CHAPTER I

INTRODUCTION

Telecommunications is one of the important elements in the infrastructure sector of any economy. It serves a variety of wants and needs in a modern knowledge based society. Since the dawn of the modern electronics communication after world war II, more people have been put into contact with one another, more knowledge have been accumulated and recorded and more people have access to that knowledge than ever before in history (Williams, 1983). Large satellites, expanded communication networks and computers have boosted the communication flow from the speed of human beings or animals to the speed of light. The new telecommunication services is a product of the computer revolution. Computers and telephones are now technological twins. Both are based on the micro-chip, both run on computer programmes. The convergence of emerging telecommunication technologies and computers is transforming business operation, broadcasting, telephone systems and human interactions in general. Technological developments have increased the demand for telecommunication services.

1.1 Social Importance

Telecommunications is becoming a vital component in the diverse fields of human activities. It is a primary agent in the creation of wealth and income by acting as a co-ordinating link for diverse activities. In Srivastava’s (1968)
view, inter regional dependence and specialisation are the direct result of rapid communication. The increased speed in manufacturing processes brought out by the application of telecommunications not only made it possible to meet the needs of increasing population, but it actually reduces the cost of manufactured products. Reservation offices are connected directly by means of long distance data transmission circuits. Telecommunication services are the lifeline in any defence network. Mobile telecommunications are used extensively by organisations like civil police, traffic police, ambulance etc. The growth of telecommunication services is an indispensable adjunct to the growth of foreign trade and the conduct of foreign relations.

1.2 Economic Importance

Improvements in information technology, particularly in telecommunication is to a large extent labour saving, for example office automation or electronic as opposed to manual exchange. It plays a major role in the integration of capital markets at the national and international level. Another effect of such improvement is a greater speed of adjustment to changes in price. The improved information flows through markets, and thereby make markets more competitive and efficient (Kelkar, 1991). Telecommunication in many instances may be complimentary to the transport system. Lastly, energy use is reduced, resource needs are kept at a minimum and pollution is non-existent in telecommunication activities. The demand for telephones for household purposes increases relatively more rapidly as a result of continuous improvements in the standard of living.
1.3 Role of Telecommunications in the National Economy

In a large country like India, it is absolutely necessary that there should be an efficient means for rapid transmission of information throughout the country due to the following reasons:

1) Communication should be available quick and reliable to the ordinary citizen and should not be the exclusive privilege of authorities or certain small groups.

2) Telecommunication saves time in the management process and is necessary in the interest of good management of all sectors of the economy.

3) Industrial, agricultural and infrastructural sectors can effectively function only if there is fast, reliable and effective communication.

4) The market and the consumer can best be served only if there is an effective and widespread communication network.

5) Development of backward areas require the opening up of those areas, not only by means of transportation but also through a good fast and reliable telecommunication network.

In short a widespread and efficient telecommunication service is a necessary pre-requisite to the socio-economic development and well-being of a country.
1.4 Demand for Telephone Services in India

Though, telecommunication is a multi-product industry producing telegraphs, telex and different types of telephone services such as local, Subscriber Trunk Dialling (STD) and International Subscriber Dialling (ISD), the telephone industry accounts nearly 4/5th of the total revenue of this sector. However, the telephone penetration rate in India is only 0.8 per 100 people as against the world average of 10.5 (World Development Report, 1994). India has been experiencing persistent excess demand for telephone connections (Direct Exchange Lines). Until recently, a private telephone was considered as an elitist good. Now it is being recognised as an infrastructural good for business and information good for consumers. In the Eighth Plan (1992-97), an outlay of Rs 25,110 crores (6% of the total plan outlay) was allotted to this sector. Besides, the Government has taken various steps to modernise and improve this sector in the field of digitalisation in switching and transmission. This sector is now open to private entry, both by domestic and foreign entrants. The Government is also trying to create a new regulatory structure for deciding issues such as entry, terms of access to the incumbent's network, tariffs etc.

1.5 Important Characteristics of Telephone Demand

Telephone demand has a number of distinguishing characteristics. Access is a demand for telephone lines and Usage refers to demand for telephone calls. Access externality arises because the utility accruing to a subscriber increases if the number of subscribers in the system increases. This gives the telephone system the dimension of a public good. Second, telephone
demand has an ‘option value’. Third, telephone services are heterogeneous in nature, because they possess four dimensions such as type of call, time, distance and duration.

Though these features have been incorporated into theoretical models by many economists, their empirical applications are limited.

1.6 Statement of the Problem

Most of the empirical works have estimated price and income elasticities for different consumer categories according to the type of tariff system (flat-rate or measured rate or both) prevailing in regions or cities. Also most of the empirical works are for the developed countries. Time series data, separately for residential demand and business demand, by type of calls for different tariff periods are not available in India.

Lack of database as well lack of interest in economic analysis are responsible for the dearth of good empirical studies on telephone demand in India. With liberalisation, privatisation and globalisation, the demand for telephone service will increase over time. Hence, it is desirable to understand the factors that determine the demands for telephone by households and business.

Due to data and time constraints, we could not analyse the demand for value added services.
1.7 Objectives

The Objectives of this study are:

(i) To undertake a review of the theoretical and empirical literature on telephone demand,

(ii) To develop disaggregated models of residential and business demand suitable for application in India,

(iii) To identify or/and generate the necessary database for the estimation of demand functions, and

(iv) To estimate demand functions for residential and non-residential categories, by types of call and to interpret the results.

1.8 Estimation of Price Elasticities

Towards these objectives, an effort is made to examine the behaviour of residential and non-residential subscribers with respect to telephone calls, by type of call. Most telephone services are priced on the basis of multi-part tariff, with a rental charge independent of the number of calls made, and a charge per call or a schedule of charges for different call slabs. Hence the average price per unit of call varies from customer to customer. This non-linear price structure poses conceptual and analytical problems in the estimation of telephone demand. Given the limited data base, we have made an attempt to estimate such a model. We have added the number in the waiting list to the number of Direct Exchange lines (D.E.Ls), to get an approximate estimate of potential demand for D.E.L.
We have also made an effort to estimate own price elasticities exploiting variations in the prices of pulses due to spatial and time of day variations in the tariff as suggested by Harald Lang and Stephen Lundgren (Economic Letters, 1991). These estimates are based on survey data and the results are reported in Chapter V.

1.9 Estimation of Residential and Non-residential Demand Functions based on Specially Designed Survey Data

The focus of this research is on the specification and estimation of residential and non-residential usage demand functions, utilising the data specifically generated for our study. We conducted an experiment to generate data at the micro level, separately for households and business firms. The unit of measurement is pulse, which is common for local, STD and ISD calls. In India, STD and ISD calls are also charged in terms of local pulses. The information on number of pulses and other dimensions for each type of call can be generated only from a digital exchange. Hence, one of the first commissioned digital exchanges in Madras city is selected for the study. The exchange chosen is Haddows Road II E10B exchange. The researcher could not select more than one digital exchange for the study due to time and resource constraints.

The primary data includes information on socio-demographic variables, bimonthly income, opinion about existing tariff, grade of service etc for residential subscribers; number of employees, type of business and bimonthly sales turnover etc for the non-residential subscribers. The information gathered
on STD and ISD calls made by the sample subscribers from the chosen exchange pertain to the type of call, time of day, distance, duration and pulses charged for each call for the bimonthly period 26th February 1993 to 25th April 1993. Then, these data are matched with the socio-economic or business characteristics of the respective subscriber categories.

1.10 Specification of the Functional Form

We have chosen log-log functional forms in our demand analysis. In the non-residential demand equations, the logarithm of bimonthly sales turnover or the logarithms of number of employees in the firm is used as a measure of size of the firm. For each type of call, the size variable is positively related to the logarithm of number of pulses and it is statistically significant at 5% level. The coefficients of the square of the size variables have negative signs which imply that the output(size) elasticities are decreasing functions of the output (size) variables. The other important explanatory variables are (i) type of activity of the firm or business (ii) age of phone connection.

In the residential demand equations, the variables included are logarithm of household bimonthly income, square of the logarithms of household bimonthly income, educational and occupational dummies. For each type of call, the coefficients of logarithms of household bimonthly income are positive but in many instances they are not statistically significant. For each type of call, the coefficients of the family size is positively related to the number of pulses.
1.11 **Organisation of the Thesis**

The first chapter sheds light on the nature and importance of the telecommunications demand, statement of the problem, objectives, methodology and the limitations of the study.

The second chapter deals with the growth and performance of telecommunication sector in India, the distribution of telephones between urban and rural areas, share of telecommunication in national plan outlays, telephone demand, traffic and tariff system etc.

The third chapter gives a brief review of existing literature on telephone demand. This chapter describes the various features of telephone calls, recent contributions to the theory and important empirical works on residential and business telephone demand. It also contains estimates of access demand for telephones in India.

Chapter four deals with the disaggregated telephone demand models for residential and non-residential users. It contains the data source, specification of the demand functions and the empirical results.

The fifth chapter deals with the non-linear demand model for STD calls. It gives the estimates for residential and nonresidential subscribers.

The last chapter presents an overall summary and conclusions of this research work. The limitations of the study are spelled out. Some suggestions are given for further work.