and reliability.

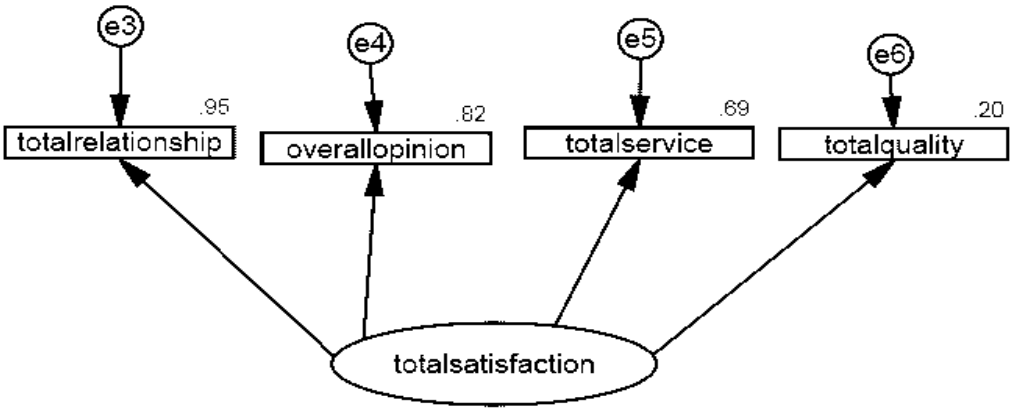

Figure: 9 CFA Model of Satisfaction

Table:12

Model Validity Statistics

GFI	NFI	CFI	RMR	RMSEA	IFI	TLI
0.937	0.948	0.950	0.011	0.270	0.951	0.851

Table-13

CFA Results of Satisfaction

Attributes	Factor Loadings	Squared Loadings	C.R	AVE
Total Quality	0.973	0.202	0.88	0.66
Total Service	0.905	0.694		
Overall Opinion	0.833	0.819		
Total Relationship	0.45	0.946		

4.1.3: Distributor Perceived Service Quality-Satisfaction Model

The full structural model is shown in Fig:10. This model incorporates all the hypothesized relationships to demonstrate a direct relationship between Distributors Perceived Service Quality and Satisfaction. The impact of reliability, assurance, responsiveness and communication on distributor perceived Service quality and satisfaction was tested in this model. The overall model is examined using SEM. The results of the research model are reported in Table-15..The structural model showing all the standardised paths is presented in Table 16.

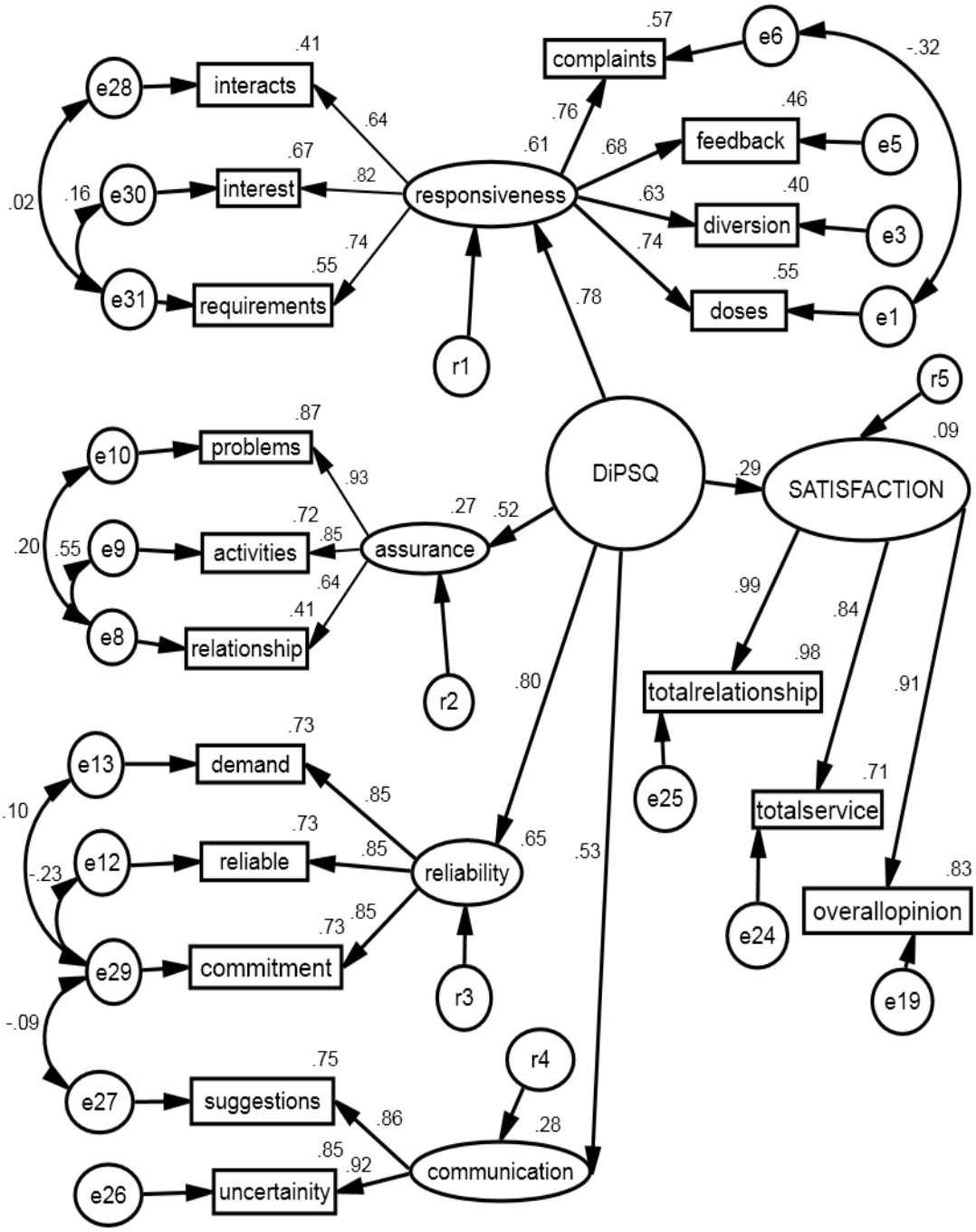

Figure: 10- Distributor Perceived Service Quality -Satisfaction Model

Model fit Assessment: The table 14 displays the model fit indices of the model. The df value is 2.16 indicates that the model is acceptable. All fit indices are at an accepted level i.e above 0.90 except GFI and AGFI. The RMSEA value is less than 0.08 which indicates model theory fits the sample data (Hair et al., 2010).

Table 14

Goodness of Fit of Full structural model

GFI	AGFI	NFI	CFI	RMR	RMSEA	IFI	TLI	χ^2	Df	χ^2/df
.879	.839	.900	.94	.088	.007	.94	.93	278.6	129	2.16

Model Fit Assessment: Validity and Reliability:

The validity of the model is based on convergent validity. The table-15 presents the significant standard loadings, Average Variance Extracted (AVE) and Construct Reliability (CR). All the constructs have significant standardized loadings and AVE values range from 0.5 to 0.84.The construct reliability values are also above 0.70 for all the constructs. It indicates that the constructs have convergent validity

Table 15

AMOS Results of Structural Model

Regression paths- DiPSQ	SL	SMC	P	AVE	CR
Responsiveness- DiPSQ					
Doses—Responsiveness	.739	.546	0.00	0.5	0.79
Diversion- Responsiveness	.634	.402			
Feedback- Responsiveness	.681	.464			
Complaints- Responsiveness	.758	.575			
Assurance- DiPSQ					
Relationship- assurance	.644	.415	0.00	0.67	0.85
Activities- assurance	.848	.719			
Problems- assurance	.931	.867			
Reliability- DiPSQ					
Reliable- Reliability	.852	.726	0.00	0.72	0.84
Demand- Reliability	.853	.728			
Communication- DiPSQ					
Uncertainty- Communication	.922	.850	0.00	0.798	0.89
Suggestions- Communication	.864	.746			
Satisfaction					
Total service- Satisfaction	.844	.713	0.00	0.84	0.94
Total relationship- Satisfaction	.992	.984			
Overall opinion- Satisfaction	.909	.827			

Note: P-Probability level of 0.001, AVE-Average Variance Extracted, CR-Construct Reliability, SMC-Squared Multiple Correlations,SL-Standardised Loadings

Results of Testing of Hypothesis:

The overall model is presented from hypothesis-1 to hypothesis-5. This model incorporates all the hypothesized relationships to demonstrate a direct relationship between Distributors Perceived Service Quality and Satisfaction. The results of the SEM of the research model proposed are reported in Table-16. The results indicate that the pathway from distributor perceived service quality to satisfaction is significant ($p<0.00$) with a standardised regression weight of 0.29. Therefore the hypothesis that Distributors perceived service quality (DiPSQ) affects the level of satisfaction is supported in this study.

The hypothesis (1a) "Reliability have a significant effect on DiPSQ" is significant ($p<0.001$) and the standardized regression weight is 0.803.Therefore the hypothesis that Reliability affects DiPSQ"is supported.

The hypothesis (1b) "Assurance have a significant effect on DiPSQ"is significant ($p<0.001$) and the standardized regression weight is 0.522. Therefore the hypothesis that Assurance affects DiPSQ is supported

The hypothesis (1c) "Responsiveness have a significant effect on DiPSQ" is significant ($p<0.001$) and the standardized regression weight is.0.781.Therefore the hypothesis -Responsiveness affects DiPSQ is supported

The hypothesis (1d) "Communication have a significant effect on DiPSQ" is significant ($p<0.001$) and the standardized regression weight is.0.530.Therefore the hypothesis Communication affects DiPSQ is supported

The fifth hypothesis (H5) "DiPSQ have a significant effect on Satisfaction" is significant ($p<0.001$) and the standardized regression weight is.0.292.Therefore the hypothesis DiPSQ affects Satisfaction is supported

Table:16

Standardized Regression Weights for Path Relationships

Construct Relationship	SRW	Sig	Result
1a: Reliability has a significant effect on DiPSQ	0.803	0.00	Supported
1b :Assurance has a significant effect on DiPSQ	0.522	0.00	Supported
1c:Responsiveness has a significant effect on DiPSQ	0.781	0.00	Supported
1d:Communication has a significant effect on DiPSQ	0.530	0.00	Supported
1e:DiPSQ has a significant effect on Satisfaction	0.292	0.00	Supported

Note:SRW-Standardised Regression Weights,Sig-Significance

4.1.4: Supply Chain Management Practices of the Selected Company:

The present study has made use of the widely recognized SCOR model (Supplychain operations Reference Model) for examining the Supply chain management practices followed in the selected company. SCOR is a cross industry model that contains standard process definitions and metrics matching supply chain processes against best practices. In this study SCM practices were compared with the best in class practices using SCOR model. This model (shown in Fig: 11) evaluated the supply chain from four perspectives- Supply chain Reliability, Supply chain Responsiveness, Supply chain flexibility and Supply chain Asset Management efficiency.

Certain metrics like delivery time, on time deliveries, supplies made as per the quantity ordered and Procurement time and production cycle time were used to identify the rate at which the supply chain provides products to the customers. From the study it was found that around 80 percent of the companies' production cycle time was less than 20 days and in only 20 percent of cases it was less than 3 days. Almost 75 percent of company said that it could meet up to 20 percent of the demand surge when there is an unexpected increase in demand (i.e -Supply chain flexibility). An organization's efficiency is determined on the basis of asset management. Cash to-cash cycle time, Work in progress inventory, finished goods, inventory turnover Metrics were used for measuring asset management efficiency. Finished goods inventory in majority of the cases was held for less than 7 days. Cash to cash time is above 90 days in 30 percent of cases while for 25 percent of the cases it was less than 30 days. Inventory turnover in 40 percent of the cases was 8-14 days. 38percent of distributors said that the costs associated with operating the supply chain were 3-5 percent. Hence it can be concluded that the Pharmaceutical Company's Performance is comparatively better in terms of reliability, responsiveness and flexibility.

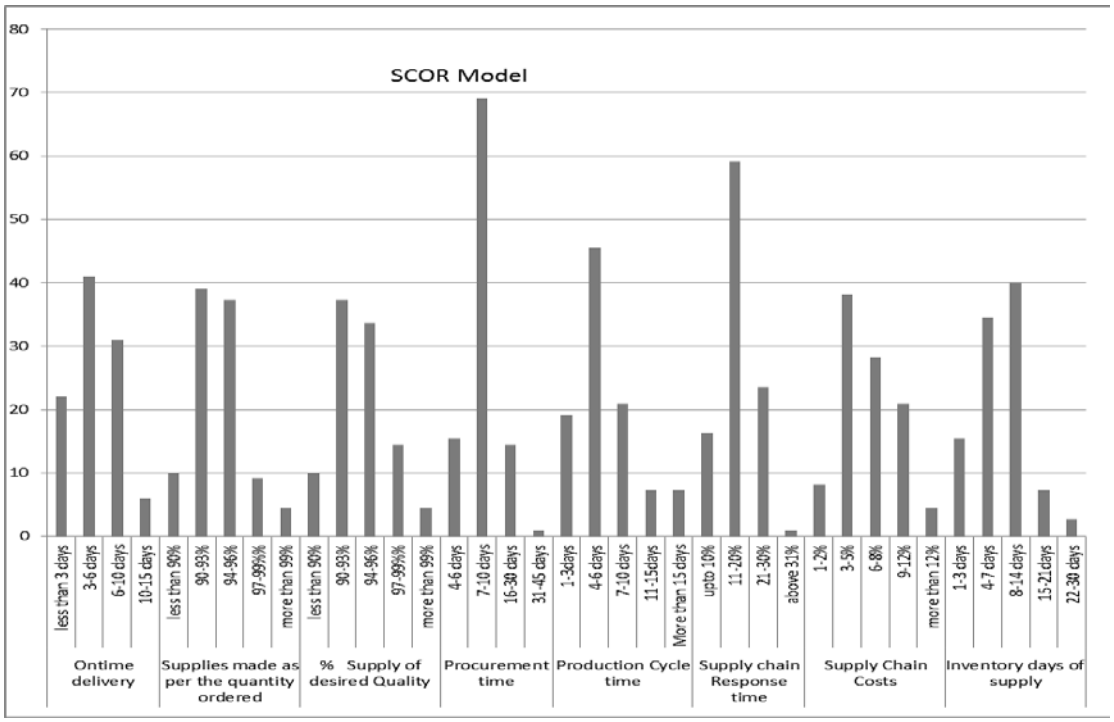

Figure: 11 -SCOR Model

The company's performance was compared with the best in class Practices (Fig: 12) As far as Supply Chain Reliability and Supply Chain Asset Management Efficiency was concerned the selected Company was comparatively better in terms of on time delivery and inventory turnover. The analysis revealed that the company is still far away from best in class practices indicating that it got a remarkable opportunity to lower costs, improve asset management, improve delivery time and enhance customer service by improving the supply chain practices.

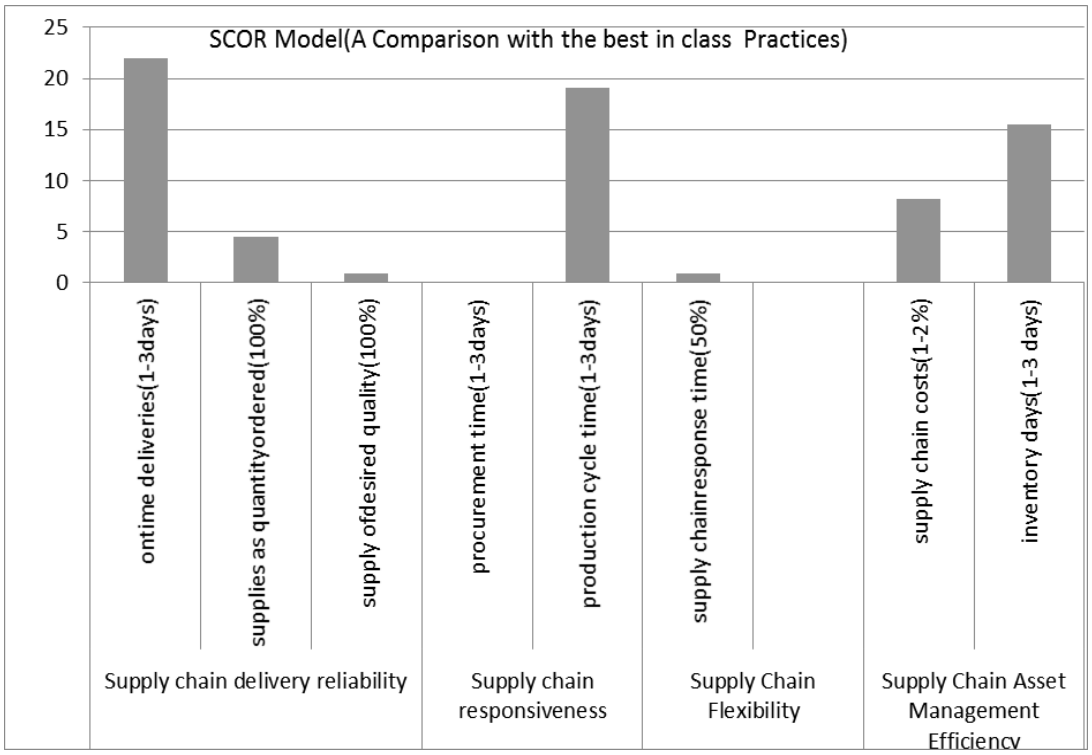

Figure: 12-SCOR Model (A Comparison with the best in class Practices)

The top three supply chain management process followed in the company include Production planning, Inventory Replenishment, Demand Management (forecasting), followed by order fulfillment, process design, inventory management, transportation management and product development. The major responsibilities of supply chain function in the company are planning and deploying inventory effectively, reducing transportation costs, maximizing customer service, reducing warehousing costs, reducing inventory costs, decreasing manufacturing cycle time, better managing the demand, innovating new products and services, providing predictable delivery performance. The Procedures used in company to support supply chain management are Material requirement planning, advanced planning system, theory of constraints, bar coding and just in time. The main Supply chain issues in this company are customer service, quality management and transportation. Third party logistics are used for customs clearance agents and transportation. The supply chain is supported by a powerful IT infrastructure, Emails, faxes, Intranet, Internet, ERP (Enterprise Resource Planning). The Information exchange between members is timely and adequate.

4.1.5 Problems faced By Distributors:

From the Figure: 13 it was found that the problems of packaging, delay ,warehousing and too many players in Hyderabad, spurious drugs, shelf life and returned goods in Visakhapatnam, packaging, labeling and returned goods in Rajahmundry were the major problems faced by distributors which are actually affecting the performance of the chain.

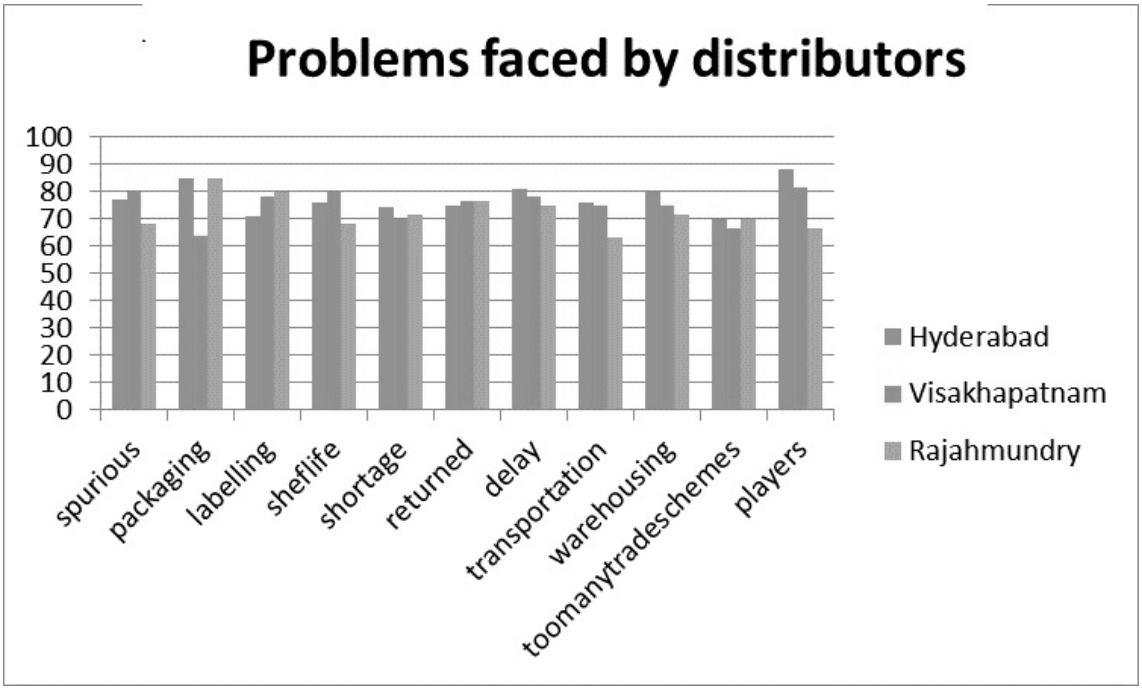

Figure13: Problems faced by distributors

4.2: Service quality at The Distributor-Retailer Interface of the Pharmaceutical Supply Chain

The Indian drug distribution system consists of the drug manufacturers; CFAs /super stockiest; stockiest; wholesalers and chemists. (Fig: 14). In principle, each of the larger pharmaceuticals producers has one CFA in each of India's States; in practice, especially in the case of a larger company, there may be several in each of the larger States. Stockiest/wholesalers: Stockiest typically market products of 6-8 pharmaceutical companies, only a few distribute products of more than 50 companies. The remainder of the market is made up of a large number of small-scale suppliers, who often act as prescribers as well as retailers. Distributors play very significant role in providing quality service and in effecting the supply chain performance. In this scenario an attempt was made to study the critical factors of service quality at the distributor-retailer interface of the pharmaceutical supply chain and examine how service quality effects customer satisfaction.

Primary data was collected through survey method. From the available literature and discussions had with the experts and academicians, a questionnaire (Appendix-II) was developed using SERVQUAL (Parasuraman *et al.,* 1988) as the basis. Research Scholars were employed to get the data from distributors and chemists. It almost took six months' time period to collect the data. A Sample of 220 distributors was selected from the chosen major Indian Pharmaceutical company. A Sample of 350 Retailers (druggists/chemists) member of All Indian Organization of Chemists and Druggists (AIOCD Ltd.) were purposively selected from three major cities.

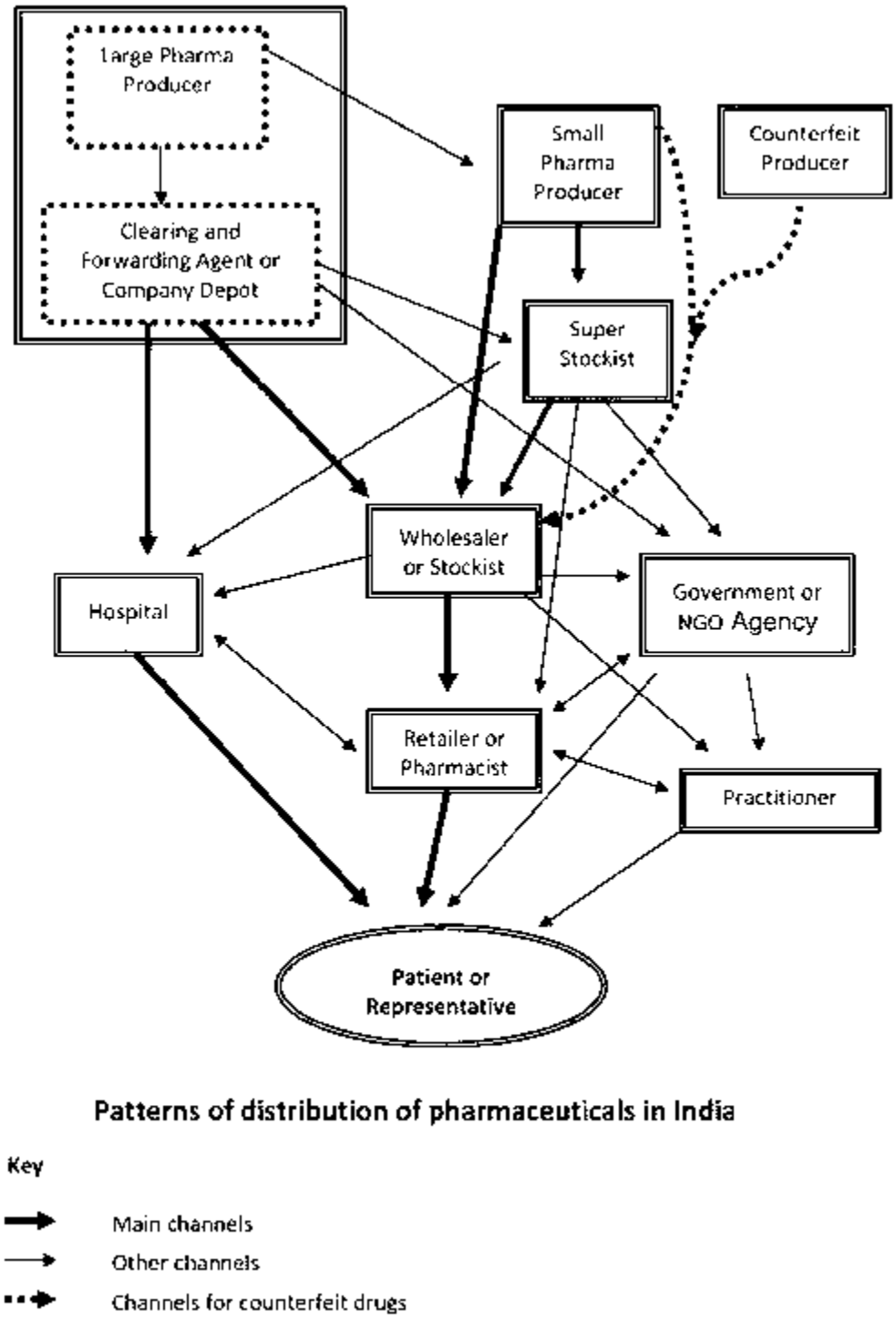

Figure: 14-Patterns of distribution of Pharmaceuticals in India

4.2.1: Critical Factors of Service Quality from Distributors' Perspective

EFA was conducted to know the critical service quality factors as perceived by distributors at Distributor–Retailer Interface of the chain. The analysis extracted three factors which were named as Reliability, Assurance and Empathy (based on Eigen values>1) (Table 19). The total variance explained by all these factors was 59 percent; (shown in Table 18) The KMO is 0.851 indicating the efficiency of the test (Table 17). Reliability test for the data collection instrument indicated that the Cronbach alpha is 0.828 satisfying the reliability criteria (acceptable standard is 0.5). (Table 20)

Table 17
Results of KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.851
Bartlett's Test of Sphericit	Approx. Chi-Square	1078.142
	df	78
	Sig.	0.000

Table 18

Total Variance Explained

C	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.762	36.63	36.63	4.762	36.634	36.632	4.60	35.401	35.401
2	1.792	13.79	50.41	1.792	13.785	50.42	1.76	13.526	48.928
3	1.141	8.781	59.20	1.141	8.781	59.202	1.33	10.272	59.200
4	.936	7.200	66.39						
5	.783	6.02	72.42						
6	.746	5.73	78.16						
7	.589	4.53	82.69						
8	.550	4.22	86.92						
9	.446	3.43	90.35						
10	.396	3.05	93.39						
11	.370	2.84	96.24						
12	.293	2.26	98.49						
13	.196	1.51	100.00						

Extraction Method: Principal Component Analysis.C-Components

Table 19

Rotated Component Matrix

Items description	Dimensions		
	Reliability	Assurance	Empathy
The physical facilities at distribution Centre are visually clean- P1	.823		
Distributor effectively handles the expired / counterfeit drugs issue-P2	.822		
Individual responsibilities are clearly defined-P3	.818		
Distributor responds immediately to Enquiries-P4	.801		
Distribution Members share responsibility for the quality and safety of products-P5	.800		
Vehicles used in the transportation are visually in a good condition-P6	.772		
Records are kept confidential-P7	.734		
Methods designed for payments are convenient-P8		.696	
Distribution Centre has suitable office working hours-P9		.610	
Distribution Centre personnel fulfill specific requirements-P10		.594	
All required information is available on bill provided-P11		.550	
Competent personnel are available for delivery-P12			.849
Personnel in the distribution Centre have the knowledge to answer customers questions-P13			.687

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 20

Reliability Statistics

	Scale Mean If Item Deleted	Scale Variance If Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha If Item Deleted	Cronbach's Alpha Of 13 Items
P1	40.77	34.407	.649	.800	0.828
P2	40.80	35.378	.688	.799	
P3	40.79	33.107	.761	.789	
P4	40.80	34.355	.684	.797	
P5	40.80	33.789	.704	.795	
P6	40.88	33.816	.626	.803	
P7	40.90	35.250	.644	.802	
P8	40.44	40.586	.337	.825	
P9	40.34	41.605	.258	.828	
P10	40.41	41.101	.283	.827	
P11	40.31	43.641	-.051	.847	
P12	40.45	42.111	.129	.836	
P13	40.49	41.895	.137	.836	

4.2.2: Critical factors of Service Quality from Retailers' Perspective:

The critical service quality factors as perceived by Retailers at the Distributor – Retailer interface were identified through EFA. It extracted six factors (Tables: 23) named as Reliability, Responsiveness, Assurance, Empathy Tangibles and facilities (based on Eigen values>1) explaining 61 percent of the total variance. (Table: 22). The value of (KMO) is 0.692. The results of Bartlett test of Sphericity shows that it is highly significant (sig. 0.000), which suggests that factor analysis is appropriate (Table:21). Reliability test for the data collection instrument indicated that the Cronbach alpha is 0.749 satisfying the reliability criteria (acceptable standard is 0.5).

Table :21

Results of KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.692
Bartlett's Test of Sphericity	Approx. Chi-Square	1083.128
	df	136
	Sig.	.000

Table: 22

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Components	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.36	19.80	19.80	3.36	19.80	19.80	1.948	11.45	11.45
2	2.33	13.76	33.56	2.34	13.76	33.56	1.944	11.43	22.89
3	1.34	7.91	41.47	1.34	7.90	41.47	1.772	10.42	33.31
4	1.29	7.62	49.09	1.29	7.62	49.09	1.738	10.22	43.53
5	1.13	6.69	55.77	1.13	6.67	55.77	1.642	9.66	53.20
6	1.04	6.16	61.93	1.04	6.16	61.93	1.485	8.73	61.93
7	.97	5.72	67.65						
8	.88	5.17	72.83						
9	.74	4.40	77.23						
10	.69	4.08	81.31						
11	.60	3.58	84.90						
12	.53	3.14	88.04						
13	.50	2.95	90.99						
14	.44	2.59	93.59						
15	.41	2.43	96.02						
16	.35	2.09	98.11						
17	.32	1.88	100.000						

Extraction Method: Principal Component Analysis.

Table 23

Rotated Component Matrix

Items	RL	RS	T	E	F	A
Personnel in the distribution Centre have the knowledge to answer your questions –S1	.79					
Distributor effectively handles the expired/counterfeit drugs issue-S2	.52					
All required information is available on invoice provided –S3		.76				
Personnel in the distribution Centre have the authority to solve your problems –S4		.65				
Distributor provides services at short notice (if required)-S5		.56				
A batch tracking system is used to enable specific batches to be traced during the distribution process. S6		.49				
Vehicles used in the transportation are visually in a good condition -S7			.76			
Distribution Centre has suitable office working hours –S8			.72			
Distributor has sufficient facilities for storing drug products-S9			.61			
The physical facilities at distribution Centre are visually clean–S10				.82		
Distribution Centre personnel give individual attention –S11				.57		
Distribution Centre personnel fulfill specific requirements –S12				.54		
Distributor responds immediately to enquires –S13				.51		
Storage areas are clean and dry and maintained within acceptable temperature limits-S14					.84	
Order taking / delivery methods are accurate-S15					.73	
Payment information is kept confidential –S16						.85
Personnel at the distribution Centre are trained –S17						.62

Note:RL-Reliability, RS-Responsiveness, E-Eampathy, F-Facilities, A-Assurance

Table:24

Reliability Stastics: (Item-Total Statistics)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach' Alpha of 17 items
S1	50.79	49.47	.39	.73	0.75
S2	50.40	49.81	.34	.74	
S3	50.26	50.77	.37	.73	
S4	50.67	52.00	.27	.74	
S5	50.49	50.55	.38	.73	
S6	50.59	52.20	.19	.75	
S7	50.19	49.87	.41	.73	
S8	50.12	47.70	.52	.72	
S9	49.92	49.13	.45	.72	
S10	50.23	53.25	.19	.75	
S11	50.68	51.05	.42	.73	
S12	50.83	51.02	.42	.73	
S13	50.57	52.22	.19	.75	
S14	50.13	51.67	.22	.75	
S15	50.29	52.09	.22	.75	
S16	50.47	50.69	.29	.74	
S17	50.51	48.48	.45	.73	

4.2.3 Scale Development and Validation

The study used AMOS 20 to run the CFA for all the constructs by means of structural equation modeling which was used to evaluate the underlying four factor model where individual items in the model were examined to understand how closely they represent the same construct. The output of explorative factor analysis was considered as underlying measurement model for CFA. The process started with preliminary analysis of the data and developing individual CFA model for each factor of the theoretical factor structure that was identified in EFA (see Table-23). Several runs of CFA were conducted until satisfactory goodness of fit statistics was obtained. During this process, items with low variance were removed. After deletion of these items, a valid scale (RPSQ) with three dimensions and nine items emerged. (See Fig: 15).The scale emerged after CFA was assessed for goodness of fit statistics.

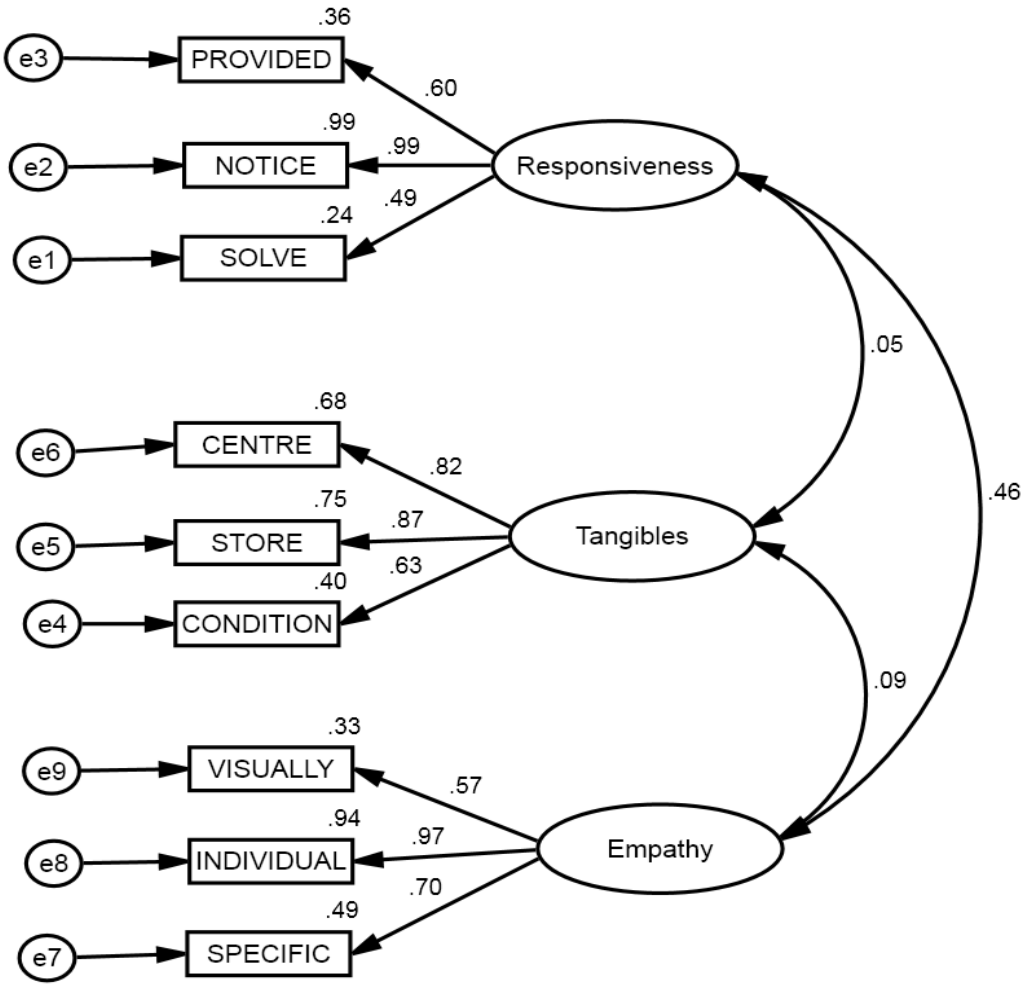

Figure:15- Retailers' Perceived Distributors' Service Quality Scale

Model Fit: The scale was examined in terms of goodness of fit statistics. The p-value of 0.00 for the Chisquare statistics implies good absolute model fit. RMSEA value (0.068) is between 0.03 and 0.08 which indicates an acceptable level of internal consistency. The fit indices RMR(0.049), GFI(0.962) NFI(0.940),IFI(0.964),CFI (0.964),TLI(0.946) and AGFI(0.929) are all within the recommended tolerances . The normed Chi-square (57.641) is also within the broader recommended range. The amount of squared multiple correlations for all dimensions in the model are more than 0.5 thus indicating acceptable squared factor loadings. All the factor loadings in the CFA model developed are statistically significant at level of significance of 0.001. The fit indices reflect acceptable level of fit and all the indices are within recommended tolerances. (See Table-25).

Table : 25

The CFA Goodness Of Fit Indices Of Scale

GFI	AGFI	NFI	CFI	RMR	RMSEA	IFI	TLI	P	X^2	df
0.96	0.93	0.94	0.96	0.05	0.07	0.96	0.95	0.00	57.64	24

Reliability and Validity: The scale was examined in terms of reliability and validity. The overall value of Cronbach's coefficient α for the nine items in the scale developed after CFA is 0.722 and for the three dimensions individually is-Responsiveness: 0.730: tangibles: 0.815 and empathy: 0.778. Reliability for all the constructs exceeded suggested level of 0.60 (Nunnally, 1978). This indicates that each of the constructs identified was adequately captured by its indicators

Validity: The SERVQUAL scale was used as the basis for the questionnaire. It was finalized after thorough discussions with experts and academecians thus it has strong content validity.The results of the study in the Table 26 show that AVE is above 0.5 and C.R is above 0.6 satisfying the required criteria. In addition, all Eigen values of constructs greater than 1.0 also confirm convergent validity (Hair et al., 2006).

Table 26

CFA Results of Developed RPSQ Scale

Constructs	Attributes	SE	Cronbach Alpha	C.R	AVE
Responsiveness	Provided	0.60	0.730	0.68	0.52
	Notice	0.99			
	Solve	0.49			
Tangibles	Condition	0.63	0.815	0.84	0.61
	Store	0.86			
	Centre	0.82			
Empathy	Specific	0.70	0.778	0.80	0.58
	Individual	0.97			
	Visually	0.57			

In this study all the extracted variance estimates were greater than squared inter-construct correlations, (see Table-27) satisfying the discriminant validity

Table 27

AVE and Squared Inter-Construct (covariance) Correlations (SIC) for Discriminant Validity Analysis

Dimensions	Responsiveness	Tangibles	Empathy
Responsiveness	0.52		
Tangibles	0.012*0.012=0.000144	0.61	
Empathy	0.111*0.111=0.0123	0.030*0.030=0.06	0.58

Note: AVE in the diagonal and squared correlations off-diagonal

Assessment of unidimensionality using goodness of fit statistics, scale reliability and construct validity therefore confirmed that the scale which emerged during CFA (Figure: 4.2.2) is a good model. It has three dimensions (Responsiveness, Empathy and Tangibles) and nine items. This model constitutes a service quality scale for measurement of service quality at the Distributor-Retailer interface of pharmaceutical

CFA of Customer Satisfaction:

A three item scale was used to measure customer satisfaction derived from the literature. The Satisfaction dimension consisted of three indicators namely opinion about problems, quality of the service, and overall satisfaction. Fig: 16 presents the schematic representation of the CFA model for satisfaction.CFA was applied and the dimension- problem had to be removed as it was having low variance. Only quality of the service, and overall satisfaction were retained. As there are only two attributes the fitness indices could not be calculated. The AVE value was more than 0.68 and C.R value is 0.81.

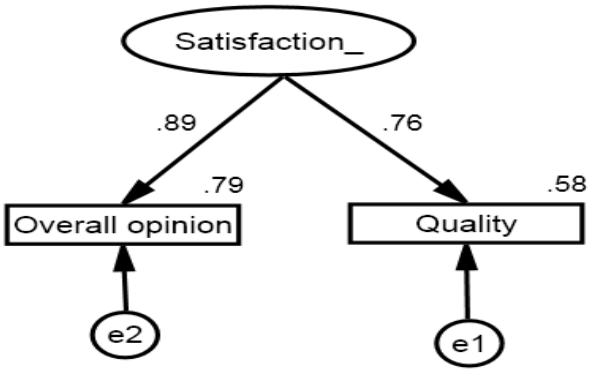

Fig: 16- Satisfaction Model

4.2.4: Retailers' Perceived Distributors' Service Quality-Satisfaction Model:

This final model was developed to test the impact of service quality on satisfaction using Structural Equation Modeling (Figure 17). The results of the specified model were examined with goodness of fit statistics. The p-value of 0.00 for the chisquare statistics implies good absolute model fit. RMSEA value (0.079) is between 0.03 and 0.08, indicates an acceptable level of internal consistency (Hu and Bentler, 1999) and also implies that the model theory fits the sample data (Hair *etal,* 2010). The fit indices RMR(0.060),GFI(0.930),NFI(0.898),IFI(0.932),CFI (0.931),TLI(0.912) are all within the recommended tolerances except AGFI(0.893). The normed Chi-square (122.296) is also within the broader recommended range. The amount of squared multiple correlations for all dimensions in the model are more than 0.5 thus indicating acceptable squared factor loadings. All the factor loadings in the CFA model developed are statistically significant at 0.001, level of significance. The fit indices reflect acceptable level of fit and all the indices are within recommended tolerances. (See Table: 28). The standardized regression weights in each pathway are provided in the (Table: 30). This model incorporates all the hypothesized relationships to demonstrate a direct relationship between service quality and satisfaction.

Table 28
The CFA Goodness of Fit Indices of Scale

GFI	AGFI	NFI	CFI	RMR	RMSEA	IFI	TLI	P	χ^2	df
0.93	0.89	0.89	0.93	0.06	0.08	0.93	0.91	0.00	122.29	43

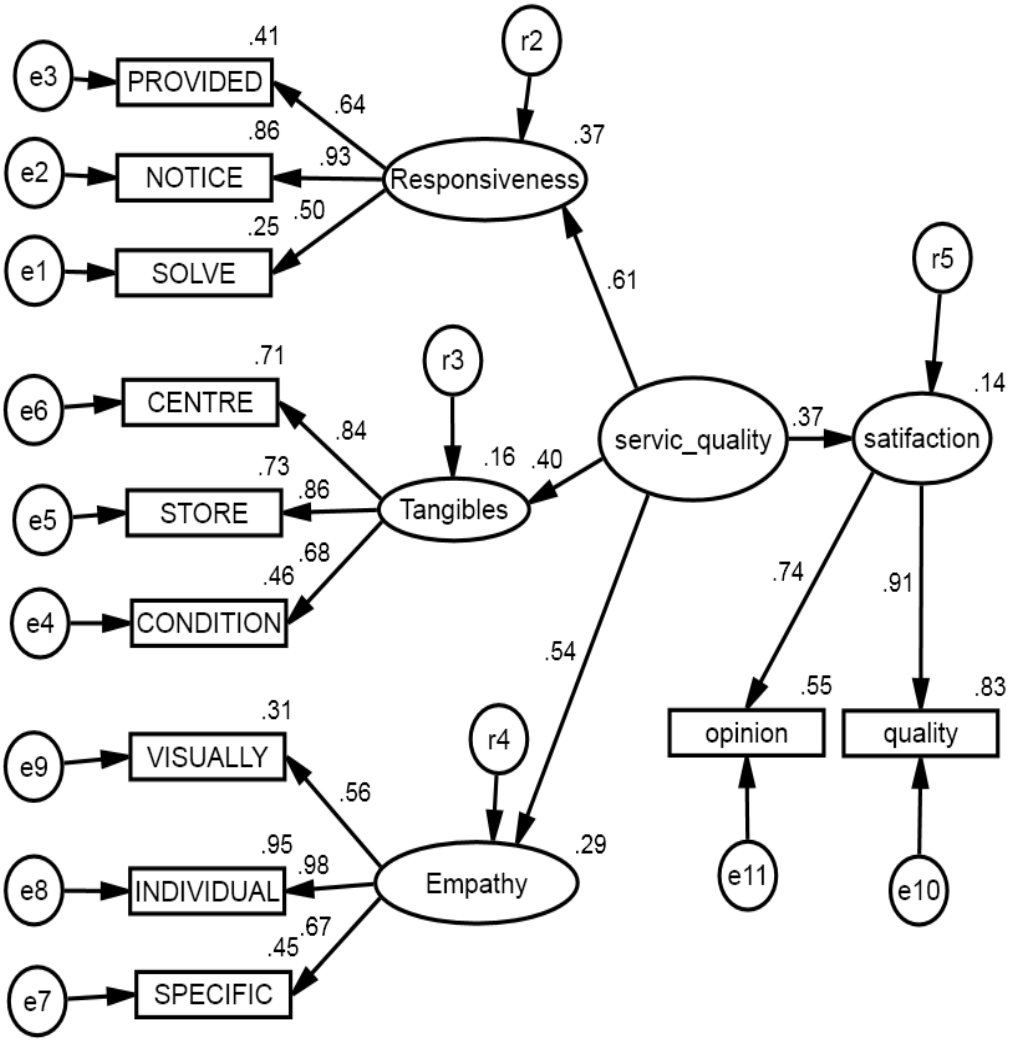

Figure 17-Retailers' Perceived Distributors' Service Quality-Satisfaction Model

Validity and Reliability of the Structural Model:

The measurement model's validity is assessed based on convergent validity. The Table 29 presents the significant standard loadings of latent constructs, AVE and CR. All the constructs have significant standardized loadings and AVE values range from 0.50 to 0.69. The construct reliability values are also above 0.8 for all the constructs. It indicates that the constructs have convergent validity

Table: 29

AMOS results of Structural Model

Regression paths	Factors	SL	SMC	AVE	P	CR
Service quality	Responsiveness					
	Provided	0.641	0.410	0.51	0.00	
	Notice	0.928	0.862			
	Solve	0.503	0.253			
	Tangibles					
	Condition	0.676	0.458			
	Store	0.856	0.733	0.63	0.00	0.92
	Centre	0.842	0.709			
	Empathy					
	Specific	0.671	0.450			
	Individual	0.976	0.953	0.57	0.00	
	Visually	0.559	0.312			
Satisfaction	Overall opinion	0.739	0.546			
	Quality	0.913	0.834	0.69	0.00	0.81

Note: P-Probability level of 0.001, AVE-Average Variance Extracted, CR-Construct Reliability, SMC-Squared Multiple Correlations, SL-Standardized loadings

Results of Testing of Hypothesis

The overall model is presented from hypothesis-1 to hypothesis-4.This model incorporates all the hypothesized relationships to demonstrate a direct relationship between RPSQ and Satisfaction. The results of the SEM of the research model proposed are reported in Table-30. The results indicate that the pathway from RPSQ to satisfaction is significant ($p<0.00$) with a standardised regression weight of 0.369. Therefore the hypothesis that Retailers perceived service quality (RPSQ) affects the level of satisfaction is supported in this study.

The hypothesis (2a) states that “Responsiveness have a significant effect on RPSQ” is significant ($p<0.001$) and the standardized regression weight is 0.609.Therefore the hypothesis Responsiveness affects RPSQ is supported.

The hypothesis (2b) states that “Tangibles have a significant effect on RPSQ”is significant ($p<0.001$) and the standardized regression weight is 0.403. Therefore the hypothesis Tangibles affects RPSQ is supported

The hypothesis (2c) states that “Empathy have a significant effect on RPSQ is significant ($p<0.001$) and the standardized regression weight is.0.536.Therefore the hypothesis Empathy affects RPSQ is supported

The hypothesis (2d) states that "RPSQ have a significant effect on Satisfaction" is significant ($p<0.001$) and the standardized regression weight is.0.369.Therefore the hypothesis RPSQ affects Satisfaction is supported.

Table 30

Standardized Regression Weights for Path Relationships

Construct Relationship	SRW	Sig	Result
2a– Responsiveness has a significant effect on RPSQ	0.609	0.00	Supported
2b–Tangibles has a significant effect on RPSQ	0.403	0.00	Supported
2c-Empathy has a significant effect on RPSQ	0.536	0.00	Supported
2d- RPSQ has a significant effect on Satisfaction	0.369	0.00	Supported

SRW-Standardised Regression Weights,Sig-Significance

4.3: Service Quality at the Retailer-Consumer Interface of the Pharmaceutical Supply Chain

The role of pharmacist has changed tremendously with the changing times. The modern pharmacist has more professional duties in addition to dispensing of drugs. He has to identify drug-related problems, advice patients about the proper usage of medicines, maintain relationships with them and health care professionals and ultimately assure that no harm is done to the patients. Currently the Pharmacists are overburdened with prescriptions which give chance for committing errors. The Kaiser Family Foundation estimates that there are over three and one half billion prescriptions filled by pharmacies annually. According to a study by the Auburn University College of Pharmacy, community pharmacies make an average of four errors for every two hundred and fifty prescriptions filled. On an average, for every one thousand prescriptions dispensed, a pharmacy in the United States will dispense one prescription that contains an error with, at least, the potential to cause serious injury or death. The Drug Topics survey indicated it was not only high volume that caused errors. Several of the pharmacists reported that they had made errors in the last couple of months on days when they filled less than 100 prescriptions. The most serious of these errors are commonly referred to as “mechanical errors, “because they involved a purely mechanical misstep. These usually do not involve professional judgments or decisions, but are simple human mistakes. As typically defined, “mechanical errors” are (1) wrong drug dispensed; (2) wrong strength of the drug dispensed; and (3) wrong directions placed on the label. According to the Pharmacists, Mutual Insurance Company Claims -Study of claims against pharmacies, pharmacists or pharmacy technicians, mechanical errors represent more than eighty percent of all claims reported to the insurance company over the past two decades., (Pharmacists Mutual® Claims Study 1989 through 2008).In this scenario the role of Pharmacists in delivering quality services to customers in both organized and unorganized pharmacies in three major Indian cities has been studied. The study mainly examined the critical factors of functional service quality and developed a scale for the measurement of functional service quality of pharmacists.

Concept of Functional Service Quality:

Grönroos (1984), divided service quality into two aspects. The first aspect is *the technical quality,* i.e. what is being produced or the technical outcome of the service production processes. Technical quality can also be defined as what the customer is left with when the delivery is over. The second aspect, *the functional quality,* outlines the function of the service production process and consumption. This feature concerns the interactions concerning the providing company's resources and the client with its end-users during the service production process.

Various studies have been done relating to service quality of pharmacies. Pharmaceutical care has caused considerable attention in the pharmacy literature. Pharmaceutical care signifies an important transition in the profession of pharmacy, where the major focus is the patient and outcomes of care rather than the distribution of drug products. Al-Shaqha and Zairi (2001a, 2001b), evaluated the concept of pharmaceutical care in many hospital pharmacy practices. Janković, Maksimović, Vusanović, Kostić, Kovačević & Mitrić (2001), compared the service quality in public and private pharmacies. Skyrius, Radziūnas, Barsteigiene, Baranauskas, & Grincevicius (2002), studied the pharmaceutical services rendered in Lithuanian community pharmacies. They found that Lithuanian pharmacists lack databases of patient medication records which hinder them to render pharmaceutical services of the best quality. Volmer, Vendla, Vetka, Bell & Hamilton (2008), described practice and research related to pharmaceutical care in Estonia. Basak, & Sathyanarayana (2009), evaluated the state of community pharmacies in India. Nau. (2008), described methods for measuring health care quality. Barnett et al., (2009) described the variations over a 7-year period in the major types of MTM (medication therapy management) services offered by community pharmacies. Smith (2009) reviews the quality of professional services in low and middle income countries. Sherilyn K. D. Houle, Kelly A. Grindrod, Trish Chatterley, Ross T. Tsuyuki (2014), identified remunerated pharmacist clinical care programs worldwide.

It is against this background where pharmacist has more responsibilities and commitments in preserving the health of the people, this study tried to examine the quality of services as perceived by the pharmacists themselves. The main focus is on functional service quality i.e how the pharmacists feel about the functions performed by them. In this section the the critical factors of functional service quality as

perceived by Pharmacists and Consumers have been identified.A Scale was developed for the the measurement of pharmacist's perceived functional service quality and the impact of Pharmacist Perceived Functional Service Quality (PPFSQ) on satisfaction was examined

Survey method was used to collect the primary data. The Questionnaire was prepared taking the following Reports into consideration :("The role of the pharmacist in the healthcare system, Report of a WHO consultative group, New Delhi, India, 13-16 December 1988 and Report of a WHO Meeting, Tokyo, Japan,31 August-3 September 1993.Geneva, WorldHealthOrganization,1994') and other relevant literature . It was finalised after discussions with industry experts and academicians. A questionnaire (Appendix-II) with 22 items was designed. Research scholars and experienced marketing executives administered the questionnaires. A sample of 350 chemists/Druggists were purposively selected for the study from three major Indian cities

4.3.1: Critical Factors of functional Service Quality as perceived by Pharmacists

EFA was first conducted to identify the critical factors of functional service quality. Five factors named as –Responsiveness,Assurance,Reliability,Communication and Empathy. The KMO value is 0.887(See Table 31). The total variance explained by above five factors was 55 % shown in Table 32. A significant result (<0.05) tells us that there are some relationships between the variables (Field, 2005). In this study Bartlett's test is highly significant (p<.01) suggesting factor analysis is appropriate. This value is significant for this sample at 0.05, $\chi 2 = 2220.027$ (p=0.000).

Table 31

Results of KMO and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.887
Bartlett's Test of Sphericity	Approx. Chi-Square	2220.027
	df	210
	Sig.	.000

Table32

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.34	30.17	30.17	6.34	30.17	30.17	2.91	13.87	13.87
2	1.78	8.45	38.63	1.78	8.45	38.64	2.29	10.92	24.79
3	1.33	6.31	44.94	1.33	6.314	44.94	2.17	10.35	35.14
4	1.16	5.49	50.44	1.16	5.494	50.44	2.16	10.28	45.41
5	1.02	4.85	**55.29**	1.02	4.854	55.29	2.07	9.88	55.29
6	.910	4.333	59.62						
7	.892	4.25	63.87						
8	.811	3.86	67.73						
9	.752	3.58	71.31						
10	.696	3.31	74.63						
11	.671	3.19	77.82						
12	.615	2.93	80.75						
13	.595	2.83	83.58						
14	.556	2.65	86.23						
15	.530	2.52	88.75						
16	.475	2.26	91.01						
17	.449	2.14	93.15						
18	.415	1.98	95.13						
19	.394	1.87	97.00						
20	.348	1.66	98.66						
21	.282	1.34	100.00						

Extraction Method: Principal Component Analysis.

Table 33
Rotated Component Matrix

	Components				
	E	C	RE	A	Rl
Ensuring problems identified with individual prescriptions are addressed within appropriate time frames –P1	.768				
Collaborating relationships with: other health care Professionals, national professional associations and patients-P2	.684				
Participating in health promotion campaigns to raise awareness of health issues and disease prevention –P3	.680				
Ensuring safe and proper disposal of drugs and non-prescription medications-P4	.669				
Documentation of clarifications-P5		.731			
Professional assessing of promotional materials for medicines and other products associated with health.-P6		.658			
Interacting with Patients to determine Customer Expectations-P7			.740		
Providing information to distributors about customers' –P8			.721		
Supply of antibiotics without a prescription.-P9				.787	
Reporting adverse drug reactions that have caused problem with patient's health-P10				.690	
Use of e-commerce for order placement-P11				.644	
Clarify with the health professional for illegible handwriting, incomplete information, abbreviations before prescription is processed –P12					.810
Seeking suggestions from the firm/distributor frequently-P13					.640

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization

Note:E-Empathy, C-Communication, RI-Reliability,A-Assurance,RS-Responsiveness

4.3.2: Scale Development and Validation

Confirmatory factor Analysis: In testing the validity of factorial model, CFA recognizes the extent to which the items are designed to measure the particular factor. The analysis of data was conducted through SEM using the statistical software AMOS version -20.0. The process started with preliminary analysis of the data. Individual CFA model for each factor of the theoretical factor structure was developed, which was identified in EFA (see Table 33). Several runs of CFA were conducted until satisfactory goodness of fit statistics was obtained. During this process, two dimensions (Factor 2 & Factor 3) with low variance were removed. After deletion of two dimensions, a valid scale (PPFSQ scale) with three dimensions and nine items emerged. (See Fig: 18.)

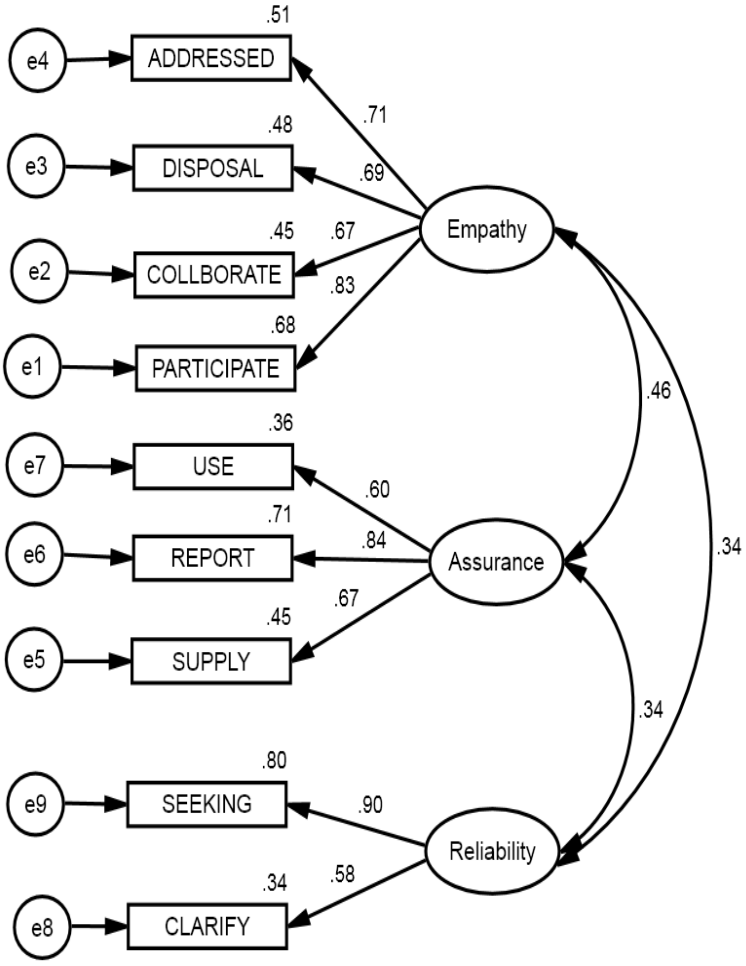

Figure 18 -Pharmacist Perceived Functional Service Quality Scale (PPFSQ)

Validity of the PPFSQ Scale

The scale was examined using goodness of fit statistics. The p-value of 0.00 for the Chisquare statistics implies good absolute model fit. RMSEA value (0.064) is between 0.03 and 0.08, indicates an acceptable level of internal consistency (Hu and Bentler, 1999) and shows the model theory fits the sample data (Hair *et al.* 2010).The absolute fit indices -GFI (0.966) and RMR(0.045) and incremental fit indices IFI (0.964) and CFI (0.964) are above the recommended value indicating an acceptable level of fit. The normed ChiSquare (57.95) is also within the broader recommended range. The amount of squared multiple correlations for all dimensions in the model are more than 0.5 thus indicating acceptable squared factor loadings. All the factor loadings in the CFA model developed are statistically significant at level of significance of 0.001. The fit indices reflect acceptable level of fit and all the indices are within the recommended tolerances (See Table 34).

Table 34
Model Fit Indices Values

Goodness of fit indices	Value	Key goodness of fit indices-level of acceptable fit
GFI	.966	≥ 0.9 is Good fit
AGFI	.936	≥ 0.9 is Good fit
NFI	.940	≥ 0.9 is Good fit
CFI	.964	≥ 0.9 is Good fit
IFI	.964	≥ 0.9 is Good fit
RFI	.910	≥ 0.9 is Good fit
TLI	.945	≥ 0.9 is Good fit
RMSEA	.064	≤ 0.05 = Good fit.Between0.05 to 0.1-Reasonable fit
RMR	.045	≤ 0.05 = Good fit.Between0.05 to 0.1-Reasonable fit
$\chi 2$/ Df	2.41	If $\chi 2$/df => 0.05 = good fit,< 2 = over fit,≤ 5= Good fit,>5 = adequate fit
P	0.00	p < 0.001

Reliability and Validity: The scale was examined in terms of reliability and validity.

Reliability: The overall value of Cronbach's coefficient α for the nine items in the scale developed after CFA is 0.774 and for the three dimensions individually is Fac1:0.763, Fac2: 0.692 and Fac3: 0.623. Reliability for all the constructs exceeded suggested level of 0.60 (Nunnally, 1978). This indicates that each of the constructs identified was adequately captured by its indicators. (See table-35).

Table 35
Reliability Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha of 9 items
P1	22.84	31.71	.444	.754	.774
P2	22.54	30.19	.517	.743	
P3	22.64	29.11	.583	.733	
P4	22.94	32.01	.462	.753	
P5	23.19	33.37	.319	.770	
P9	22.79	31.09	.373	.766	
P10	23.00	29.26	.539	.739	
P11	22.68	29.29	.478	.750	
P13	23.21	31.52	.400	.760	

The questionnaire was designed based on WHO Reports and the relevant literature. It was finalized after thorough discussions with experts. The instrument thus has strong content validity.The results of the study in the table 36 show that AVE is above 0.5 and C.R is above 0.8 satisfying the required criteria. In addition, all Eigen values of constructs greater than 1.0 also confirm convergent validity (Hair et al., 2006).

Table 36
Results from Confirmatory Factor Analysis

Constructs	Items	F.L	alpha	AVE	C.R
Empathy	Ensuring problems are addressed	.826	.763	0.53	.082
	Maintaining relationships	.668			
	Participating in health promotion campaigns	.691			
	ensuring safe disposal of drugs	.713			
Assurance	Supply of antibiotics without a prescription	.672	.692	0.506	0.89
	Reporting adverse drug reactions	.843			
	Use of e-commerce	.596			
Reliability	Clarify with the health professional	.580	.623	0.571	0.87
	Seeking suggestions from the firm/distributor	.897			

Note: F.L-Factor Loadings, A.V.E-Average Variance Extracted, C.R-Construct Reliability

In this study all the extracted variance estimates were greater than squared inter-construct correlations, (see Table-37) satisfying the discriminant validity.

Table 37
AVE and Squared Inter-Construct (covariance) Correlations (SIC) for Discriminant Validity Analysis

	Empathy	Assurance	Reliability
Empathy	0.527		
Assurance	0.14	0.507	
Reliability	0.03	0.027	0.503

Note: AVE in the diagonal and squared correlations off-diagonal

The unidimensionality was assessed using goodness of fit statistics, scale reliability and construct validity confirmed that the scale which emerged during CFA (Figure 18) is a good model. It has three dimensions -Empathy, Assurance and Reliability having nine items. This PPFSQ scale thus can be used to measure the quality of service provided by pharmacists

Relation between Service Quality and Satisfaction:

In order to know the impact of service quality on satisfaction the pharmacist perceived functional service quality was used. The overall satisfaction was measured using three dimensions –the level of satisfaction in terms of facilities in pharmacies and the ability of the pharmacy in achieving the goals and the problems faced by pharmacists. CFA was applied and the dimension- problems has to be removed as it was having low variance. Only Goals and Facilities were retained. As there are only two attributes the fitness indices could not be calculated. The AVE value was more than 0.51 and C.R value is 0.9(Fig:19)

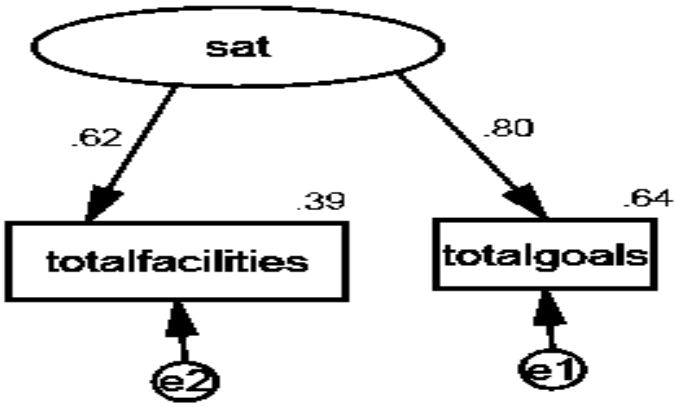

Figure: 19 Satisfaction Model

4.3.3: PPFSQ – Satisfaction Model

This final model (fig:20) was developed to test the impact of service quality on satisfaction. The specified model was examined with the observed data in terms of goodness of fit statistics. The p-value of 0.00 for the chisquare statistics implies good absolute model fit. RMSEA value is (0.067) .The absolute fit indices of GFI (0.951), NFI(0.918) AGFI (0.922) comparative fit indices -IFI (0.949) and CFI (0.948) also indicate an acceptable level being above the recommended values. All of these values are above 0.90. The normed ChiSquare (132.86)) is also within the broader recommended range. This indicates that the model fits well (Hu and Bentler, 1995; Hair et al., 2010) except for little variations in RFI (0.893). Basically, the structural model is considered to fit the sample data reasonably and can be accepted as a fitting model (see Table: 38). The standardized regression weights in each pathway are provided in the Table: 40. This model incorporates all the hypothesized relationships to demonstrate a direct relationship between functional service quality and satisfaction. The overall model is examined using Structural Equation Modeling.

Table 38
Model Validity Statistics

Goodness of fit indices	Value
GFI	.951
AGFI	.922
NFI	.918
CFI	.948
IFI	.949
RFI	.893
TLI	.932
RMSEA	.067
χ2/ Df	106.908/42=2.54

4.3.4 Validity and Reliability of the Structural Model

The measurement model's validity is assessed based on convergent validity. Table 39 presents the significant standard loadings of latent constructs, AVE and CR. All the constructs have significant standardized loadings and AVE values range from 0.50 to 0.63. The construct reliability values are also above 0.6 for all the constructs. It indicates that the constructs have convergent validity

Table 39
AMOS results of Structural Model

Regression paths		SL	SMC	AVE	P	CR
Service quality	Reliability					
	Clarify	.728	.530	0.59	0.00	0.92
	Seeking	.801	.641			
	Assurance					
	Supply	.742	.551	0.639	0.00	
	Report	.930	.864			
	Use	.693	.481			
	Empathy					
	Participate	.824	.679	0.53	0.00	
	Collaborate	.660	.436			
	Disposal	.696	.484			
	Addressed	.718	.516			
Satisfaction	Total Facilities	.918	.843	0.53	0.00	0.67
	Total Goals	.455	.207			

Note:SL-Standardised Loadings,SMC-Squared Multiple Correlations,CR-Construct Reliability

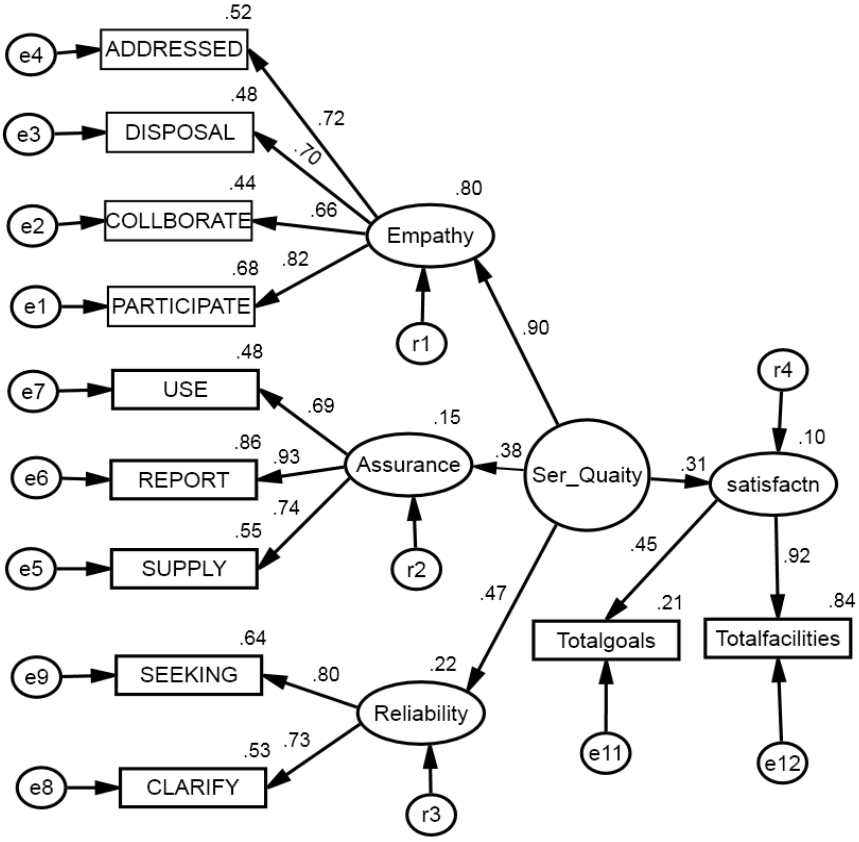

Fig: 20- PPFSQ Structural model

(Note: Ser_Quaity-Service Quality; satisfactn-Satisfaction)

Results of Hypothesis testing:

The overall model as presented in Fig. 20 is based on hypothesis framed. This model incorporates all the hypothesized relationships to demonstrate a direct relationship between empathy, assurance and reliability with service quality, and service quality with satisfaction (see Table-40)

The regression path between empathy and PPFSQ is significant (p<0.001) having standardized regression coefficient of 0.897. Therefore, the hypothesis-3a: empathy has a significant effect on PPFSQ is supported.

The regression path between Assurance and PPSQ is significant (p<0.001) having standardized regression coefficient of 0.381. Therefore, the hypothesis-3b: Assurance has a significant effect on PPFSQ is supported.

The regression path between Reliability and PPSQ is significant (p<0.001) having standardized regression coefficient of 0.470. Therefore, the hypothesis-3c: - Reliability has a significant effect on PPFSQ is supported.

The regression path between PPFSQ and satisfaction is significant (p<0.001) having standardized regression coefficient of 0.31. Therefore, the hypothesis 3d: - Pharmacist perceived service quality has a significant effect on satisfaction is supported

Table 40
Results of Hypothesis testing

Construct Relationship	SRW	Sig	Results
H1 (3a)– Empathy has a significant effect on PPFSQ	0.89	0.00	Supported
H2(3b) – Assurance has a significant effect on PPFSQ	0.38	0.00	Supported
H3(3c) –Reliability has a significant effect on PPFSQ	0.47	0.00	Supported
H4(3d)–PPFSQ has a significant effect on Customer Satisfaction	0.31	0.00	Supported

Note:Pharmacist Perceived FunctionalService Quality-PPFSQ

4.3.5: Consumer Perceptions about Retailers:

From the literature review and focussed group discussions had with experts and academicians a questionnaire using (SERVQUAL-Parasuraman, 1988) suiting to the pharmaceutical context was developed. After pretesting, the questionnaire the primary data was collected (Appendix-IV). A sample of 300 consumers (in proportion of 150-Hyderabad, Rajahmundry-75, and Visakhapatnam-75) from three major cities of Andhra Pradesh, India were purposively selected.

4.3.6: Critical factors of Service Quality as Perceived by Consumers

EFA was used to identify the important dimensions of service quality as perceived by consumers. The results (Table-41) showed the value of KMO adequacy, is 0.787 suggesting that the factor analysis test has proceeded properly. The results of Bartlett test of Sphericity were highly significant (sig. =0.000), suggesting that the factor analysis is appropriate for examining the multidimensionality. Through factor analysis, five dimensions (whose Eigen values are greater than one) were extracted at the Retailer-Consumer interface, which are named as–Responsibility, Empathy, Reliability, assurance and Physical Facilities.(Table 43) All these factors are explaining 55.89% of variance(see Table 42). Reliability test for the data collection instrument indicated that the Cronbach alpha is 0.712 satisfying the reliability criteria (acceptable standard is 0.5). (See Table-44)

Table 41

KMO and Bartlett's Test-at Retailer Consumer Interface

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.79
Bartlett's Test of Sphericity	Approx. Chi-Square	544.66
	df	91
	Sig.	.000

Table 42

Total Variance Explained

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.27	23.33	23.33	3.27	23.34	23.33	1.91	13.61	13.61
2	1.23	8.81	32.14	1.23	8.817	32.14	1.84	13.11	26.72
3	1.19	8.55	40.69	1.19	8.557	40.69	1.53	10.92	37.64
4	1.12	8.03	48.73	1.12	8.037	48.73	1.35	9.65	47.29
5	1.00	7.17	**55.89**	1.00	7.17	55.89	1.20	8.60	55.89
6	.891	6.36	62.25						
7	.827	5.91	68.16						
8	.779	5.56	73.72						
9	.725	5.18	78.90						
10	.668	4.77	83.676						
11	.636	4.54	88.217						
12	.617	4.41	92.63						
13	.571	4.08	96.71						
14	.461	3.29	100.00						

Extraction Method: Principal Component Analysis

Table 43

Rotated Component Matrix

Items	Resp	Emp	Reli	Assu	Phys
Pharmacist effectively handles the expired drugs issue-C1	.720				
Personnel in the pharmacy centre have the authority to solve your problems –C2	.717				
Pharmacist advices about problems that might occur with medication –C3	.548				
Pharmacist checks with you about how well your medications are working-C4		.783			
The pharmacist shows interest in your health –C5		.652			
Pharmacist responds immediately to your complaints-C6		.525			
When customers have any problem Pharmacist shows a genuine interest in resolving it –C7		.470			
Pharmacy staff are courteous and respectful to you-C8			.681		
Pharmacist advises about how to take medications-C9			.678		
Personnel in the pharmacy centre have the knowledge to answer customer's questions-C10				.766	
Pharmacist maintains the privacy of your conversations –C11				.593	
Pharmacy centre has modern equipment (computers, air conditioning, etc)-C12					.733
Pharmacist has time to spend with You-C13					.639

Note: Resp-Responsibility, Emp-Empathy, Reli-Reliability, Assu-Assurance, Phys-Physical Facilities

Table 44

Reliability Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha of 13 items
C1	43.93	31.91	.393	.69	
C2	44.03	31.73	.383	.69	
C3	44.05	32.17	.358	.699	
C4	44.18	31.66	.364	.699	
C5	44.18	31.94	.376	.699	
C6	44.06	32.08	.385	.69	
C7	44.05	32.74	.326	.699	0.71
C8	44.08	33.11	.250	.71	
C9	44.03	32.14	.344	.69	
C10	43.13	36.53	.087	.72	
C11	44.04	31.86	.417	.69	
C12	43.79	33.21	.269	.70	
C13	44.23	32.06	.334	.69	

4.3.6 :Major Factors considered in choosing a Particular Pharmacy

Customers gave their first ranking to quality, followed by proximity, delivery and availability and the last rank to timings and schemes as the basic factors in choosing a particular pharmacy (based on Kendall's W test) (Table-45). The study revealed that most of the consumers (almost 62.3 percent) prefer organized pharmacies in the three major cities of Andhra Pradesh.

Table 45

Preference factors for choosing a Pharmacy: Kendall's W test

Factors	Mean Rank
Proximity	3.08
Quality	2.47
Delivery	3.18
Availability	3.94
Schemes	5.15
Timings	4.89
Others	5.31

Table 46

Test Statistics -Kendall's W test

N	31
Kendall's W	.277
Chi-Square	51.545
df	6
Asymp. Sig.	.000

4.3.8 Comparison between Organised and Unorganised Pharmacies:

The growth of modern retailing has led to organised retail chains in the pharma sector.This has actually caused lot of differences between Organised and Unorganised pharmacies.This study identified the differences with regard to the facilities and functioning of Organised and Unorganised pharmacies

Facilities in Organized and Unorganized Pharmacies:

The ANOVA (Analysis of Variance) technique identified that the 'F' value for labeling (1.939), Segregation (0.123), Packaging (0.159), Ambience (0.00)), Location (0.344) and Storing (0.021) are statistically not significant at 0.05 level. The ANOVA results showed that out of nine variables, three variables-ventilation- F' value (13.18), Temperature-F value (11.960) and construction- F-value (9.198) were statistically significant at 0.05 levels. There was a significant difference between the pharmacies with regard to facilities like temperature, ventilation and construction. Remaining all other variables are insignificant and it clearly indicates that there is no significant differences between facilities in organized and unorganized pharmacies with regard to labeling, Segregation Packaging, Ambience, Location and Storing except temperature, ventilation and construction (See Table-47)

Table 47

Facilities in Organized Vs Unorganized Pharmacies

Facilities	Sum of Squares		Mean Square		F	Sig.
	Between	Within	Between	Within		
Ventilation	9.95	262.57	9.95	.755	13.18	.00
Stock Labeling	1.38	248.21	1.39	.713	1.94	.17
Temperature Control	9.28	270.11	9.29	.776	11.96	.00
Segregationof	.071	201.59	.071	.579	.124	.73

different Materials						
Floor Construction	5.79	218.90	5.77	.629	9.19	.00
Ambience	.000	277.15	.00	.796	.00	1.00
Location of Stock	.231	234.31	.24	.673	.34	.56
Storing Products according to Standards	.011	186.29	.01	.535	.02	.88

Goals in Organized and Unorganized Pharmacies: It can be observed from the ANOVA Table-48 that the 'F' value for Receipt (0.044), Completeness (3.019), Response (2.652)), Service (0.324) are statistically not significant at 0.05 level. The ANOVA results showed that out of seven variables, three variables-Invoice- F' value (47.949), cycle time-F value (8.533) and satisfaction-F-value (4.274) were statistically significant at 0.05 levels. There was a significant difference between the pharmacies in achieving goals like Invoice, cycle time and satisfaction Remaining all other variables - Receipt ,Completeness, Response and Service are insignificant and it clearly indicates that there are no significant differences between goals in organized and unorganized pharmacies with regard to Receipt,Completeness, Response and Service except Invoice, cycle time and satisfaction.

Table 48

Goals in organized Vs unorganized Pharmacies

Goals	Sum of Squares		Mean Square		F	Sig.
	Between	Within	Between	Within		
Damage Free Receipt	.026	202.17	.026	.581	044	.83
Invoice Accuracy	32.105	232.99	32.10	.670	47.95	.00
Order Cycle Time.	6.315	257.41	6.311	.740	8.53	.00
Order Completeness	2.75	316.47	2.746	.909	3.02	.08
Speed Of Response To Enquiries	1.93	253.49	1.931	.728	2.65	.10
Customer Satisfaction	2.57	209.38	209.38	.602	4.27	.04
Quality Service	.183	196.17	.183	.564	.32	.57

4.3.9: Problems faced by Pharmacists in Pharmacies:

The pharmacists are facing various problems which are affecting the performance of the pharmacies. In unorganizedpharmacies–Incorrect pricing, increasing players, trade schemes, limited shelf life, mislabeling are the major problems while in organized pharmacies the problems are -medication errors, warehousing, delay in delivery. In three major Indian cities- wrong medication(96%),Incorrect pricing (87%) and shelf life (86%) in Hyderabad, warehousing (92%), counterfeit drugs (90%) and shelf life (91%) in Visakhapatnam, transportation (92%) and shelf life (91%) in Rajahmundry are the major problems (See fig: 21)

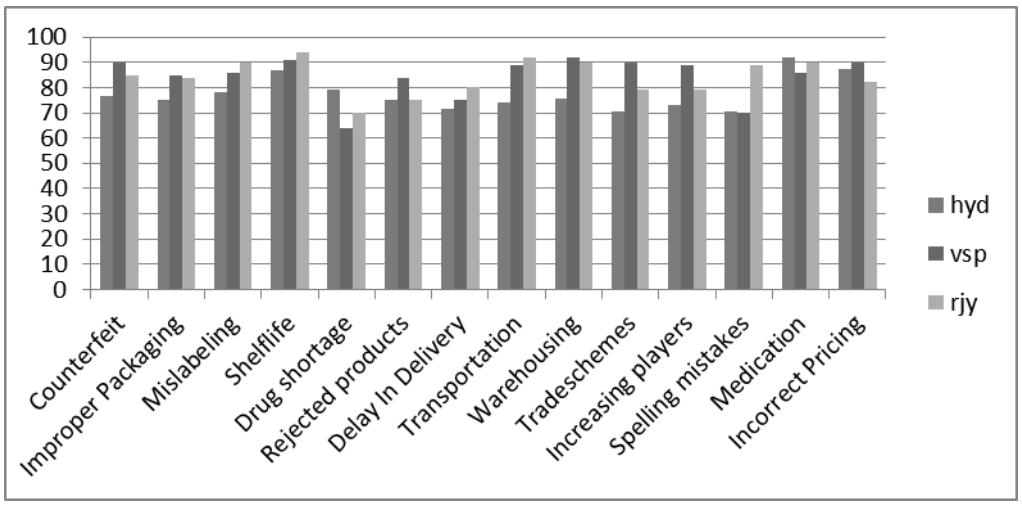

Figure: 21 –Problems of Pharmacists

Problems faced by Customers with Pharmacies:

The major problems experienced by the customers with the pharmacies were spurious goods (91.3%) and dusty atmosphere (83%) in Hyderabad, delay in delivery (79%) and shortage of drugs (68%) in Visakhapatnam, non-availability (69%) delay in delivery and shortage of drugs (65%) in Rajahmundry. (See Fig.22)

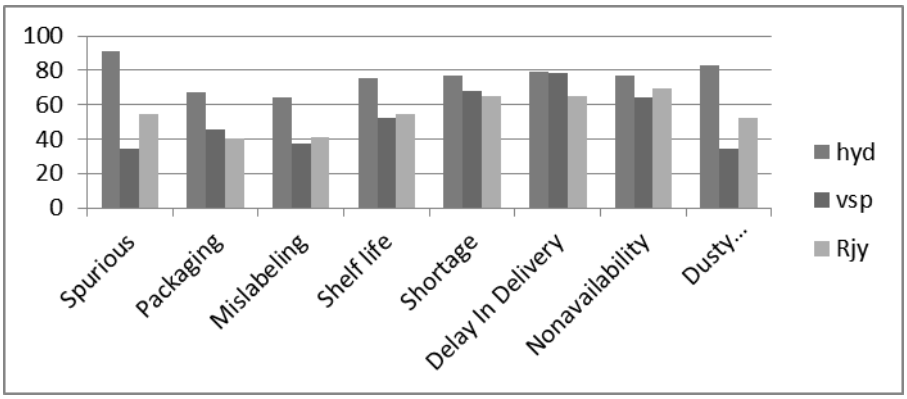

Figure: 22- Problems of Customers

4.4: Service Quality at the Manufacturer-Customer (Doctor) Interface of the Pharmaceutical supply chain

For any pharmaceutical company the patient is end consumer and doctor is direct customer. For pharmaceutical companies, doctor(customer) is more important that's why they emphasize more on supply chain management and for doctors their consumer(patient) is more important so they expect effective supply chain mangement practices from the company. The role of supply chain managers is to deliver considerable value to their companies by understanding the customers' delivery requirements. Companies are struggling to meet the competition and are increasingly looking at quality, as a weapon to gain Competitive Advantage and it is true for pharmaceutical companies their customer that is doctor is more important that's why they are emphasizing more on quality in supply chain management. (The Pharma Research, 2010).

In the pharmaceutical industry, the health delivery system is also characterized by a market failure uncommon in other markets, that is, consumers are mostly not involved in the decision making process of their purchase of goods and services, a complex web of decision-makers determine the nature of the transaction (Prescription) for which direct customer of pharmaceutical industry (Doctor) is responsible. Here patient is end customer and doctor is direct customer for any pharmaceutical company.Patient choices are dictated mainly by doctors, pharmacists or hospital staff. So Doctors play a very vital role in influencing the end consumers in purchasing medicines so satisfying doctors is the most important task for the pharmaceutical manufacturers. So the service provided by the company has a lot of impact in influencing doctors prescribing behavior. A preliminary survey was conducted to identify the important factors influencing doctors prescribing behavior for this selected pharmaceutical company and it was found that quality is the most influencing factor. Hence in this section the critical factors effecting service quality at (manufacturer)-doctor (customer) interface of the pharmaceutical supply chain was identified and the impact of service quality on doctor's satisfaction and their prescribing behavior was examined

Survey method was adopted for gathering the primary data. For this study, the mostly used service quality measurement scale-SERVQUAL proposed by Parasuraman *et al.* (1988) was used. The questionnaire was finalized after discussions

with company experts, retailers, doctors and academicians (Appendix-III). Research scholars and experienced marketing executives administered the questionnaires. Questionnaires were administered to doctors in the hospital during their free time with prior appointment. The data was collected within six months time frame work because it became very difficult to get the doctors free time. Doctors were asked to give their opinion about the selected pharmaceutical company. The third largest pharmaceutical company of India was selected for the study. A sample of 200 registered doctors of All India Medical Association was purposively selected for the study from the three major cities. Among the selected doctors majority of the doctors are having more than five years' of clinical experience, treat more than thirty patients per day and were associated with the selected pharmaceutical company from the past five years. Majority (67 percent) of the doctors was middle aged 35-45 years and (20 percent) were 46-55 years.

4.4.1 Factors effecting Doctor's Prescribing Behavior

According to the study, published by the Social Science Research Network, doctors who accepted free meals, speaking fees, consulting payments and so on from one drug maker were more likely to prescribe that drug maker's brand-name products--not only compared with a competing brand in the same category, but with cheap generic versions, too. So it is very necessary for any pharmaceutical company to understand the critical factors effecting doctor's prescribing behavior to withstand the heightened competition. In this context, the study made an attempt to find the critical factors influencing doctor's prescribing behavior. Based on the Friedman Test (Table 49) it was observed that the factors like Availability of drugs, Quality, Price and Reputation were ranked as the topmost in order of preference in prescribing drugs in general for any pharmaceutical company, and for the selected pharmaceutical company-Quality, Reputation, Availability and Price were given the top rankings. (Table 51)

Table 49

Friedman Rank Test To Identify Factors considered by doctors in prescribing drugs for any company

Factors	Mean Rank
A. Quality	2.55
B. Price	2.86
C. Availability of drugs	2.37
D. Reputation	3.37
E. Representative	6.28
F. Research	8.12
G. Literature	9.43
H. Sponsorship	9.44
I. Combinations	8.00
J. Programmes	7.47
K. Packaging	8.65
L. Incentives	9.75
O. Sideeffects	12.70

Table 50

Test Statistics -Friedman Test

N	57
Chi-Square	485.728
df	12
Asymp. Sig.	0.000

Table 51

Friedman Rank Test To Identify Factors considered by Doctors in prescribing drugs for this selected Company

Ranks	Mean Rank
Reputation	2.06

Quality	2.00
Availabilty	2.56
Price	4.06
Offers	4.69
Others	5.63

Table 52

Test Statistics- Friedman Test

N	16
Chi-Square	52.286
df	5
Asymp. Sig.	.000

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4.4.2: Reasons for brand Switching:

Almost 68.5 percent of the doctors said that they shifted from one brand to another regularly and the main reason for switching the brands were identified as Introduction of newer molecule, Price and Persistence of the Medical Representative (Based on the Friedman Test- Table 53)

Table 53

Friedman Test (Ranks)- Reasons for brand Switching

	Mean Rank
Price	2.16
Introduction of newer molecule	1.98
Persistence of the Medical Representative	2.74
Promotional effort of the company	3.67
Trial of a new brand	4.55
others	5.90

Table 54

Friedman Test- Test Statistics

N	137
Chi-Square	453.079
Df	5
Asymp. Sig.	.000

4.4.3: Critical Factors of Service Quality from Doctors' Perspective:

The doctors were asked to identify important critical service quality factors at the manufacturer –doctor interface of the pharmaceutical supply chain. Exploratory factory analysis was conducted and four factors were extracted –named as Responsiveness, Assurance,Reliabilty and Empathy (Table 57). The KMO value(Table 55) was (0.902) and total variance explained was 56%.(Table 56) Confirmatory factor analysis was conducted with the above extracted factors derived from exploratory factor analysis. After conducting CFA a valid scale with three dimensions and eight items emerged (Fig: 23)

Table 55
Results of KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.902
Bartlett's Test of Sphericity	Approx. Chi-Square	1284.506
	df	153
	Sig.	.000

Table 56

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.69	37.19	37.19	6.69	37.18	37.19	3.13	17.37	17.37
2	1.23	6.79	43.97	1.22	6.79	43.97	2.83	15.72	33.09
3	1.15	6.36	50.33	1.15	6.36	50.33	2.42	13.46	46.55
4	1.07	5.90	**56.24**	1.06	5.90	56.24	1.74	9.69	56.24
5	.95	5.26	61.49						
6	.87	4.81	66.31						
7	.80	4.47	70.79						
8	.69	3.84	74.62						
9	.63	3.55	78.17						
10	.59	3.32	81.48						
11	.57	3.18	84.67						
12	.53	2.95	87.62						
13	.49	2.72	90.34						
14	.41	2.27	92.61						
15	.38	2.13	94.74						
16	.35	1.93	96.67						
17	.33	1.83	98.50						
18	.27	1.50	100.00						

Extraction Method: Principal Component Analysis.

Table 57

Rotated Component Matrix

Items	Component			
	Resp	Assu	Reli	Emp
The Company provides information about adverse drug reactions that have caused a problem with a patient's health	.732			
The company provides information about the latest products	.704			
The company regularly interacts with you to understand your requirements	.688			
The company ensures the availability of drugs	.648			
The company informs you of the changing market requirements regularly	.540			
Materials associated with drugs like pamphlets, statements are visually appealing		.776		
The company takes regular feedback about the product Performance		.643		
The Company provides information about potential drug diversion or Inappropriate use		.631		
There is no uncertainty involved in the promotion of company's Products		.581		
Company's Promotional information is clear, legible, accurate, balanced, fair and objective		.491		
Internet promotion of medicinal products is based on technical, scientific and professional principles.		.480		

Medical Representatives have sufficient knowledge to answer your questions	.711	
The Company educates about new drugs, doses or delivery systems associated with alternative products	.645	
The company takes your suggestions into consideration with regard to Improvement of the product quality	.630	
All printed promotional materials are legible and include the name of the product, active ingredients, name and address of the company or its agent and Date of production of the advertisement	.546	
Medical Representatives of these companies visit frequently		.787
Company has customer's interest at heart		.701
The company shows keen interest in solving your complaints relating to drugs		.488

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization,Res-Responsiveness,Ass-Assurance,Rel-Reliability,Emp-Empathy.

4.4.4 Scale Development and Validation:

Development of service quality scale at the doctors –Manufacturer (company) interface: The scale which emerged after CFA was assessed for goodness for fit statistics. RMSEA value is 0.071 indicating adequate model fit. All the factor loadings in the CFA model developed are statistically significant at 0.001 level of significance. The amount of squared multiple correlations for all dimensions in the model are more than 0.5 thus indicating acceptable squared factor loadings. The absolute fit indices of GFI (0.960) and RMR (0.047) and incremental fit indices IFI (0.969) and CFI (0.969) are above the recommended value indicating an acceptable level of fit. The normed ChiSquare (34.194) is also within the broader recommended range (Table:58).

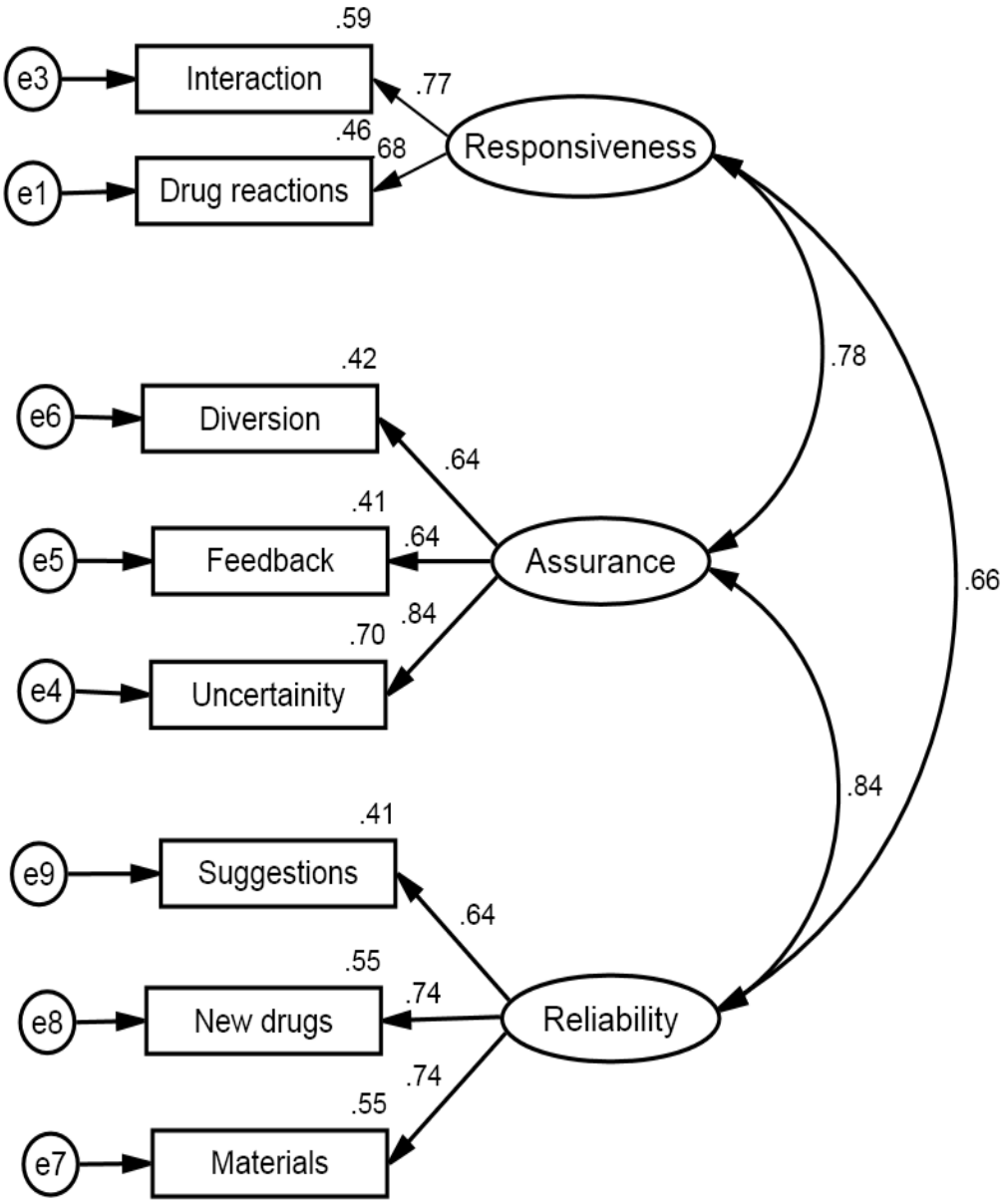

Figure 23 -Doctor's Perceived Service Quality scale-CFA Model

Table 58

Model Fit Summary

	Model- main dimensions of service quality	Key goodness of fit indices/level of acceptable fit
$\chi 2$ /df =	34.194/17=2.01	If $\chi 2$ /df => 0.05 = good fit,< 2 = over fit ≤ 5= Good fit,>5 = adequate fit.
P	0.00	p < 0.001
GFI	0.960	≥ 0.9 is Good fit
AGFI	0.916	≥ 0.9 is Good fit
NFI	0.940	≥ 0.9 is Good fit
CFI	0.969	≥ 0.9 is Good fit
RMR	0.047	0.05 = Good fit Between0.05 to 0.1, Reasonable fit
RMSEA	0.071	≤ 0.05 = Good fit Between0.05 to 0.1,Reasonable fit
IFI	0.969	≥ 0.9 is Good fit
TLI	0.948	≥ 0.9 is Good fit Between 0.850 to0.9 reasonable fit
AIC	72.194	Lower values indicating better fit

Reliability and Validity:

The overall value of Cronbach's coefficient α for the eight items in the scale developed after CFA is 0.850.

SERVQUAL (Parasuraman *et al.,* 1988) was used as the basis for the preparation of the questionnaire.It was finalised according to the requirements of the pharma context after discussions with experts and academician thus satisfying content validity. The results of the study in the (Table 59) show that AVE is above 0.5 and CR is 0.7 and more thus satisfying the criteria for convergent validity.

Table 59

CFA Results of Doctors' Perceived Service Quality Scale

Dim	Items	S.E	C.R	AVE	alpha
RE	The Company provides information about adverse drug reactions that have caused a problem with a patient's health	0.68	0.70	0.53	0.69
	The company regularly interacts with you to understand your requirements	0.77			
A	There is no uncertainty involved in the promotion of company's Products	0.84	0.75	0.51	0.755
	The company takes regular feedback about the product performance	0.64			
	The Company provides information about potential drug diversion or Inappropriate use	0.64			
RL	All printed promotional materials are legible and include The name of the product, active ingredients, name and address of the company or its agent and Date of production of the advertisement	0.74	0.75	0.50	0.75
	The Company educates about new drugs, doses or delivery systems associated with alternative products	0.74			
	The company takes your suggestions into consideration with regard to Improvement of the product quality	0.64			

Note:RE-Responsiveness,A-Assurance,RL-Reliability,SE-Standardised Estimates,AVE-Average Variance Extracted,CR-Construct Reliability,Dim-Dimensions

The variance extracted is greater than the squared correlation estimate. And the results showed in Table-60 reveals that it meets the above requirement satisfying discriminant validity.

Table 60

AVE and Squared Inter-Construct (covariance) Correlations (SIC) for Discriminant validity analysis

	Responsiveness	Assurance	Reliability
Responsiveness	0.527		
Assurance	(0.508)* (0.508)=0.258	0.507	
Reliability	(0.389)*(0.389)=0.151	(0.568)*(0.568)=0.324	0.503

Note: AVE in the diagonal and squared correlations off-diagonal

The unidimensionality of the scale (Figure 23) which emerged during CFA is assessed using goodness of fit statistics, scale reliability and construct validity which confirmed the scale is a good model. It has three dimensions (reliability, assurance, and responsiveness) and eight items. This model constitutes a service quality scale for measurement of service quality in the manufacturer (company) - doctor (customer)

CFA of Satisfaction

A four item scale was used to measure customer satisfaction derived from the literature. The Satisfaction dimension consisted of four indicators namely – satisfaction with quality of the drugs, quality of the service, relationship with the company and overall satisfaction with the company. Figure 24 presents the schematic representation of the CFA model for satisfaction. The factor loadings are significantly loaded to the dimension. The fit indices of the CFA model of satisfaction are in the accepted level. The absolute fit indices of GFI (0.991) AGFI (0.954), RMSEA (0.066) and RMR (0.01)) and incremental fit indices NFI (0.988) and the CFI (0.995) are above the recommended minimum value indicating an acceptable level of fit (table-61). In the same way, the AVE and CR values are 0.57 and 0.84 respectively that meet the minimum level 0.50 for AVE and 0.70 for CR (Hair et al., 2010). It indicates the dimension of satisfaction has construct validity and reliability. (Table-62)

Table 61

Model Fit Summary(Satisfaction)

$\chi 2$	Df	AGFI	GFI	NFI	CFI	IFI	TLI	RFI	RMSEA	RMR
3.7	2	0.95	0.99	0.99	0.99	0.99	0.98	0.75	0.07	0.01

Table 62
CFA Results of Customer Satisfaction

Attributes	Factor loadings	Squared loadings	C.R	AVE
Opinion on product quality	058	0.34	0.84	0.57
Opinion on service quality	0.80	0.64		
Opinion on relationship	0.82	0.68		
Overall opinion	0.79	0.638		

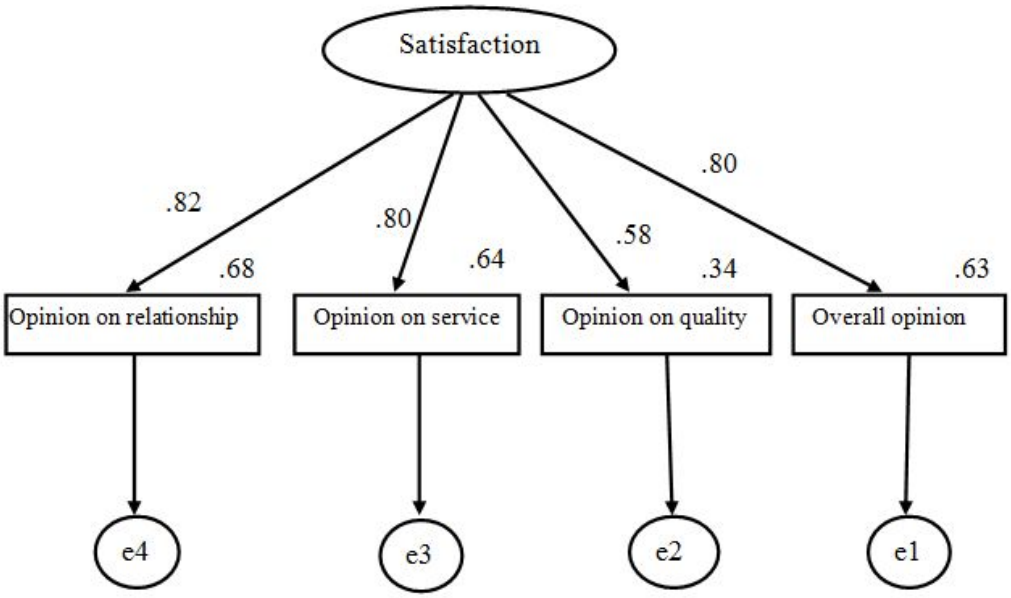

Figure: 24 -CFA Model Of Satisfaction

CFA of Loyalty (Doctor's Prescribing Behavior):

Based on the literature, a five item scale was used to measure Loyalty. Loyalty dimension consists of five items- I will continue prescribing the company products in the future , I may not switch to a competitor even when there are offers; I have good relationship with the company, I recommend the company products to others, I feel proud to be associated with this company. After conducting CFA only three dimensions continue, switch and recommend were retained. Two items with low variance were removed. This resulted in a good fitting model. Figure 25 presents the schematic representation of the CFA model for Loyalty. It can be seen that the factor

loadings are significantly loaded to the dimension. The fit indices of the CFA model of loyalty are in the accepted level. The absolute fit indices of GFI (0.976), AGFI (0.856) ,RMR (0.031) and comparative fit indices NFI (0.950) and CFI (0.956) are all above the recommended minimum value indicating an acceptable level of fit (table-63).The fit indices of the CFA model of loyalty are in the accepted level . The final resulting CFA model of loyalty dimension with three indicators is shown in fig: 25. AVE and CR are calculated with the standard factor loadings of the dimension. Table 64 shows the significant standardized factor loadings, variances extracted and construct reliability which is at accepted level, the AVE and CR values are 0.52 and 0.76 respectively that meet the minimum level of 0.50 for AVE and 0.70 for CR (Hair et al., 2010). The cronbach alpha is 0.728.It indicates the dimension of loyalty has construct validity and reliability.

Table 63

Model Fit Summary (Loyalty)

$\chi 2$	Df	AGFI	GFI	NFI	CFI	IFI	TLI	RFI	RMSEA	RMR
7.47	1	0.86	0.98	0.96	0.96	0.96	0.87	0.85	0.18	0. 03

Table 64

CFA Results of Loyalty

Attributes	Factor loadings	Squared loadings	C.R	AVE
Continue	0.667	0.444	0.76	0.52
Switch	0.895	0.801		
Recommend	0.570	0.325		

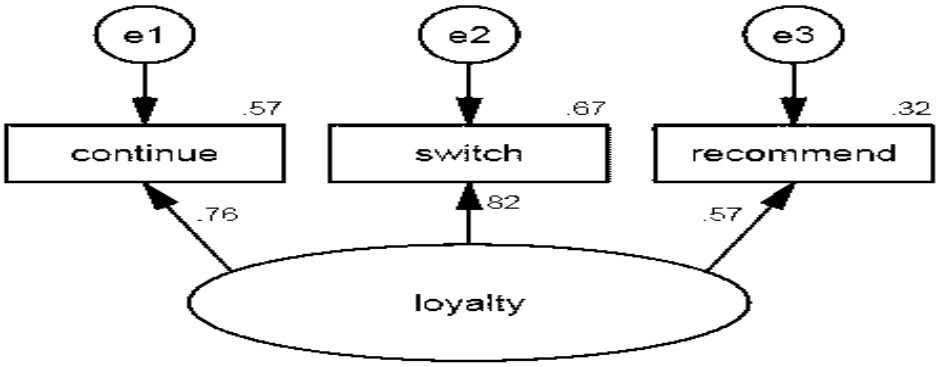

Figure: 25 CFA Model of Loyalty

An examination of the regression weights provided within AMOS results shows that all the Pathways of the constructs with doctor perceived service quality are significant. Hence this base model was retained to further improve after adding customer satisfaction and loyalty dimensions to prove the relationship between service quality, satisfaction and loyalty. While developing the theoretical model the dimensions related to the less cognitive aspects of customer perceptions (Satisfaction and Loyalty) were not included in the exploratory factor analysis as it is not recommended to mix cognitive and emotional aspects within an analysis (DeVellis, (2003). But they were analyzed in the confirmatory factor analysis so that the final structural model can be tested along with these structural paths for evaluating the hypothesis proposed.

4.4.5: Service Quality–Satisfaction-Loyalty Model of Pharmaceutical Supply Chain:

The specified model (Service Quality–Satisfaction-Loyalty Model) was examined with the observed data in terms of several goodness of fit statistics. The p-value of 0.00 for the chisquare statistics implies good absolute model fit. RMSEA value (0.056) is between 0.03 and 0.08, indicates an acceptable level of internal consistency (Hu et al.,1999), the model theory fits the sample data (Hair, *et al.* 2010).The absolute fit indices of GFI (0.919) and RMR(0.041)and incremental fit indices IFI (0.957) and CFI (0.956) are above the recommended values indicating an acceptable level of fit.(Table 65) The normed ChiSquare (137.744) is also within the broader recommended range. RMSEA value (0.056) is between 0.03 and 0.08, indicating the

model theory fits the sample data (Hair *et al.*, 2010).The fit indices reflects acceptable level of fit and all the indices are within recommended tolerances which indicates that the hypothesized model fits the data well with some fit indices indicating a good fit whilst others indicating an average fit with AGFI (0.886) and RFI (0.871). All of these values were above 0.90. This indicates that the model fits well (Hu & Bentler, 1995; Hair et al., 2010) except for little variations in AGFI and RFI. Basically, the structural model is considered to fit the sample data reasonably and can be accepted as a fitting model. The standardized regression weights in each pathway are provided in the Table 67. This model incorporates all the hypothesized relationships to demonstrate a direct relationship between service quality, doctor's satisfaction and prescribing behavior. The overall model is examined using SEM. (Fig:26).An examination of the hypothesized model indicates that the model has an acceptable fit. The results indicate that the pathway from company's service quality to doctor's satisfaction is significant ($p<0.00$) with a standardised regression weight of 0.996. Therefore the hypothesis that service quality affects the level of satisfaction is supported. The pathway from doctor's satisfaction to doctors behaviour intentions is significant ($p<0.00$) with a standardised regression weight of 0.948 and hence the hypothesis relationship can be treated as significant. Therefore the hypothesis that doctors' satisfaction affects the level of doctor's prescribing behavious is supported in this study. (Table: 67)

Table 65

Model Fit Indices(Service Quality –Satisfaction-Loyalty Model)

$\chi 2$	Df	AGFI	GFI	NFI	CFI	IFI	TLI	RFI	RMSEA	RMR
137.744	85	.89	.92	.89	.96	.96	.95	.871	.056	.041

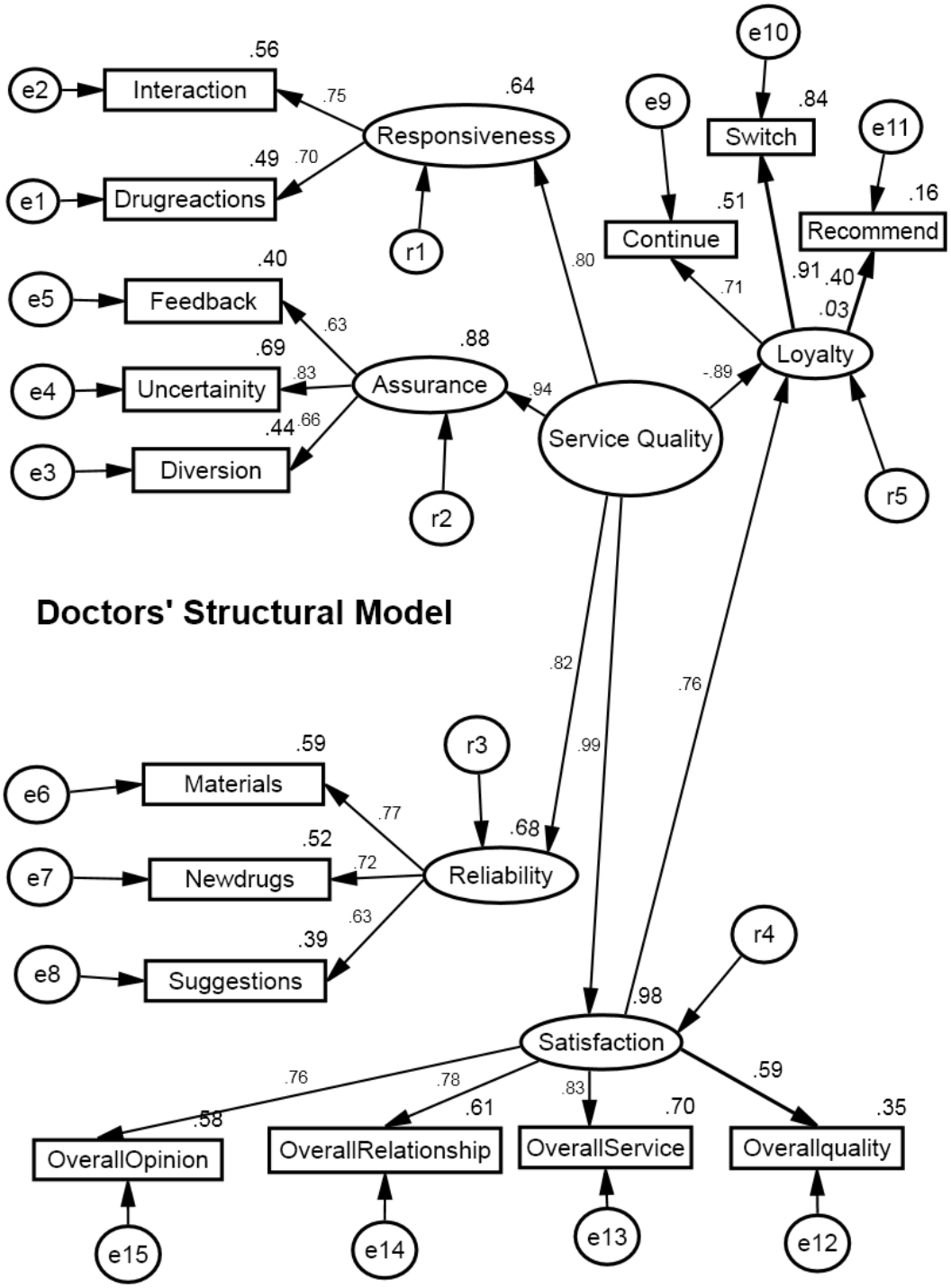

Figure: 26 –Doctor Perceived Service Quality –Satisfaction-Loyalty Model

Validity and Reliability of the Structural Model;

The measurement model validity is evaluated through convergent validity. The table 66 presents the significant standard loadings of latent constructs, AVE and (CR). All the constructs have significant standardized loadings and AVE values range from 0.50

to 0.73. The construct reliability values are also above 0.70 for all the constructs. It indicates that the constructs have convergent validity

Table 66
AMOS Results of Structural model

Regression paths		SL	SMC	P	AVE	CR
Service quality	SQ-Responsiveness	0.80	0.64	0.00	0.73	0.89
	SQ-Assurance	0.94	0.88	0.00		
	SQ-Reliability	0.83	0.68	0.00		
Satisfaction	SA-productquality	0. 59	0.35	0.00	0.56	0.77
	SA-Service	0.83	0.69	0.00		
	SA-relationship	0.78	0.61	0.00		
	SA-overall opinion	0.76	0.58	0.00		
Loyalty	Loyalty-continue	0.71	0.51	0.00	0.50	0.74
	Loyalty-Switch	0.92	0.84	0.00		
	Loyalty-recommend	0.41	0.16	0.00		

Results of Hypotheses Testing:

The overall model is presented from hypothesis1 to hypothesis 6. This model incorporates all the hypothesized relationships to demonstrate a direct relationship between doctors perceived service quality (DPSQ), doctors' satisfaction and behavioral intention (doctor's future prescribing behavior). The results of the SEM of the research model proposed are reported in Table.67. The results indicate that the pathway from company's service quality to doctor's satisfaction is significant ($p<0.00$) with a standardised regression weight of 0.996. Therefore the hypothesis that service quality affects the level of satisfaction is supported. The pathway from doctor's satisfaction to doctors behaviour intentions is significant ($p<0.00$) with a standardised regression weight of 0.948 and hence the hypothesised relationship can be treated as significant. Therefore the hypothesis that doctors'satisfaction affects the level of doctor's behavious is supported in this study.

The first hypothesis (4a) posits that "*responsiveness has a significant effect on Doctors perceived service quality" (DPSQ)* is significant ($p< 0.001$) and the

standardized regression weight is 0.805. Therefore the hypothesis that the responsiveness influences service quality is supported

The second hypothesis (4b) posits that "*Assurance have a significant effect on DPSQ*is significant (p< 0.001) with the standardized regression weight 0.938. Therefore the hypothesis that Assurance influences service quality is supported.

The third hypothesis (4c) posits that "*Reliability has a significant effect on DPSQ"*. is significant (p< 0.001) and the standardized regression weight is 0.824 Therefore the hypothesis that Reliability influences service quality is supported

DPSQ has a significant effect on Customer satisfaction. The pathway from doctor perceived service quality to customer satisfaction is significant (p< 0.001) and the standardized regression weight is 0.996.Therefore the hypothesis(4c) that doctor perceived service quality influences customer satisfaction is supported

"Customer satisfaction has a significant effect on doctor's behavior intentions (doctor's future prescribing behavior. The pathway from doctor perceived service quality to customer satisfaction is significant (p< 0.001) and the standardized regression weight is 0.765.Therefore the hypothesis(4d) that Customer satisfaction has a significant effect on doctor's behavior intentions (doctors' future prescribing behavior) is supported

The hypothesis (4e) posits that "–DPSQ has significant effect on doctor's behavior intentions (doctors' future prescribing behavior)".The results are shown in Table: 67. The pathway from DPSQ to doctor's behavioral intentions is significant (p< 0.001) and the standardized regression weight is - .893 which is a negative path and hence the relationship can be treated as insignificant Therefore the hypothesis DPSQ has significant effect on doctor's behavior intentions (doctors future prescribing behavior) is not supported.

Table 67

Standardized Regression Weights for Path Relationships

Construct Relationship	SRW	Sig	Result
H4a– Responsiveness has a significant effect on *DPSQ*	.800	0.00	Supported
H4b– Assurance has a significant effect on *DPSQ*	.936	0.00	Supported
H4c–Reliability has a significant effect on *DPSQ*	.825	0.00	Supported
H4d– *DPSQ* has a significant effect on customer satisfaction	.991	0.00	Supported
H4e- Customer satisfaction has a significant effect on – doctors prescribing behavior	.765	0.00	Supported
H4f– *DPSQ* has significant effect on doctor's prescribing behaviour	-.893	0.00	Partially Supported

Note:SRW-Standardized Regression Weight,Sig-Significance
**Probability level of 0.001*

4.4.6: Problems faced by doctors:

High price, non-availability of the drugs and adulteration were the major problems faced by doctors with the selected pharmaceutical company in three Indian cities (Fig: 27)

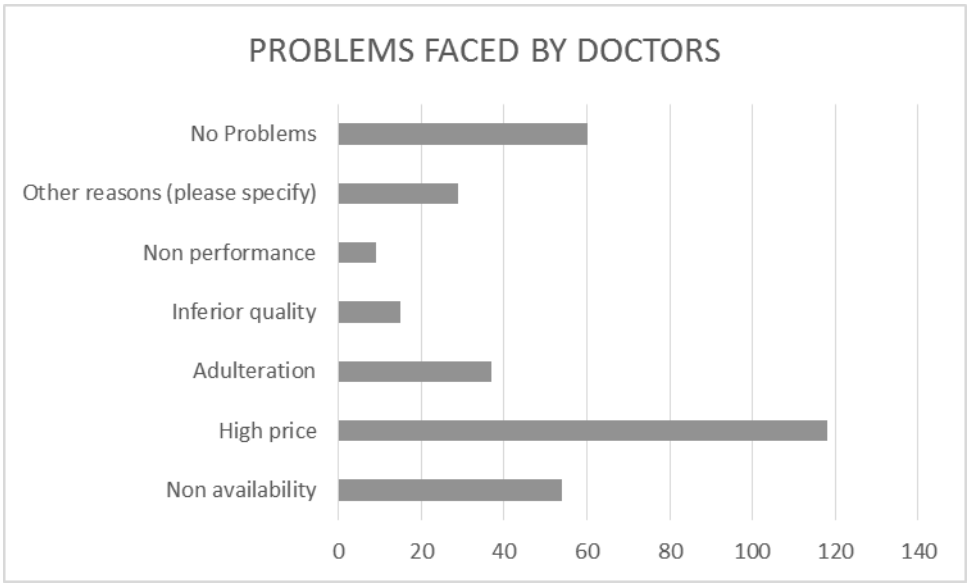

Figure: 27 Problems faced by doctors

CHAPTER-V

FINDINGS AND SUGGESTIONS

The study evaluates the role of service quality in pharmaceutical supply chain. This study has been undertaken mainly in the pharmaceutical sector as it directly affects the health of the people. This entire thesis is divided into five chapters- importance of service quality in the pharmaceutical supply chain and the significance of the pharmaceutical sector were explained in the first chapter. The various research works done in service quality, supply chain and customer satisfaction have been presented in the second chapter. The third chapter mainly discuss about the methodological part of the research work. The fourth chapter discusses about the exact analysis and interpretation of the data. The last chapter reports the summary and conclusions of the research work. It reveals the contributions of this work to the academicians, researchers, pharmaceutical companies and society in general. The scope of this research and future avenues are also discussed. extracted six factors (Tables: 23) named as Reliability, Responsiveness, Assurance, Empathy Tangibles and facilities

5.1: Discussion of Research Findings:

This study has been done to examine the major factors affecting the service quality at different phases in the pharmaceutical supply chain and examine its impact on customer satisfaction. This section also discusses about how far the study objectives are achieved.

Objective 1: To identify the critical factors effecting service quality at different Interfaces of the Pharmaceutical supply chain.

- **Manufacturer-Distributor Interface**: (Distributors Perceptions about Manufacturers) The EFA was conducted and four critical factors were extracted which were named as responsiveness, assurance, reliability and communication. Reliability test for the data collection instrument indicated that the Cronbach alpha is 0.913 satisfying the reliability criteria .The results showed the value of KMO is 0.905 which indicates a higher measure of sampling adequacy. The total variance explained by all these four factors was 62 percent. Confirmatory factor analysis was conducted with above extracted factors derived from EFA.

- **Distributor-Retailer Interface: (Distributors Perceived Value): Distributors perceptions about themselves were taken into consideration.** The EFA extracted three factors which were named as Reliability, Assurance and Empathy. The total variance explained by all these factors was 59 percent; the KMO is 0.851 signifying the efficiency of the test. Reliability test for the data collection instrument indicated that the Cronbach alpha is 0.828 satisfying the reliability criteria.
- **Distributor-Retailer Interface :(Retailers Perceptions about Distributors):** EFA extracted six factors which were named as Reliability, Responsiveness, Assurance, Empathy Tangibles and, facilities explaining 61 percent of the total variance. The value of (KMO) is 0.692 indicating the efficiency of the test. Reliability test for the data collection instrument indicated that the Cronbach alpha is 0.749 satisfying the reliability criteria.
- **Pharmacist functional Service Quality Perceived Value:** EFA was first conducted to identify the critical factors of functional service quality as perceived by pharmacists. Five factors were extracted through EFA named as – Responsiveness, Assurance, Reliability, Communication and Empathy. The KMO is 0.887. The total variance explained by five factors was 55 percent. Confirmatory factor analysis was conducted with the above extracted factors derived from EFA
- **Retailer- Consumer Interface :(Consumer Perceptions about Retailers):** Exploratory factor analysis was carried out and the extracted factors were named as Responsibility, Empathy, Reliability, Assurance and Physical Facilities. The KMO is 0.787 for Retailer–Customer interface. These factors are explaining 56 % of variance. Reliability test for the data collection instrument indicated that the Cronbach alpha is 0.712
- **Doctors Perceptions about Manufacturers.** Exploratory factory analysis was conducted and four factors were extracted which were–named as Responsiveness, Assurance, Reliabilty and Empathy. The KMO value is 0.902 and total variance explained was 56%. .

Objective 2: To confirm the Distributor Perceived Service quality dimensions by developing the measurement models at different Interfaces of the Pharmaceutical Supply Chain: The study used AMOS 20 to run the CFA for all the constructs to evaluate the identified factors where individual items in the model were examined to see how closely they represent the same construct at all phases of the chain

To confirm the Distributor Perceived Service quality dimensions by developing the Manufacturer measurement model at the Manufacturer–Distributor Interface of the Pharmaceutical Supply Chain

A valid scale with four dimensions Responsiveness, Assurance, Reliability and Communication and fifteen items was developed using CFA. The fit indices reflect acceptable level of fit and all the indices are within recommended tolerances. CFA standardized factor loadings of each variable in this study are above 0.50. AVE is above 0.5 and C.R is above 0.7, and Reliability for all the constructs surpassed the proposed level of 0.60 satisfying the required criteria. This model constitutes a service quality scale for measurement of service quality at the Manufacturer (Company) - Distributor (Customer) Interface of pharmaceutical supply chains

To confirm the Distributor Perceived Service quality dimensions by developing the Distributor Measurement Model at the Distributor -Retailer Interface

A valid scale with three dimensions -Responsiveness, Tangibles and Empathy and nine items were developed using CFA. The fit indices reflect acceptable level of fit and all the indices are within recommended tolerances. CFA standardized factor loadings of each variable in this study are above 0.50. AVE is above 0.5 and C.R is above 0.7, and Reliability for all the constructs surpassed the proposed level of 0.60 satisfying the required criteria. This model constitutes a Service Quality Scale for measurement of Service Quality at the Distributor -Retailer Interface.

To confirm the Pharmacist service quality dimensions by developing the Pharmacist Measurement Model in the Pharmaceutical Supply Chain

A valid scale (PPFSQ scale) with three dimensions -Empathy, Assurance and Reliability and nine items emerged through CFA. Reliability for all the constructs exceeded suggested level of 0.60. All the factor loadings in the CFA model developed

are statistically significant at level of significance Of 0.001. The fit indices reflect acceptable level of fit and all the indices are within recommended tolerance. This scale thus can be used to measure the quality of service provided by pharmacists

To confirm the Doctor Service quality dimensions by developing the Doctor Perceived Service Quality measurement model at the Manufacturer–Customer (Doctor) Interface of the pharmaceutical supply chain:

A valid scale with three dimensions-Reliability, Assurance, and Responsiveness and eight items emerged through CFA. All the factor loadings in the CFA model developed are statistically significant at a level of significance of 0.001. The amount of squared multiple correlations for all dimensions in the model are more than 0.5; Reliability for all the constructs exceeded suggested level of 0.60. The AVE is above 0.5 and CR is 0.7. This model constitutes a service quality scale for measurement of service quality in the manufacturer (company) - doctor (customer) interface of pharmaceutical supply chain.

Objective3: To study the impact Of Service Quality on Customer Satisfaction at different phases of the Pharmaceutical Supply Chain.

- **To examine the relationships between Distributors perceived service Quality and satisfaction**: The relationship between service quality and overall satisfaction was examined by evaluating Structural model. An examination of the hypothesized model indicates that the model has an acceptable fit. The results indicate that the pathway from Distributors Perceived Service Quality to satisfaction is significant ($p<0.00$) with a standardised regression weight of 0.292. Therefore the hypothesis that service quality affects the level of satisfaction is supported. All fit indices are at an accepted level i.e above 0.90 except GFI and AGFI. All the constructs have significant standardised loadings and AVE values range from 0.5 to 0.84. The construct reliability values are also 0.70 for all the constructs.
- **To examine the relationships between Retailers perceived service Quality about Distributors and satisfaction**: The relationship between service quality and overall satisfaction was examined by evaluating Structural model. An examination of the hypothesized model indicates that the model has an acceptable

fit. The results indicate that the pathway from Retailer's perceived service Quality to satisfaction is significant ($p<0.00$) with a standardised regression weight of 0.369. Therefore the hypothesis that service quality affects the level of satisfaction is supported. All fit indices are at an accepted level i.e above 0.90. All the constructs have significant standardised loadings with AVE values above 0.5 and construct reliability values above 0.80

- **To examine the relationships between Pharmacist perceived functional service Quality and satisfaction:** The relationship between the Pharmacist Perceived Service Quality and Overall Satisfaction was examined by evaluating Structural model. This model incorporates all the hypothesized relationships to demonstrate a direct relationship between service quality, and satisfaction. An examination of the hypothesized model indicates that the model has an acceptable fit. All fit indices are at an accepted level. The results indicate that the pathway from perceived service Quality to satisfaction is significant ($p<0.00$) with a standardised regression weight of 0.31. Therefore the hypothesis that service quality affects the level of satisfaction is supported. All fit indices are at an accepted level i.e above 0.90. All the constructs have significant standardised loadings with AVE values more than 0.51 and C.R value is 0.9.

Objective 4: To examine the relationships between doctors' perceived service Quality, satisfaction, and doctor's prescription behavior using SEM: The relationship between the three Service Quality Dimensions, Overall Satisfaction and Prescribing Behavior was examined by evaluating Structural model. This model incorporates all the hypothesized relationships to demonstrate a direct relationship between service quality, satisfaction and behaviour. An examination of the hypothesized model indicates that the model has an acceptable fit. All fit indices are at an accepted level. The results indicate that the pathway from company's service quality to doctor's satisfaction is significant ($p<0.00$) with a standardised regression weight of 0.996. Therefore the hypothesis that service quality affects the level of satisfaction is supported. The pathway from doctor's satisfaction to doctors behaviour intentions is significant ($p<0.00$) with a standardised regression weight of 0.948 and hence the hypothesised relationship can be treated as significant. Therefore the

hypothesis that doctors' satisfaction affects the level of doctor's prescribing behaviour is supported in this study.

Other Major findings of the Study:

- **Examination of Supply chain Management Practices using SCOR model:** The present study has made use of the widely recognized SCOR model for examining the Supply chain management practices of the company.This model evaluated the supply chain practices from four perspectives- Supply chain reliability, responsiveness, flexibility and asset management efficiency. the Pharmaceutical Company's Performance is better in terms of reliability, responsiveness and flexibility. The company's performance was compared with the best in class Practices. As far as Supply chain reliability and asset management efficiency was concerned the Company was comparatively better in terms of on time delivery and Inventory Turnover
- **Problems faced at different phases of the chain:**

  Problems faced by distributors: From the study it was found that the problems of packaging, delay, warehousing and too many players (Hyderabad), spurious drugs, shelf life and returned goods (Visakhapatnam) packaging, labeling and returned goods in Rajahmundry were the major problems faced by distributors which are actually affecting the performance of the pharmaceutical supply chain.

  Problems faced by retailers: The major problems experienced by the retailers are Incorrect pricing and shelf life (Hyderabad), warehousing and shelf life (Visakhapatnam) transportation and shelf life in Rajahmundry

  Problems faced by the consumers: The major problems experienced by the customers with the pharmacies were spurious goods and dusty atmosphere (Hyderabad), delay in delivery and shortage of drugs (Visakhapatnam) non-availability, delay in delivery and shortage of drugs (Rajahmundry)

  Problems faced by doctors: High price, non-availability of the drugs and adulteration were the major problems faced by doctors with the selected pharmaceutical company in three Indian cities
- **Factors considered by Doctors in prescribing drugs for pharmaceutical company:** It was observed that the factors like Availability of drugs, Quality,

Price and Reputation were ranked as the topmost in order of preference in prescribing drugs in general for any pharmaceutical company, and for the selected pharmaceutical company-Quality, Reputation, Availability and Price were given the top rankings based on the Friedman Test.

5.2: Implications of the Research:

The empirical evidence drawn from this analysis reveals few important implications. The study adds to the body of knowledge in three principal areas – Theoretical, Managerial and Methodological aspects as discussed below.

Theoretical Implications

- Several theoretical contributions emerge from this research. This research synthesized concepts from two main theories of Service quality. Parasuraman's SERVQUAL, Cronin & Taylor's SERVPERF and Grönroos service quality model to assess individual attributes of manufacturers, distributors and retailers service quality in a more holistic manner and in Indian context. The pharma industry is one of the world's most dynamic and profitable sectors. According to McKinsey& Company, estimates the India pharmaceutical market (domestic) will top the US$ 20 billion-mark by 2015. Hence this study is very significant for the pharmaceutical sector which is playing a major role in India. The study results will be very helpful to the pharmaceutical companies to evaluate the performance of the supply chain members. This study will be a valuable contribution to the Indian pharmaceutical sector where very little studies have been done from this perspective

Managerial Implications:

The pharmaceutical industry's profitable heritage and relatively low cost of goods is responsible for its lack of focus on supply chain efficiencies. The major findings of this study have addressed some important service quality issues in the pharmaceutical supply chain. It has addressed some important managerial implications for the manufacturers, distributors, retailers and doctors.

- This study identified the different service quality dimensions at different phases of the pharmaceutical supply chain. The study showed the influence of

these dimensions in effecting the satisfaction at different phases of the supply chain. The findings confirm with the existing theory and add more insights to the existing knowledge of service quality. This study revealed and confirmed the existence of critical relationship among perceived service quality and satisfaction at each phase of the supply chain. The findings suggest that the pharmaceutical sector needs to concentrate on the service quality issues which are actually affecting the performance of the supply chain. The study proved that along with drug quality, service quality is also a major factor which is actually determining the profitability of the sector.The results of the study are very helpful to the pharmaceutical industry to provide better services and increase customer satisfaction.

- The results of the study also indicate the need for addressing some of the major problems like non availability of drugs, transportation, incorrect pricing, labeling, adulteration which are actually effecting the supply chain performance.
- The study also came with interesting facts about pharmacies. Most of the consumers also complained about the non-availability of copy of essential drugs, RFID and advanced technology. The study identified the growing demand for organized pharmacies compared to unorganized pharmacies mainly because of quality service, quick delivery and availability of medicines in organized pharmacies. The study identified proximity, delivery and availability and the last rank to timings and schemes as the basic factors in choosing a particular pharmacy(based on Kendall's W test). The study recommends the need for more training and better facilities in unorganized pharmacies.
- The results of SEM also found that service quality acts as a key antecedent to customer satisfaction and loyalty. Hence the companies have to concentrate on service quality issues like reliability, assurance and responsiveness along with drug quality to satisfy the customers and retain them. The study also revealed the major factors effecting doctor's prescription behavior, and the major reasons for brands switching so suggesting the need for better relationships ,more communication and regular feedback between doctors and company

- The results of the study showed that the company has a lot of scope for improving profitability by lowering costs, improving asset management, delivery time and improving customer service by improving the supply chain practices.

Methodological Implications;

- The contributions of this study in terms of methodology are significant as it is one of the few studies that test service quality in pharmaceutical supply chain in Indian context.
- This research has filled gaps in the area of service quality in pharmaceutical supply chain by identifying the important predictors of service quality in supply chain in Indian conditions which can be used in Management research in other countries. Moreover, this study develops its own scales to measure service quality at each phase of the supply chain which satisfied the validity and reliability tests.
- The relationship between service quality, customer satisfaction and loyalty has been well established with in the service industry context. This research extends the understanding of those relationships with in the context of manufacturing sector.

Practical Implications:

- The study identified the service quality dimensions at each phase of the supply chain which itself is very challenging
  - Responsiveness, Assurance, Reliability And Communication were important service quality dimensions identified at manufacturer-distributor Interface,
  - Responsiveness, Tangibles and Empathy were important service quality dimensions identified at distributor-retailer interface.
  - Empathy, Assurance and Reliability were important service quality dimensions identified at Retailer-Consumer interface
  - Reliability, Assurance, and Responsiveness were important service quality dimensions identified at manufacturer –doctor interface of the pharmaceutical supply chain.

- The study identified that consumers are not getting complete support from pharmacists in terms of information or advices so they need more training.The study also found that doctors are being influenced by promotions and offers rather frequently so the poor customers are being exploited
- It was also found that proper coordination and communication is missing among the members in the supply chain.

5.3: Research Contribution

The research contributes to the existing knowledge from both theoretical and practical perspective. The research adds new insights within the pharmaceutical industry context. It identified a number of new dimensions and attributes derived from literature review and focus group discussions to examine the relationship between service quality and satisfaction. The research contribution is briefly discussed in relation to the industry and conceptual contributions.

Contribution to Academic Theory (i.e., Service quality Management):

The research contributes to academic theory by developing the models which identified dimensions and attributes in the context of service quality in pharmaceutical supply chain and showed their impact on satisfaction and loyalty. The dimensions identified in this study will help in understanding the role played by service quality in pharmaceutical supply chain. The study gives rise to the development of new concepts and models in the area of service quality in the manufacturing sector.

Contribution to Academic Practice:

The research contributes methodologically to existing service quality measurement research. By testing and revalidating the scales at each phase of the supply chain with diverse samples at different phases of the supply chain the study gives rise to new ideas for further development of scales in service quality in different manufacturing sectors

Contribution to Pharmaceutical Industry:

The research is new of its kind which studies service quality at different phases of the supply chain and tries to show the impact of service quality on satisfaction and doctors prescribing behavior. The pharmaceutical sector plays a very important role in

preserving the health of the people so this study will be very helpful to the manufacturers to improve the supply chain performance by measuring service quality and to overcome the problems faced at each phase of the supply chain. This study will surely be helpful to manufacturers, distributors, pharmacists, doctors and customers in improving their performance and increasing the customer satisfaction.

5.4: Limitations of the Study:

Despite the positive aspects and results there are also a few limitations which needs to be addressed in future research

Theoretical Limitations:

The study was confined to three major Indian cities and one major pharmaceutical company. The study can be extended to a larger sample .The Supplier-manufacturer Interface could not be studied.

Methodological Limitations:

The data was collected at a single point of time so cause and effect relationship cannot be analyzed. The survey method of collecting data also has limitations so observations and in-depth interviews need to be incorporated. Recent mathematical modelling techniques like, Data Envelopment Analysis (DEA), Quality Function Deployment (QFD) may be applied to this research

5.5: Scope for Future Research:

The research work *service quality in supply chain* provides a lot of scope for new ideas and concepts.

The study on service quality in manufacturing sector covering all phases of the supply chain is new in its idea. This study was only confined to pharmaceutical sector the study can be extended to other manufacturing sectors.

The importance of service quality in supply chain was emphasized in this study, the difference between service quality and goods quality and how they influence the supply chain performance can be worked out in future research

This study was confined to only three major Indian cities so the results cannot be generalized it can be extended to a larger sample .

The perceptions of customers change with the changing times so longitudinal research will be more appropriate for this study.

The study developed a model showing the influence of service quality on satisfaction and doctors prescribing behavior but there are also other factors like image, research, promotional aspects, and future research can study these aspects.

This study failed to include the role of suppliers and medical representatives who are also major players in effecting the supply chain performance so future works can also include these aspects.

Future research can explicitly study each phase of the supply chain and show how they can affect the total performance of the business

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APPENDICES

APPENDIX 1
Distributors' Questionnaire

Dear Respondent,

Kindly spare few minutes to answer the questionnaire. Information collected will be used for academic purpose only.

1. Personal Profile:
   a. Name:
   b. Age;
   c. Educational Qualification:
   d. Years of Experience:
   e. Number of Warehouses (Total) ---------(owned) ..... (third Party) .....
   f. Address:
2. How do you place orders to manufacturers?
   a. Paper
   b. EDI
   c. Telephone
   d. Fax
   e. Email
   f. Web-based
3. Please tick relevant number that reflects company's practices
   (SD-Strongly Disagree, D- Disagree, N-Neither Agree nor Disagree, A-Agree, SA-Strongly Agree)

Particulars	SA	A	N	D	SD
1. There is no uncertainty involved in the promotion of Company's products					
2. The company provides information about the latest products					
3. The company takes regular feedback about the product Performance					
4. The company regularly interact with you to understand your requirements					
5. The company takes your suggestions into consideration with regard to improvement of the product quality					
6. The company informs you of the changing market requirements regularly					
7. The Company provides information about potential drug diversion or inappropriate use					
8. The Company provides information about adverse drug reactions that have caused a problem with a patient's					
9. The Company educates about new drugs, doses or delivery systems associated with alternative products					
10. Company's Promotional information is clear, legible, accurate, balanced, fair and objective					
11. The company ensures the availability of drugs regularly					

12. Company has customers interest at heart					
13. Medical Representatives give you reliable information					
14. Company shows keen interest in solving your complaints relating to drugs					
15. The Company works regularly with distributors to jointly solve problems					
16. The Company works with distributors to jointly plan future activities					
17. The Company puts serious effort into building trust and commitment with all members					
18. The Company has good relationships with distributors					
19. The Company possesses the necessary information					

4. What is the extent of goods damaged in transportation and handling?
5. Do you use an established (tested) method of forecasting demand?
   a) Yes b)No

6. If yes (to Q.No.5a) mention the methods/procedures used?

7. What is the accuracy of the forecast?
   i) +/-5%
   ii) +/-10%
   iii) +/-25%
   iv) > +/-25%
8. What is the extent of orders cancelled?
   i) < 5% of order booked
   ii) 5-10%
   iii) 10to 20 %
   iv) > 20% of order booked
9. What is the extent of stock returns from the field?
   i) < 5% of sales
   ii) 5-10%
   iii) 10-20%
   iv) > 20% of sales
10. What do you do with rejected pharmaceutical products?

    i) Dispose
    ii) Dispatch to Suppliers
    iii) Return to saleable stock
    iv) Others (please specify)

11. What are the practices followed for reducing Inventory? Please specify_____

12. What is the Inventory holding period?
13. How is work in process /inventory /material usage tracked?
14. How is the Information exchange between members in the supply chain?

    a. Timely
    b. Accurate
    c .complete
    d. adequate
    e. reliable
    f. all

15. How often do you face these problems? (VR-Very Regularly, R-Regularly-Sometimes, N-Never)

Problems	**VR**	**R**	**S**	**N**
spurious and counterfeit drugs				
Improper packaging				
Improper Labelling				
limited shelf life				
Drug Shortage				
Rejected and returned products				
Delay in delivery				
Transportation problems				
Warehousing problems				
Too many trade schemes				
Increasing players in market				
Other problems(please specify)				

16. How many days does it take for you to place an order and receive it?

    a)less than 3 days
    b) 3-6 days
    c) 6-10 days
    d).10-15 days
    e).more than 15 days

17. What is the time gap between customer placing an order to the moment of receipt of payment?

a. less than 20 days
b. 21-40 days
c. 41-60days
d. more than 60 days

18. For how many days do you generally hold the Inventory?

a.l-3days
b.4-7 days
c.8-14 days
d. 15-21 days
e. above 22 days.

19. How many times is the manufacturer able to meet the additional demand requirements?

a. Up to 10%
b. 11-20%
c.21-30%
d.above31%

20. How many times did do you deliver the goods by the promised time (in right quantity and quality)

a. Less than 90% b.90-93% c.94-96% d.97-99% e. more than 99%

21. How many times did do you ship the total order in the initial shipment itself?

a. Less than 90% b.90-93% c.94-96% d.97-99% e. more than 99%

22. How many times were the goods delivered in the desired quality to the customers?

a. less than 90% **b**.90-93% **c**.94-96% **d**.97-99% **e**. more than 99%

23. How many times is the inventory purchased, sold, and replaced during an accounting period?

a. below 6 times **b**. 6-10 times **c**.11-15 times **d**.16-20 times **e**. above 25 times

24. Please indicate the extent to which you agree or disagree with the following statements regarding distributor's performance by ticking the appropriate one .

(SA-Strongly Agree, A-Agree, N-Neither Agree nor Disagree, D-Disagree, SD-Strongly Disagree)

Particulars					
	SA	**A**	**N**	**D**	**SD**
Distribution Centre has modern equipment (computers, air conditioning, etc)					
Distributor has sufficient facilities for storing drug products					
The physical facilities at distribution Centre are not visually clean					
Vehicles used in the transportation are visually in a good condition					
Storage areas are clean and dry and maintained within acceptable temperature limits					
Packaging materials and transportation containers are of suitable design to prevent damage of pharmaceutical products during transport.					
A batch tracking system is used to enable specific batches to be traced during the distribution process.					
Personnel at the distribution Centre are not trained					
Order taking / delivery methods are accurate					
All distribution members are not familiar with the Marketing Code of Ethics					
Distributor effectively handles the expired / counterfeit drugs issue					
All required information is available on invoice provided					
Records are not kept confidential					
Distribution Members share responsibility for the quality and safety of products					
There are written procedures and records for traceability of the products distributed.					
Distributor responds immediately to enquires					
Distributor responds immediately to complaints					
Distributor do not provides services at short notice (if required)					
Distribution Centre personnel do not give individual attention					
Distribution Centre personnel do not fulfil specific requirements					
Distribution Centre has suitable office working hours					
Payment information is kept confidential					
Personnel in the distribution Centre do not have the authority to solve your problems					
Personnel in the distribution Centre do not have the knowledge to answer your questions					
When distributor promises to deliver by a certain time they do so					

25. Please give your valuable suggestions for better performance of the company

Company

Retailers

Thank You very much for sparing your valuable time

APPENDIX II

Questionnaire for Chemists/Druggists

Dear Respondent,
Kindly spare few minutes to answer the questionnaire. Information collected will be used for academic purpose only.

1. General Profile:

a . Name of the Pharmacy:
b. Age
c. Professional Qualification:
   i. Pharmaceutical education ii. Bachelor of Pharmacy iii. Diploma in Pharmacy iv. No Pharmaceutical education

d. Work Experience of the drug seller (years of work in a pharmacy):
e. Operating hours of pharmacist:
f. Area (sq. feet)
g. Address:

2. Please indicate the extent to which you agree or disagree with the following statements regarding the Pharmacy performance by writing the appropriate choice.(SA-Strongly Agree, A-Agree, N-Neither Agree nor Disagree, D-Disagree, SD-Strongly Disagree)

Quality Dimensions	SA	A	N	D	SD
Pharmacy Centre has modern equipment(computers, air					
Pharmacy do not have sufficient facilities for storing					
The physical facilities at Pharmacy Centre are visually					
Personnel handling drugs are not professional in					
Personnel at Pharmacy Centre are trained					
Personnel in the pharmacy Centre have the knowledge to answer customers questions					
Personnel in the pharmacy Centre have the authority to					
Pharmacist maintains the privacy of customer's					
When customers have any problem Pharmacist do not show a sincere interest in solving it					
Pharmacist effectively handles the expired drugs issue					
All required information is not available on invoice					
Pharmacist effectively handles the counterfeit drug					
Records are kept confidential					
Pharmacist do not provide legal support when needed					
Pharmacist responds immediately to customer's					
Pharmacist responds immediately to customer's enquiries					
Pharmacist advices about problems that might occur					
Pharmacist instructs about how to take medications (if					
Pharmacist gives individual attention to each customer					

Pharmacist do not check with customers about how well their medications are working					
Pharmacist Provides information about the storage of					
Pharmacy Centre do not fulfil customer's specific					
Pharmacy Centre do not have office working hours					
The pharmacist shows interest in customer's health					
Methods designed for payments are convenient for					
Pharmacy staff are not courteous and respectful to					
Pharmacist helps when customers have a health problem					
Pharmacist checks with you about how well your					
Pharmacist has time to spend with You					
Temperature is controlled for maintenance of drugs					
The pharmacist's efforts to help you improve your					

3. Do you collect returned goods? **Yes/No**

4. How do you place orders to Manufacturers/Distributors? (Please tick)
a. Paper b. EDI c. Telephone d. Fax e. Email f. Web-based

5. How do you rate the following facilities in your Pharmacy?

Facilities	Excellent	Very good	Good	Average	Poor
Ventilation(No Sunlight damage)					
Stock labelling					
Temperature Control					
Segregation of different Materials					
Packaging					
Floor construction					
Ambience					
Location of stock					
Storing products according to					

6. How is the Pharmacy meeting its goals in these service areas?

Goals	Excellent	Very good	Good	Average	Poor
Damage free receipt					
Invoice accuracy					
Order Cycle Time.					
Order Completeness					
Speed of Response to enquiries					
Customer Satisfaction					
Quality Service					

7. How often does your Pharmacy face these problems? (VR-Very Regularly, R-Regularly, ST- Sometimes, FT-Few Times , N-Never)

Problems	VR	R	ST	FT	N
Spurious And Counterfeit Drugs					
Improper Packaging					
Mislabeling					
Limited Shelf Life					
Drug Shortage					
Rejected And Returned Products					
Delay In Delivery					
Transportation Problems					
Warehousing Problems					
Too Many Trade Schemes					
Increasing Players In Market					
Spelling Mistakes Or Illegible Handwriting Prescription					
Medication Errors(Similar Sounding Brand Names)					
Others(Please Specify)					
Incorrect Pricing					

8. Please tick (yes or No or unsure) with respect to the availability of the following in your Organization

Particulars	Yes	No	Unsure
Temperature monitoring device.			
Alternative power supply for the Refrigerator			
copy of essential drugs			
Penalties for tampering, counterfeiting & divesting			
RFID for onsite Inspection at Intervals			
Bill counting machines			
Electronic protocols			
Digital tracking system			
Computerized billing and Inventory system			
Knowledge of temperature range for vaccines			

9. Please indicate the extent to which you agree or disagree with the following statements regarding distributor's performance by ticking the appropriate one. (SA-Strongly Agree, A-Agree, N-Neither Agree nor Disagree, D-Disagree, SD-Strongly Disagree)

Particulars	**SA**	**A**	**N**	**D**	**SD**
Distribution Centre has modern equipment (computers, air conditioning, etc)					
Distributor has sufficient facilities for storing drug products					
The physical facilities at distribution Centre are not visually clean					
Vehicles used in the transportation are visually in a good condition					
Storage areas are clean and dry and maintained within acceptable temperature limits.					
Packaging materials and transportation containers are of suitable design to prevent damage of pharmaceutical products during transport.					
A batch tracking system is used to enable specific batches to be traced during the distribution process.					
Personnel at the distribution Centre are trained					
Order taking / delivery methods are accurate					
All distribution members are not familiar with the Marketing Code of Ethics					
Distributor effectively handles the expired / counterfeit drugs issue					
All required information is available on invoice provided					
Records are not kept confidential					
Distribution Members share responsibility for the quality and safety of products					
There are written procedures and records for traceability of the products distributed.					
Distributor responds immediately to enquires					
Distributor responds immediately to complaints					
Distributor do not provides services at short notice (if required)					
Distribution Centre personnel do not give individual attention					
Distribution Centre personnel do not fulfil specific requirements					
Distribution Centre has suitable office working hours					
Payment information is kept confidential					
Personnel in the distribution Centre do not have the authority to solve your problems					
Personnel in the distribution Centre do not have the knowledge to answer your questions					
When distributor promises to deliver by a certain time they do so					

10. How do you rate the quality dimensions for the pharmaceutical products of these Companies? (Excellent-E, Very Good-VG, Good-G, Average-A, Poor-P)

Performance of the Product					
	E	**VG**	**G**	**A**	**P**
Adverse drug reactions					
Taste and smell of medicine					
Attractiveness of a package					
Immediate effect of a medicine					
Damage in the product					
Side effects of medicine.					

11. Please respond to each question by ticking the number which reflects your own perceptions?

a. My opinion about company can be best described as

Very unsatisfied 1 - 2 - 3 - 4 - 5 - 6 - 7 Very satisfied

b. My opinion about the quality of products

Very poor 1- 2 - 3 - 4 - 5 - 6 - 7 Excellent

12. Please write your opinion regarding the following functions performed in the pharmacy by using the following options

(SA-Strongly Agree, A-Agree, N-Neither Agree nor Disagree, D-Disagree, SD-Strongly Disagree)

Particulars	SA	A	N	D	SD
Ensure that patients have access to all medicines					
Analyze patient profiles/ prescription records to identify areas of drug diversion or misuse					
Clarify with the health professional for illegible handwriting, incomplete information, abbreviations before prescription is processed					
Documentation of clarifications					
Ensure safety , accuracy and quality of supplied products					
Use of e-commerce for order placement					
Reporting adverse drug reactions that have caused a problem with a patient's health-					
Supply of antibiotics without a prescription.					
Regular interaction with Doctors to understand Problems.					
Interacting with Patients to determine Customer Expectations.					
Seeking suggestions from the firm/distributor frequently					
Receiving information from distributors in advance of the changing market requirements:					
Providing information to distributors about customers' requirements					
Advising to Patients and supplying medicines or other treatment for the symptoms of ailments that can properly be self-treated					
Establishing arrangements with other health professional communities for health promotion activities					
Professional assessing of promotional materials for medicines and other products associated with health.					
Disseminating information about medicines and other aspects of healthcare.					
Collaborating relationships with other health care Professionals, national professional associations and patients					
Participating in health promotion campaigns to raise awareness of health issues and disease prevention					
Ensuring problems identified with individual prescriptions are addressed within appropriate time frames.					
Ensuring safe and proper disposal of drugs and non-prescription medications					
Regular interaction with company to give your suggestions					

13. Please give your valuable suggestions for better performance of distributors and companies

Thank You very much for sparing your valuable time

APPENDIX - III
Questionnaire for Doctors

Dear Sir/Madam,
Kindly spare few minutes to answer the questionnaire, Information collected will be used for academic purpose (part of Ph.D. work) only.

1. Personal Profile:

a. Age:
b. Gender:
c. Educational Qualification:
d. Religion:
e. Years of practice: a. Below 3 Years b.3-6 Years c.6-9 Years d. Above 9 years
f. Number of patients per day: 0-29 b.30-59 c.60-89 d. More than 89
g. Time per patient: a. < 5 min b.5 -10min c. 10-15 min d. > 15 min
h. Name of the hospital:
i. Address

2. **Doctor's prescribing Behaviour**

a. Which factors do you consider most important when you are prescribing a drug of one company to the other? (Please rank **the top four factors** in order of preference)

s.no	Factors	Rank
1	Product Quality	
2	Price of Product	
3	Availability	
4	Reputation of the company	
5	Medical Representative's Activities	
6	Research &Development	
7	Literature/Updates/Journals	
8	Sponsorship for conferences	
9	New Combinations	
10	Medical Education Programmes	
11	Packaging	
12	Incentives	
13	No side effects	

3. Do you prescribe drugs for this company? Yes/No

4. If (yes to q.no 3) how long have you been prescribing the drugs of this company?
a. Less than one year b.One to five years c.five to ten years d.More than ten years

5. What are the reasons for choosing these Companies? Please Rank them (**1-5)** according to your preference?

Reputation	***Quality***	***Availability***	***Price***	***offers***	***Others (Please specify)***

6. How many times you recommended other companies products because of non-availability of this company 'drugs?

One –two times	***two-four times***	***four to six times***	***more than six times***

7. What are the problems generally a patient faces with respect to drugs of this company?

S.No	**Problems**	
	Non availability	
	High price	
	Adulteration	
	Inferior quality	
	Non performance	
	Other reasons (please specify)	
	No Problems	

8. What do you think about the quality of the information provided by Medical representatives?

Timely	**accurate**	**adequate**	**Reliable**	**all the five**

9. Please indicate the extent to which you agree or disagree with the following statements regarding company's performance by ticking the appropriate choice.
(SA-Strongly Agree, A-Agree, N-Neither Agree nor Disagree, D-Disagree, SD-Strongly Disagree)

Particulars					
	SA	**A**	**N**	**D**	**SD**
There is no uncertainty involved in the promotion of Company's Products					
The company provides information about the latest products					
The company takes regular feedback about the product Performance					
The company regularly interacts with you to understand your requirements					
The company takes your suggestions into consideration with regard to improvement of the product quality					
The company informs you of the changing market requirements regularly					
The Company provides information about potential drug diversion or inappropriate use					
The Company provides information about adverse drug reactions that have caused a problem with a patient's health					
The Company educates about new drugs, doses or delivery systems associated with alternative products					
Company has customer's interest at heart					
Medical Representatives give you reliable information					
Company ensures the availability of drugs regularly					
The company shows keen interest in solving your complaints relating to drugs					
Medical Representatives have sufficient knowledge to answer your questions					
The Company promotes pharmaceutical products objectively without exaggerating their properties					
Company's Promotional information is clear, legible, accurate, balanced, fair and objective					
Materials associated with drugs like pamphlets, statements are visually appealing					
Medical Representatives of these companies visit frequently					
Company's Promotional information is based on an up-to-date evaluation of all relevant evidence and is not mislead by distortion, exaggeration, undue emphasis, omission or in any other way.					
All printed promotional materials are legible and include The name of the product, active ingredients, name and address of the company or its agent and Date of production of the advertisement					

10. Do you shift from one brand to another brand in same category: **Yes/No**

11. If (yes to Q.No.10) what are the Reasons for shifting from one brand to another? Please Rank the reasons in order of importance.

S.No	**Rank**	**Reasons**
1.		Price
2.		Introduction of Newer Molecule
3.		Persistence of the Medical Representative
4.		Promotional effort of the company
5.		Trial of a new brand
6		Other reasons (please specify)

12.Do the activities of Medical representatives of drug companies affect your prescribing decision?

a. Very Regularly b. Regularly c. Sometimes d. Rarely e. Never

13. How do you rate the quality dimensions for the pharmaceutical products of these Companies?

(Excellent-E, Very Good-VG, Good-G, Average-A, Poor-P)

Performance of the Product					
	E	VG	G	A	P
Adverse drug reactions					
Taste and smell of medicine					
Attractiveness of a package					
Immediate effect of a medicine					
Damage in the product					
Side effects of medicine.					

14. Please respond to each question by ticking the number which reflects your own perceptions?

a. My overall opinion about this company can be best described as

Very Unsatisfied 1 - 2 - 3 4 - 5 - 6 - 7 Very Satisfied

b. The quality of products

Very poor 1 - 2 - 3 4 - 5 - 6 - 7 Excellent

c. The quality of service

Very poor 1 - 2 - 3 4 - 5 - 6 7 Excellent

d. Relationship with the company

Very poor 1 - 2 - 3 4 - 5 - 6 - 7 Excellent

15. Please give your valuable suggestions for better performance

Thank you much for sparing your valuable time

APPENDIX- IV

Questionnaire for Consumers

1. Personal Profile:
   a. Gender: Male/Female
   b. Age : a.19-25 years b.26- 35years c. 36-45 years
   d. 46-55 Years e.56-65 Years g. over 65 years
   c. Education: i. Post Graduate ii. Graduate iii. Intermediate iv. S.S.C
   d. Marital Status: Married/Unmarried
   e. Occupation: a. Business b. Govt. Services c. Private d. Professional
   e. Student f. Retired g. House wife h. Others (please specify)
   f. Approximate Monthly Income:
   g. Name of the Pharmacy (Medical Store) which you visit frequently:----------
   h. Location:

2. What are the Reasons for choosing this Pharmacy? (Rank in order of Preference)

S.No	Rank	Reasons
1		Location
2		Quality of Service
3		Speed Delivery
4		Availability of drugs
5		Schemes/Offers
6.		Others(please specify)

3. Please indicate the extent to which you agree or disagree with the following statements regarding the Pharmacy performance by ticking the appropriate number.(SA-Strongly Agree, A-Agree, N-Neither Agree nor Disagree, D-Disagree, SD-Strongly Disagree)

S.No	**Quality Dimensions**	**SA**	**A**	**N**	**D**	**SD**
1.	Pharmacy Centre has modern equipment(computers, air conditioning, etc.)					
2.	Pharmacy has sufficient facilities for storing drug products					
3.	The physical facilities at Pharmacy Centre are visually clean					
4.	Personnel handling drugs are professional in appearance					
5.	Personnel at Pharmacy Centre are trained					
6.	Personnel in the pharmacy Centre have the knowledge to answer customers questions					
7.	Personnel in the pharmacy Centre have the authority to solve your problems					
8.	Pharmacist maintains the privacy of your conversations					

9.	When customers have any problem Pharmacist shows a sincere interest in solving it					
10.	Pharmacist effectively handles the expired drugs issue					
11.	All required information is available on invoice provided					
12.	Pharmacist effectively handles the counterfeit drug issues					
13.	Records are kept confidential					
14.	Pharmacist provides legal support when needed					
15.	Pharmacist responds immediately to your complaints					
16.	Pharmacist advices about problems that might occur with medication					
17.	Pharmacist instructs about how to take medications					
18.	Pharmacist responds immediately to your enquiries					
19.	Pharmacist gives you individual attention					
20.	Pharmacist checks with you about how well your medications are working					
21.	Pharmacist Provides information about the proper storage of your medication					
22.	Pharmacy Centre fulfils your specific requirements					
23.	Pharmacy Centre has office working hours suitable to you					
24.	The pharmacist shows interest in your health					
25.	Methods designed for payments are convenient to you					
26.	Pharmacy staff are courteous and respectful to you					
27.	Pharmacist help when you have a health problem related to your Medication					

4. **Customer Satisfaction**

a. How satisfied are you with the following with respect to this Pharmacy?**(VUS-Very unsatisfied, US-Unsatisfied, N-Neither Unsatisfied/Satisfied, S-Satisfied, Very Satisfied)**

S.No		**VUS**	**US**	**N**	**S**	**VS**
a.	Store Accessibility					
b.	Store Facilities					
c.	Promotions/Information					
d.	Store Atmosphere					
e.	Sales Persons Behaviour					
f.	Store Lay out					
g.	Prices					
h.	Speed of Service					
i.	Labelling					
j.	Damage free goods					
k.	Billing accuracy					
l.	Speed of Response to enquiries					
m.	Overall Quality Of Service Provided By The					

	Pharmacy					
n.	Overall Level Of Satisfaction With The Pharmacy					
o.	Overall Superiority Of Service Provided by This Pharmacy Compared To Other Pharmacy					

b. How often did you face these problems with respect to this Pharmacy?
(VR-Very Regularly, R-Regularly, S-Sometimes, N-Never)

S.No	Problems	VR	R	S	N
a.	Spurious And Counterfeit Drugs				
b.	Improper Packaging				
c.	Mislabeling				
d.	Limited Shelf Life				
e.	Drug Shortage				
g.	Delay In Delivery				
h	Non Availability Of Medicine				
i	Dusty Stores				

c. How many times have you visited this store?----------

d. Would you recommend this pharmacy to someone who seeks your advice? Yes/No

e. Do the Pharmacists clarify with the health professional for illegible handwriting, and incomplete Information before prescription is processed? Yes/No

f. Do you feel that doctors get influenced by gifts/offers while prescribing? Yes/No

5. .How do you rate the following in this Pharmacy?

Facilities	**Excellen**	**Very good**	**Good**	**Averag**	**Poor**
Ventilation(No Sunlight damage)					
Stock labelling					
Temperature monitoring device.					
Alternative power supply for the Refrigerator					
Floor construction (for minimizing dust)					
Ambience					
Location of stock					
Damage free receipt					
Invoice accuracy					
Order Cycle Time.					
Order Completeness					
Speed of Response to enquiries					

Quality Service					
Storing products according to Standards					
Bill counting machines					
Electronic protocols (helps in eliminating problems in reading doctors hand writing					
Digital tracking system					
Computerized billing and Inventory system					
Knowledge of temperature range for vaccines					
RFID for onsite Inspection at Intervals					
Technology to facilitate the assignment and tracking of serial no' s for individual Packages					
Customer Satisfaction					

6. How do you rate the quality dimensions for the pharmaceutical products of this Company? (Excellent-1, Very Good-2, Good-3, Average-4, Poor-5)

S.No.	**Performance of the Product**	1	2	3	4	5
a	Adverse drug reactions					
b	Taste and smell of medicine					
c	Attractiveness of a package					
d	Immediate effect of a medicine					
e	Damage in the product					
f	Side effects of medicine.					

7. Please give your valuable suggestions for better performance

Thank you much for sparing your valuable time

APPENDIX- V

Profile of the Selected Pharmaceutical Company

The PharmaceuticalCompany was founded in 1984 in Hyderabad; the Pharmaceutical Company started out as a supplier to Indian drug manufacturers, but soon began exporting to other markets. Today, it develops, manufactures, and markets a wide range of pharmaceuticals in India and overseas with major markets including India, the United States, Russia, and Europe. The company offers a portfolio of products and services. A highly optimized, highly effective supply chain is the mission of this company. The company's supply chain is based on very robust processes that draw from bodies of knowledge such as 'theory of constraints' and lean management. The supply chain is supported by a powerful IT infrastructure, providing visibility of inventory across various supply chain nodes and capturing inventory data and supply data in real time, which is vital in responding effectively to customers' demands. This company is India's second largest pharmaceutical firm in revenue.

The company began as a supplier to Indian drug manufacturers, but it soon started exporting to other less-regulated markets that had the advantage of not having to spend time and money on a manufacturing plant that would gain approval from a drug licensing body such as the U.S. Food and Drug Administration (FDA). By the early 1990s, the expanded scale and profitability from these unregulated markets enabled the company to begin focusing on getting approval from drug regulators for their formulations and bulk drug manufacturing plants in more-developed economies. This allowed their movement into regulated markets such as the US and Europe. In 2014, It was listed among 1200 of India's most trusted brands according to the Brand Trust Report 2014, a study conducted by Trust Research Advisory, a brand analytics company

The company's first international move took it to Russia in 1992. There, the company formed a joint venture with the country's biggest pharmaceuticals producer, Biomed. In 1993, the company entered into a joint venture in the Middle East and created two formulation units there and in Russia. It exported bulk drugs to these formulation units, which then converted them into finished products. In 1994, it started targeting the US generic market by building state of art manufacturing facility

The company exceeded $500 million USD in revenues, flowing from their APIs, branded formulations and generics segments; the former two segments account for almost 75% of revenues. It deals in and manages all the processes, from the development of the API to the submission of finished dosage dossiers to the regulatoryagencies.

APPENDIX –VI

CITY PROFILES

Hyderabad is the capital of the Indian state of Andhra Pradesh. The city has an area of 650 square kilometers (250 sq million) and a population of 6.8 million, and the metropolitan area contains 7.7 million residents, making it the city. The city was once a global center of the diamond and pearls trade, for which it is known as City of Pearls. Hyderabad International Airport was adjudged the world's fifth best airport. Hyderabad's 13 universities and business schools form a major center for higher education and research. The city is home to the Telugu film industry known as Tollywood. Hyderabad emerged as a pharmaceutical and biotechnology hub and is known as India's pharmaceutical capital and "Genome Valley of India". It is among the global centers of information technology for which it is known as Cyberabad (Cyber City). The city is home to more than 1300 IT firms, including global conglomerates such as Microsoft (the largest R&D campus outside the US), Google, IBM, Yahoo!, Dell, Facebook, and major Indian firms including Mahindra Satyam, Infosys,and Wipro.

Visakhapatnam (also known as Vizag) is a port city on the southeast coast of India. With a population of 1,730,520, it is the second-largest city in the state of Andhra Pradesh (after Hyderabad) and the third-largest city on the east coast (after Chennai and Kolkata). Visakhapatnam is located at 625 kilometers (388 mi) east of the state capital, Hyderabad. The city is home to several state-owned heavy industries and a steel plant; it is one of India's largest seaports and has the country's oldest shipyard. Visakhapatnam has the only natural harbor on the east coast of India. The city was named after Visakha, the Hindu god of valor. It is nestled among the hills of the Eastern Ghats and faces the Bay of Bengal on the east. Visakhapatnam is the administrative headquarters of Visakhapatnam district and headquarters of the Eastern Naval Command of the Indian Navy. Visakhapatnam has a nickname The City of Destiny and, more recently, the Goa of the East Coast. Like its west-coast counterpart it offers attractive beaches, laterite hillocks and a pleasing landscape. It is also a focus of urban and tourist development. Visakhapatnam is listed as one of the 100 fastest-growing cities in the world. Pilkington (an automotive-glass manufacturer) and Jawaharlal Nehru Pharma City (JNPC) are also in Visakhapatnam. JNPC is the only

pharmaceutical SEZ in India, with 38 pharmaceutical companies including PharmaZell of Germany and Eisai Pharma of Japan. The Visakhapatnam Port (the largest in the country) was a gateway contributing to the development of the petroleum, steel and fertilizer industries.

Rajahmundry is a city and municipal corporation of the Andhra Pradesh state in India. It is situated 400 kilometers (249 mi) east of the state capital, Hyderabad, on the banks of the River Godavari. Known as the Cultural Capital of Andhra Pradesh, Rajahmundry is noted for its versatile Vedic culture and intellect. It is the fourth largest by area and eighth most populous city in Andhra Pradesh. City Population is 343,903 (Census 2011).

APPENDIX VII

PUBLICATIONS OUT OF THIS RESEARCH

- "Measuring Service Quality Of Pharmacies-A Study with Reference to Three Major Indian Cities", International Journal of Pharmacy , 2015; 5(1): 253-264, ISSN 2249-1848
- "Evaluation Of Service Quality from Distributor's Perspective in The Pharmaceutical Supply Chain", International Journal Of Scientific & Engineering Research, Volume 5 , Issue 9 ,2014 ,pp.1024-1035, ISSN 2229-5518
- "Service Quality in Pharmaceutical Supply Chain –A Study with reference to three major cities of Andhra Pradesh, India," International Journal of Services and Operations Management, Inder Science Publishers(in press)
- "Measuring Service Quality In Pharmaceutical Supply Chain –Distributor's Perspective" International Journal Of Pharmaceutical and Healthcare Marketing Emerald Publications. (accepted for publication)
- "Service quality in the Pharmaceutical Supply Chain –A Case Study With Reference to A major Indian Pharmaceutical Company" ,International Journal Of Services Sciences (IJSSCI)-(under review)