Telecom Services in Urban and Corporate Segments: A Consumer Perspective

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Based on a sample of respondents — both owners and non-owners of telephones — drawn from two cities of Gujarat as well as three corporate houses of Ahmedabad, this study by S Manikutty identifies issues regarding estimation of demand for telephone connections and services and draws implications for the government including the role of TRAI.

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The process of liberalization which started in 1992 has brought about a sea change in the telecommunications sector. Ten years ago, such changes were almost inconceivable. The Department of Telecommunications (DoT), which enjoyed a monopoly, has never been known for its dynamism or responsiveness to customer needs. The technologies it used were outdated; long waiting periods for getting telephone connections were the norm; customer grievances were not given much importance. But, with liberalization, although the sector experienced many false starts, it appears there would be major structural changes in the telecom industry in India. In some telecom circles, private cellular operators are already functioning; private basic service providers are likely to start their operations in many circles soon. The DoT will be subject to at least some degree of competition, and will have to cater to the needs of consumers to a much greater degree than it has had to thus far. It would have to expand its services to meet the demand and explore new areas, especially in value added services. At the same time, it would be called upon to generate resources for the new investments needed, which are almost mind boggling. It is estimated that the demand for telephone lines by the year 2006 A.D. will be 63 million lines (the present number of lines is about 12 million), and the resources needed to achieve this would be about US $ 56 billion over the next ten years (See Bhatnagar, 1997). The private operators will have no easy time either; they would have to estimate the demand for different services quite carefully and find ways of generating profits under conditions which promise to be quite difficult. To oversee and regulate the operators, including DoT, a new regulatory body, the Telecom Regulatory Authority of India (TRAI) has been recently constituted. Thus, the game is going to be played on a very different scale and under very different rules in the coming years.

At this point, it would be very useful for both DoT and the private operators to have a good understanding of the quantum and the nature of demand for the different types of services from different customer segments, their price sensitivity, the present

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levels of satisfaction of the consumers, and the problems they face. This paper reports the results of a preliminary study addressed to these questions in the urban segment. A complementary study by Jain and Sastry (1997), addresses similar questions regarding the rural segment.

More specifically, the study seeks to understand, among urban and corporate consumers of telecom services, (i) the usage patterns of telecommunication services and their implications; (ii) the levels of satisfaction of different segments of consumers with the present services offered (wherever possible, voice and data needs were studied); (iii) the factors which could predict ownership of telephones; (iv) the demand for new or additional telephone connections and how this is distributed among the different consumer segments; and (v) the price sensitivity of this demand to the quality of service and price. This is only a pilot study, whose objective is not so much to arrive at definite conclusions as to identify issues regarding estimation of demand for telephone connections and services that could be researched in greater detail. Hopefully, even these preliminary findings could provide useful data for DoT and service providers; it could also be useful for the policy makers in the Telecom Commission to frame better policies, including the role of TRAI. The possible policy implications thrown up by the study are highlighted at appropriate places in the paper.

Methodology of the Study

The study was carried out in two cities in the State of Gujarat, namely, Ahmedabad and Mehsana. Three corporate houses were also studied all of which were from Ahmedabad.

Ahmedabad is the largest city in the state and has a population of nearly 3.3 million. The corporate offices of a number of firms as well as their factories are located in Ahmedabad. There are 255,811 working telephone connections in the city, which gives a penetration of nearly 8 per 100 persons*. Mehsana is a relatively small town, with a population of 0.13 million. There are 9356 working phones in the town, giving a penetration of 7.2 per hundred. Being urban areas, the penetration levels of Ahmedabad and Mehsana are far higher than the national penetration of 1.3 per hundred.

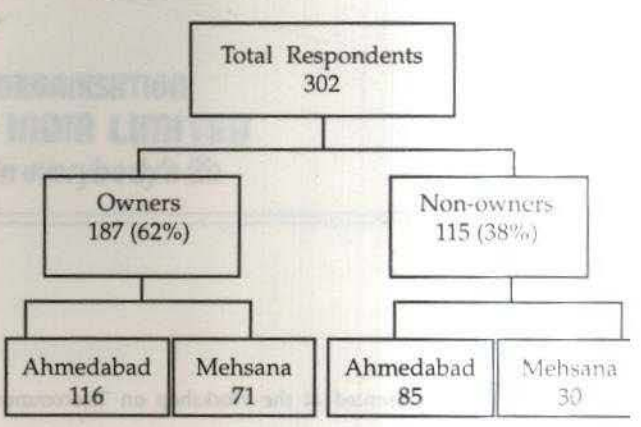
In the cities chosen, the study was addressed to three customer segments: (i) individual consumers; (ii) small businessmen and self-employed professionals and (iii) corporate houses. Self-employed professionals and businessmen were treated as a separate category since their usage patterns and needs were expected to be quite different from those of individual users. Among individuals, non-users were also surveyed to assess their needs and their sensitivity to price.

For the study, a total of 302 individuals (consisting of owners as well as non-owners of telephones) were interviewed through a structured questionnaire. Of these, 201 were from Ahmedabad and 101 from Mehsana. In the chosen cities, a list was made of different areas served by different telephone area codes. The number of consumers targeted in all the areas was nearly equal. In each area, a locality was chosen which had a fairly large number of telephone subscribers: this meant that the residents of these localities were relatively well-to-do people. This approach was taken rather than a pure random sample since, in a random sample, a large number of poor localities would be included and we felt that interviewing the residents of these areas may not be very useful for the study.

In each locality, every fifth house was selected and one member of the family was interviewed. It was also decided that the sample would have owners of telephones and non-owners in the approximate rates of 2:1, and to ensure this ratio, the search was stopped in one segment (usually the non-owners) as soon as it reached the "quota." Exhibit 1 gives the structure of the samples drawn.

In the self-employed/professionals category, 104 persons were interviewed, of whom 68 were from Ahmedabad and 36 were from Mehsana. The number of professionals and small businessmen interviewed were nearly equal. The selection was done through

Exhibit 1: Sample Spread



* The source for the number of telephone lines in Ahmedabad and Mehsana is the *Alphabetical List of Exchanges of Gujarat Circle* (Ahmedabad: Chief General Manager's Office, Gujarat Circle, Gujarat Telecommunications). The population figures are based on the Census 1991, extrapolated.

a random process from the telephone directory, ensuring a mix of professionals such as doctors, lawyers, chartered accountants, traders and merchants, and businessmen. All the persons interviewed owned telephones; five had fax lines as well. The interviews were done through a structured questionnaire.

In the corporate segment, three firms were studied: M/s. Mudra Communciations Ltd., Arvind Mills Ltd., and Core Healthcare Ltd. Mudra is a service organization with national operations; Core Healthcare is a company with national and international distribution operations; and Arvind Mills is a large manufacturing company with purchase, distribution, and marketing with large export operations.

In each of the firms selected, about 25 executives were interviewed. These were supplemented by in-depth interviews with some of them, which always included the person in charge of telecom services (including liaison with DoT), the persons involved in the planning of facilities (voice and data), at least one executive at a senior level (usually reporting to the Chief Executive) and the person in charge of analysis of bills. We also interviewed one switchboard operator from each company. The rest of the interviewed persons were from various departments such as purchase, marketing, production, and logistics. Each interview typically lasted for half an hour to forty five minutes.

Data

In the interviews with individuals, self-employed professionals, and small businessmen, besides personal data such as age, education, occupation, income (turnover in the case of small businessmen), whether he/she owned a telephone and/or fax and consumer durables owned, data on their present usage pattern (local and long distance calls), their satisfaction with the quality of services provided at present and the difficulties faced and their interest in acquiring a new/additional telephone, their sensitivity to charges (both upfront connection charges and tariffs for calls) were collected. In the case of corporate respondents, besides company data, data on their existing telecom facilities, their pattern of earmarking of lines for different purposes, pattern of usage of other facilities such as fax and E-Mail and their technology planning for future needs were collected (see Appendix 1).

Profile of the Respondents

Individuals: The individuals interviewed were all over 25 years of age, evenly distributed across all age groups. The education levels were quite heterogenous; 38 per cent were graduates and 15 per cent, post graduates; the rest had varying educational levels. Fifty three per cent of the respondents were engaged in business; 23 per cent in government service; 17 per cent in private service; and the rest were in various other occupations. Forty four per cent had income of less than Rs 5,000 per month; 47 per cent had income levels between Rs 5,000 and Rs 10,000 per month; five per cent between Rs 10 and 15 thousand per month; and four per cent had income levels exceeding Rs 15,000 per month.

One hundred and eighty eight out of the sample of 302 respondents owned a phone connection (i.e., nearly 60%). Of the owners, five per cent had two telephones and 71 per cent had STD facility.

Self-employed Professionals/Businessmen: The respondents were nearly all graduates or above (88%). Fifty four respondents were self-employed professionals and 50 were small businessmen. Seventy three per cent had only one telephone; 23 per cent had two telephones; three per cent had three telephones, and one respondent had four telephones. Five persons had fax lines, one of whom had two fax lines. Only 34 per cent in this segment had STD facilities.

Findings of the Study

First, we present the findings on the individual users and self-employed professionals and small businessmen. Next, we present the findings on corporate houses. The latter are treated separately due to their very different requirements and usage patterns.

Usage Patterns

Number of Calls Made Per Day: The average individual owner, we found, made about 12.5 calls a day, of which one call was an STD call. On an average, 5.5 calls were for official/business purposes of which 0.8 were STD/ISD calls. The remaining calls were to family members, friends and relatives, and to gas agencies and grocers. No significant difference was found between Ahmedabad and Mehsana consumers regarding local calls but in Mehsana, the number of STD calls was much higher (2.69 per day) as compared to Ahmedabad. About 20 per cent of respondents used STD. No interesting patterns were found among segments such as age, education, occupation, and income.

Non-owners were also found to be significant users. The difference between owners and non-owners in local calls was found to be small; in fact, of the non-owners who used STD at all, they dialled 10 STD calls per day on an average. The public telephone booths (PCOs) operated by private operators were,

thus, extensively used for STD calls; in fact many owners with STD facilities still preferred to use public telephones, either because they could reclaim the costs from their employers (these operators give a receipt) or they felt that PCO rates were cheaper*.

Duration of Calls: Indians are considered to be loquacious. This propensity, if true, is not reflected in the duration of their telephone conversations. Sixty five percent of respondents in Ahmedabad and 80 per cent in Mehsana said they completed their calls in less than three minutes; 95 to 98 per cent finished them within six minutes. In the case of STD calls too, 60 per cent of the calls were completed in three minutes and 90 per cent in six minutes.

We investigated the possible reasons for the differences in the call duration between Ahmedabad and Mehsana. It was noted that Mehsana has electronic exchanges and in electronic exchanges, calls are usually charged at the rate of one call per 3 minutes or part thereof. In other words, a four minute call would be charged as two calls. In Ahmedabad, there is a mix between electronic and non-electronic exchanges. Thus, we had an opportunity to investigate whether the duration of calls differed (as stated by the respondents) between phones under electronic exchanges and non-electronic exchanges. The difference was significant both in the case of individuals and self-employed professionals/ small businessmen. The calls in the electronic exchanges were found to be of shorter average duration as compared to those in non-electronic exchanges.

Policy Implications: The clear policy implications of these findings would be (i) to install electronic exchanges as quickly as possible; and (ii) fix the duration of each unit call to some value, say, three minutes. This would encourage the users to complete their calls quickly easing the congestion in line traffic and making the numbers dialled more easily accessible. In fact, it may be worthwhile examining whether a higher cut-off rate beyond six minutes (say one call per minute) or even a linear time dependent charging system such as quarter call per minute is feasible.

Time at which Calls are Made: In India, the tariffs for STD calls are heavily dependent on the time the calls are made. Between 7 p.m. and 9 p.m., and between 5 a.m. and 8 a.m., the tariffs are half the daytime tariffs; between 9 p.m. and 5 a.m. the tariffs are one quarter*. Hence, it is to be expected that the maximum number of STD calls would be made at the quarter-rate slot. This was true: about 70 per cent of STD calls by individuals were made between 9 p.m. and 5 a.m. In Ahmedabad, this percentage was 80 per cent; in Mehsana it was only 57 per cent, perhaps due to the greater inconvenience of making calls, especially from PCOs, later at night in the smaller towns. The pattern of STD dialling did not depend upon income, occupation, etc. In short, everyone wished to avail of the concessional tariffs.

Self-employed professionals and businessmen have to make their calls during office hours or as and when needed. Hence, 47 per cent of STD calls were made between 9.00 a.m. and 7.00 p.m.; another 35 per cent were made at any time as needed; only 12 per cent of calls were made in the time slot of 9.00 p.m. to 7.00 a.m.

Policy Implications: The above findings might indicate at first sight that the number and duration of STD calls are sensitive to price. This may, however, be a hasty conclusion. The availability of a very cheap tariff rate at a reasonably convenient time may result in people waiting for this slot; if people have to wait for quite inconvenient times, they may well prefer to avoid the wait. The new tariff structure introduced from February 15, 1997, attempts to alter the calling patterns (and perhaps increasing the DoT's revenue in the process) by making the quarter rate available only from 11 p.m. The new structure gives DoT a unique opportunity to analyse the behaviour of persons in each time slot. It is not clear that the calls now being made between 9.00 p.m. and 11.00 p.m. will fetch better revenues (at one third instead of quarter rates); it could happen that many calls previously done at half rate between 7.00 p.m. and 9.00 p.m. would now be done at one third rate between 8.30 p.m. and 11.00 p.m. A scientific study of the calling patterns (exact records of which are available at the exchanges) may point to the optimal tariff rates for different time slots. Since fax rates also follow the voice rates, the overall impact of optimal fixation of slots on DoT's revenues may be considerable.

Billing: The average bi-monthly billing for an individual subscriber was Rs 817, with no significant difference between Ahmedabad and Mehsana subscribers. Only about four per cent of respondents in Ahmedabad

* Actually this could be true. The telephone rates per call go up with increased number of calls from private phones, and could be higher than PCO rates (which are levied at a flat rate) if one's personal phone is heavily used.

* From February 15, 1997, the tariff structure has been changed. From 7.00 a.m. to 8 a.m. and 7 p.m. to 8.30 p.m., the rate is half the full rate; between 6.00 a.m. and 7 a.m. and between 8.30 p.m. and 11 p.m., it is one-third the full rate; and between 11 p.m. and 6.00 a.m., it is one-quarter. At the time of the study, these new tariffs had not come into force.

stated that they paid just the rental (Rs 350 per two months) while in Mehsana, this was 31 per cent. But, 75 per cent in Ahmedabad and 80 per cent in Mehsana paid bi-monthly bills of less than Rs 800. There was some relationship with occupation, the businessmen paying relatively higher bills, their average being Rs 992 per month.

The billing had only a weak relationship with income, with the Pearson correlation coefficient between income and bills being only 0.08. Thus, it is not clear whether due to general rise in the level of incomes as such, the revenues per line will necessarily go up substantially. Considering that the present cost of provision of a line is around Rs 30,000, the returns from the industrial user segment is likely to continue to be meagre for a long time to come.

In the case of small businessmen/self-employed professionals, the average bi-monthly bill was Rs 2,305. In this segment, Ahmedabad had a far higher billing (Rs 3,426) as compared to Mehsana (Rs 1,693). About 53 per cent of respondents paid bills less than Rs 1,000; 78 per cent paid bills less than Rs 2,000.

Policy Implications: It would appear that the average revenue per line is not likely to go up substantially due to the rise in income levels. But, the difference between individual and small businessmen/self-employed professional segments indicates that with rise in economic activity and more number of self-employed professionals and entrepreneurs emerging, the average realization per line of DoT could go up considerably*.

Impact of Ownership of Multiple Phones on Average Billing: An interesting question we investigated was: did ownership of more than one phone reduce the average bill per line and, if so, how much? Since there were only very few owners of multiple phones in the individual segment, our analysis was confined to the professionals (businessmen segment). We found that there was no reason to support the hypothesis of reduced income per line from persons with multiple lines; on the contrary, the revenue per line went up with persons with multiple lines. This may be seen from Table 1.

Policy Implications: Table 1 indicates that when releasing new lines, possession of another phone need not be a factor from the revenue point of view.

* The relationship between income and telephone usage was not investigated for this segment due to difficulty in getting reliable replies regarding income or turnover.

Table 1: No. of Phones Owned vs. Billing

No. of Phones Owned	*n*	*Average Bi-monthly Bill(Rs)*	*Average Bi-monthly Bill/Line*
1	75	1153.00	1153.00
2	23	3201.00	1600.50
3	3	18117.00	6039.00

Satisfaction with the Quality of Service

Problems Faced by the Consumers and the Levels of their Satisfaction: The respondents stated that they faced a number of problems, the most frequent being dead phones, lines not being available (especially in STD), faulty instruments, delays in repairs, and problems in lodging complaints. Table 2 gives the percentage of individual respondents who stated that they faced different problems and their frequency.

For self-employed professionals and businessmen, the problems faced were broadly similar; but 52

Table 2: Problems Faced and their Frequency

Problems Faced	*% of Respondents*	*Frequency (%)*				
		V.F.	*F*	*S*	*R*	*N*
Dead Phone	68	6	48	21	23	2
Lines not Available	66	51	28	13	7	1
Faulty Instrument	34	8	43	24	25	0
Delays in Repairs	29	41	33	21	4	1
Problems in Lodging Complaints	18	30	28	23	12	6
Incorrect/ Irregular Billing	23	25	23	11	39	2
Attitudes of Repair Staff	8	61	22	6	6	5
Corruption	9	14	27	9	41	5
Accessibility of Higher Officers	4	40	10	30	10	10
Attitude of Higher Officers	3	57	0	29	4	0

Legend : V.F : Very Frequent
F : Frequent
S : Sometimes
R : Rarely
N : Never

Note: The frequency of complaints is based on the number of respondents facing the respective problems.

per cent complained about delays in repairs; 40 per cent experienced problems in lodging complaints; and 25 per cent complained of corruption.

People with higher education tended to complain more about all the above aspects. Surprisingly, access to higher level officers was stated to be a problem much frequently by government officers (who may be thought of as having easier access to officials of DoT, another government department) as compared to others.

Interestingly, problems such as corruption, attitude of repair staff and of higher officials were not expressed by a good majority of individuals, but were expressed more vehemently by self-employed professionals and businessmen (who contribute a greater per line revenue). Seventy eight per cent said they faced corruption all the time; 63 per cent complained about accessibility of senior staff. A high proportion of 'I cannot say' responses to question regarding accessibility to higher levels indicates that many people do not attempt to contact higher levels in case of problems.

The time taken for repairs of faults was surprisingly not seen to be high, going by the responses. Thirty per cent of respondents stated that their faults were rectified on the same day or second day (Ahmedabad: 21%; Mehsana: 39%). However, 14 per cent stated rectification took a week and 15 per cent stated it took a month. The pattern of responses by self-employed professionals/small businessmen was broadly similar.

The overall degree of satisfaction on a 1-5 scale (1 for highly dissatisfied; 5 for highly satisfied) with DoT's present services was surprisingly (to us) good: it ranged around 3.8 for individuals. But it was much lower for small businessmen/self-employed professionals. Table 3 gives the degree of satisfaction.

Table 3: Degree of Satisfaction (1-5 Scale)

	Individuals	*Self-employed Businessmen*
Working of Phones	3.8	2.6
Availability of Lines	3.7	2.8
Clarity of Voice	4.0	2.3
Billing System	4.0	2.1
Response Time for Fault Repair	3.4	3.1
Complaint Lodging System	3.8	2.6
Attitude of Some Staff	3.9	2.2
Access of Higher Officers	3.8	2.0
Attitude of Higher Officers	3.8	1.9

Policy Implications : On the whole, it would appear that while there is clearly great scope for improving services, the perception of DoT's present level of quality of service on the part of users is not particularly adverse. This clearly has implications for new service providers, for, it is by no means clear that the consumers will flock to private operators as soon as they enter the arena. For the DoT, on the other hand, it would imply that the higher paying customers are less satisfied with its service and hence are more liable to switch loyalties.

An issue that arises is whether TRAI should set service standards and impose penalties if they are not met. These standards should be the same for private service providers as well as for DoT.

Customer Views on Installation Charges Levied by DoT: Opinion was sought as to how the respondents felt about the different charges levied by DoT, namely, (i) charges levied for booking a phone and connecting a new line, both under Own-Your-Telephone (OYT) and non-OYT schemes; (ii) telephone rentals billed bi-monthly; and (iii) charges for local and long distance calls.

The booking charges are levied at the time of booking a telephone. At the time of installation, additional charges are to be paid. The charges vary for different kinds of schemes and for the capacity of telephone exchange. The charges for the more popular schemes are as follows:

	At the time of		
	Booking		*Installation*
	Ahmedabad	*Mehsana*	
General non-OYT	Rs 5,000	Rs 3,000	Rs 800
OYT	Rs 15,000	Rs 8,000	Rs 800
Immediate (Tatkal)	Rs 3,000	Rs 3,000	Rs 27,000

Note : Charges for connection in rural areas are different from that given above.

The general perception of respondents seems to be that the above charges are generally appropriate (though DoT may not think so!). For non-OYT schemes, ten per cent of the respondents felt that the booking charges were very high, 21 per cent felt they were high and 46 per cent felt that they were appropriate. Twenty three per cent had no opinion. These responses are broadly similar to those in the rural areas. There was no major difference between the opinions of owners of telephones and non-owners. Eighty per cent of the respondents in Ahmedabad felt that for non-OYT, booking charges of Rs 3,000 were appropriate

was very recently that the charges were raised from 3,000 to Rs 5,000); five per cent thought Rs 2,000 re appropriate; while eight per cent thought Rs 00 were appropriate. Other respondents indicated ious "appropriate" amounts varying from Rs 3,500 Rs 15,000. In Mehsana, 78 per cent thought Rs 2,000 appropriate. For OYT, 39 per cent of the respond- s had no opinion; 28 per cent thought the charges re very high; 14 per cent thought they were high; ly 18 per cent thought they were appropriate. The ount of Rs 15,000 was considered appropriate by per cent of respondents of Ahmedabad; Rs 10,000 31 per cent; and Rs 8,000 by 13 per cent. In Mehsana, per cent thought Rs 10,000 to be appropriate; 22 cent thought Rs 5,000 would be appropriate.

It should be noted that the difference between T and non-OYT has little do with the cost of the phone instrument as such (this costs only about 800) but is really a charge for quicker connection. ery year DoT decides on the number of new nections to be given that year and gives suitable otas" for each circle. Of the number of new nections to be made, 40 per cent goes to OYT okings; 20 per cent goes to "special" categories and balance 40 per cent to non-OYT bookings. Since T bookings are much less in number than non-OYT okings, the waiting list is much shorter; in many hanges, an OYT connection can be had almost mediately. The much higher booking and installa- n charges for OYT is thus really nothing but a mium for quicker connection. DoT would love to e more OYT connections which recover nearly half cost of installation, although part of this recovery eutralized by rebates in rentals given to subscribers der this category (a rebate of about 33 per cent). wever, with steady expansion of DoT network and tallation of exchanges, even non-OYT waiting time reduced to about two to three years in many places is varies a great deal between different states and n between different exchanges under the same). With additional operators in local circuits, the iting list is likely to come down still further; this uld imply that the revenue per line by way of oking and installation charges will come down wily for DoT. For example, in Gujarat Circle, in 5-96, the entire registration fee, amounting to Rs million, was from OYT. This formed nearly 6.5 cent of the telephone revenues of the Circle.

We found that, in general, the consumers were ally unaware of the real costs of effecting a new nection. Most do not have even the faintest idea t it could cost anything like Rs 30,000 (which are actual costs).

Policy Implications: On the one side, the number of OYT applicants is likely to come down with progressive induction of new capacity and with the entry of private service providers. Thus, DoT stands to lose a considerable portion of its present revenues from installation charges. On the other hand, due to the low level of awareness on the part of the consumers about the cost of new lines, considerable consumer resistance can be expected if DoT attempts to raise its upfront charge too quickly. Thus, there is a need for the DoT to start new and intense consumer education programmes regarding the cost of provision of new lines; on the other hand, it has to gear itself to considerable losses in its revenue from installations.

Opinion Regarding Rentals: Regarding rentals, nearly 40 per cent of individual respondents and 57 per cent of self-employed professionals/small businessmen considered the present rentals appropriate; there was no significant difference between owners and non-owners. A higher percentage of respondents in the higher income groups (income of more than Rs 10,000 p.m.) said the rentals were appropriate as compared to the lower income groups. These findings are also similar to those in the rural areas.

The "desired" charges for bi-monthly rental were in two groups: Rs 200, mostly in Mehsana and Rs 360, mostly in Ahmedabad. These are the prevailing rentals in these two cities. These responses had little to do with income of the respondents.

The present bi-monthly rentals are not adequate to cover the working expenses of DoT (e.g. salaries, materials for maintenance, supervision, etc. but excluding new capital investment). For example, the annual working expenses per line for Gujarat Circle were Rs 2800 for the year 1995-96 (*Annual Report*, 1996) or nearly Rs 480 for two months. Thus, just as the installation charges do not cover the cost of installation of a new line, the rentals do not cover the working expenses. The situation is actually worse than what is portrayed above, since in OYT phones, the subscribers are given a rebate of one-third of the rent above.

On the other hand, while some increases in rentals may be acceptable, a major revision is not likely to be acceptable to the subscribers.

Opinion Regarding Call Charges: Most of the respondents did not consider the local call charges high. Sixty three per cent thought they were appropriate; only 24 per cent considered them high, and six per cent, very high. Even with regard to STD rates, 44 per cent thought they were appropriate. Twenty three per cent thought they were high; but a somewhat higher

percentage (17%) thought they were very high. The average "desired" rate for unit call was Rs 0.80 as against the existing rate of Rs 0.80 for calls up to 500 in two months and Rs 1.00 for above 500 calls. There were three clusters of responses, at Rs 0.8 (31%); Rs 1.00 (19%) and Rs 2.00 (22%). The higher income group (Rs 10,000 p.m. and above) gave more frequent responses for the rate of Rs 2 per call (9% as against a population average of 4%).

Such surveys of "desired" charges, of course, have limited reliability. But, it does seem to indicate that a major hike in call charges is likely to result in considerable customer outrage on "exploitation by a monopoly."

Implications: The above findings have major implications for private service providers. It seems unlikely that the cost of provision of a line is much less than the current rate of Rs 30,000 per line. Even at half this amount, it seems unlikely to get many new subscribers, if the experience on OYT telephones (with booking and installation charges of Rs 15,000) is anything to go by. Similarly, customer willingness to pay a rental much higher than the prevalent rates (especially new customers) also seems doubtful, and this may not cover the operating expenses. Clearly, some hitch hiking on DoT's infrastructure would be inevitable. In such cases, the question that arises is, what kind of charges should DoT levy on private users on a long-term basis? What should be the criteria for fixing these charges? This may be a question for TRAI to tackle.

Demand for Telephones and Services

Ownership: Demand for a telephone connection is not easy to estimate, since the basic need, viz., communication of a message can be satisfied in a variety of ways. At some inconvenience to oneself and others, for example, ownership of a phone can be substituted by going to a public call office (PCO) to make calls and a friendly neighbour's phone to receive them. This, in fact, is a widely prevalent practice (unlike the rural areas, however, the practice of paying for incoming calls does not seem to be widely prevalent in urban areas [Jain and Sastry, 1997]). We can, therefore, expect the demand for a phone connection to be sensitive to the booking or installation charges, waiting period, and tariff rates, especially the first two factors.

Demand can be predicted indirectly by looking at other discriminants between owners and non-owners. We studied the patterns of differences in terms of (i) age; (ii) education; (iii) income; (iv) occupation; and (v) ownership of other durables.

Our findings suggest that ownership is not relate to age and occupation. It was related to educatio levels, the owners having a higher level of educatio than non-owners. Whereas 60 per cent of owners wer graduates, 58 per cent of non-owners did not hav a degree. The relationship with income was also fairl strong. At higher levels of income, fewer people wer without phones, but even at low levels of income, th ownership was not insubstantial, as may be seen fro Table 4.

Table 4: Ownership vs. Income

Income Level (Rs.)	*Percentage in Sample*	*Percentage of People*	
		Owning a Phone	*Not Owning Pho*
Up to Rs 5,000	44	34	61
Rs 5,001 - 10,000	48	55	35
Rs 10,001 - 15,000	5	6	3
More than Rs 15,000	6	5	1
Total	100	100	100

These findings suggest that with increasing edu cation and income levels, the demand for ownershi of phones is likely to go up. A more sophisticate econometric model based on a larger sample coul be developed to predict this relationship.

Ownership of telephones was also correlated wit ownership of other consumer durables, especially c colour television sets, scooters, refrigerators, an domestic blenders/juicers (called mixers in India Ownership of black and white television sets, car ACs, washing machines, and domestic flour grinder were relatively poor predictors since the base o ownership in our sample for these items was relativel small. Among the others, colour television and refrig erators were the best discriminants (Table 5).

Table 5: Ownership of Durables and Telephones

Durable	*Percentage of Persons Owning the Durab*		
	In the Overall Sample n=301	*Among Owners of Phone n=187*	*Among Non-owners of Phone n=114*
Colour TV	72	88	46
Scooter	83	88	74
Refrigerator	80	93	56
Domestic Mixers	84	88	76
Black & White TV	25	12	46
Car	17	24	4
A.C.	8	12	0
Domestic Flour Grinder	28	37	12
Washing Machine	17	23	7

This pattern of relationship observed points to the possibility of constructing discriminant or multiple regression functions to predict ownership and growth rates in each durable as prediction of growth rates for telephones.

About five per cent of individual phone owners studied had a second telephone. Ownership of multiple phones did not have any relationship with the other variables studied.

Respondents were asked whether they would book a new connection or additional connection if (a) booking and installation charges, (b) monthly rentals and (c) tariffs for calls were reduced to what, in their opinion, were reasonable levels. Nearly half the respondents said they still would not book new phones, while the other half said they would. Among the non-owners, 73 per cent said they would opt for a new connection. Waiting time of up to two years was considered quite normal and acceptable by most of the respondents and their decision would not be affected by this factor in the above range. But, if the waiting period was more than two years, they would be reluctant to book a phone.

Policy Implications: It seems unlikely that merely because waiting lists are getting cleared, demand would go up drastically, especially if the clearance is in the OYT category and non-OYT waiting list is under two years. It would be even less likely if upfront charges are substantially more than what are prevailing at present.

Impact of Improvement in Services: Respondents were asked to what extent they would increase their usage if services were improved. About 40 per cent of respondents said that the number of calls made by them and the number as well as the duration of STD or ISD calls made by them would not change substantially. About 40 per cent said that local calls made by them would increase by 25 per cent, while 30 per cent said that their STD calls would increase by 25 per cent. About nine per cent of respondents (most of them from business segments) stated that their STD calling would go up by 50 per cent. The overall increase in local calls could be about 10 per cent and in STD segment, about 15 per cent.

Thus, it does not seem as if the usage of telephones is constrained by the quality of services available.

Impact of Charges: Table 6 gives the extent to which the respondents would increase their calling frequency (in the case of STD and ISD, frequency and duration of their calls) if charges were changed to what they thought were "reasonable" charges.

Table 6: Impact on Usage if Call Charges were Changed

	Local Calls n=302	*STD Calls n=302*	*ISD Calls n=302*
No Change	21	31	58
25% Increase	44	42	2
50% Increase	26	17	1
100% Increase	9	6	1
Cannot Say	0	4	38

Demand surveys of this kind are notoriously unreliable, but may give some indication of how price sensitive consumers are. The "desired" or "reasonable" charges are about 75 percent of the prevailing charges, and if the charges are reduced to this level, it is likely that the call frequency/duration would go up by about 25 per cent at the most, resulting in no net revenue gain for the DoT.

Since reduction in tariffs is not even contemplated, it would be more interesting to assess what would happen if charges are increased by, say, 25 or 50 per cent. We felt that the responses tended to be very unreliable. But an opportunity is now available to study the actual changes in behaviour as a consequence of revision of timings and distances for different slab rates effected from February 15, 1997, and a possible tariff revision expected shortly. It is suggested that DoT should undertake such a study shortly.

Emergence of Private Exchanges: An interesting development in recent years has been the development of "private exchanges." These are something like EPABX boards, generally with 20 line extensions, some of them being much larger. Usually these are connected to customers in a very small area, often in a housing complex. Some have facilities for an external caller to dial the desired extension number directly; others operate through manual connections. Dialling outward from the extensions is almost always through the board directly, i.e., without the assistance of the operator.

The average ratio of the number of extensions to the number of incoming lines is around 10:1. Customers are given computerized bills by the private exchange operators; usually at normal rates charged by DoT. The DoT charges much higher rentals and installation charges per line for these exchanges, depending on the area. The operators charge rentals and phone bills to the customers on various bases. Most of the private exchanges are manned around the clock.

The private exchanges seem to provide an attractive option to increase telephone usage at a low cost both to the user and to DoT. Considering the average low utilization of telephones by individual users and their relatively low billing, these exchanges also result in a higher utilization of lines (since 10 subscribers are now sharing a line). There is hardly any inconvenience to the customers, either in sending or receiving a call. They get immediate phone connection and this may be very attractive especially in areas covered by particular exchanges. DoT stands to gain due to the much higher per line revenue from these private exchanges. Assuming the same usage pattern, DoT can realize a revenue that is at least eight fold as compared to providing individual customer lines.

Policy Implication: DoT may seriously consider encouraging private exchanges as a means of providing a greater number of lines at a much lower cost, and at the same time, enhancing its own revenue.

Corporate Subscribers

Corporate subscribers are the "cash cows" of the DoT. We studied three organizations, all based in Ahmedabad. These were: Mudra Communications Ltd., Arvind Mills Ltd., and Core Healthcare Ltd. All these organizations had a telephone exchange board (EPABX), typically with around 50 DoT lines and about 200-250 extensions. The revenues they generated could vary enormously, from around Rs 5 million to Rs 10 million per month. Clearly, the per line revenue for DoT is the highest in the segment, may be around Rs 50,000 for two months.

The corporate houses studied earmarked some lines solely for incoming calls, with "hunting facility" between the lines. Hence, even if the listed number may be only one, if an outside caller dialled this number and it was busy, automatically other numbers would be tried and the free number available connected. This reduces the chances of the external caller finding the board busy. Typically, the organizations studied also dedicated one or more lines for transfer (fax/E-Mail) and some lines for direct us some of the executives. Some of them had insta "hot lines" for communication with other branch factory sites. Table 7 gives the broad break up of lines and their allocation.

The companies studied varied the way they a their lines considerably. Some companies allott relatively large number of lines as direct lines for t top executives; this meant less lines for general The majority of calls were made, however, by lo level executives, through the exchange board. boards were all computerized and the details of calls made, both the origin and the destination, co be generated through the computer. All the org zations kept close control over their telephone by keeping track of their STD/ISD calls. Some trolled them through making it mandatory, excep the top executives, to call only through the board, with permissions needed from higher levels to m STD calls.

Mudra Communications Ltd.

Beyond this, the way control was exercised var depending on the company's culture and ne Mudra, an advertising agency, has two main off in Ahmedabad besides many others; the comp depends heavily on its phone and fax to keep in to with its clients. A hot line has been kept for ac to E-Mail but none for communication between offices.

The thrust of Mudra has been to increase efficiency of usage without affecting the quality service for the internal staff and external cal Except for the CEO, none has any direct lines; all h to go through the board for incoming and outgo calls (for outgoing calls, it was not operator assist

An interesting step taken by Mudra has been introduction of an automatic cut-off after five min

Table 7: Allocation Patterns of Telephone Lines by the Firms Studied

Company	*No. of Lines*	*No. of Hunting Lines*	*No. of Direct Lines*	*No. of Lines Used for Fax/ E-Mail*	*No. of Lines for Operator*	*No. of Hot Lines*	*No. of Extensio*
Mudra	19	5	0	5	5	4	36
Arvind Head Office	34	0	14	7	12	1	136
Arvind Factory	109	9	57	0	39	4	393
Core	50	15	8	3	24	0	278

Source: Data gathered during interviews with company executives.

for every outgoing call (there was no cut-offs for incoming calls, however). This, it was claimed, had increased the efficiency of the callers since the conversation had to be restricted to the bare minimum needed. All STDs by even middle level executives needed approval from higher ups.

The accessibility of the company number from outside was very high. On an experiment conducted, calls were made to the company's listed numbers at random times. The success rate was 95 per cent. The time required to be connected to the extension was negligible, unless the extension was busy.

The company made a large number of calls, the average number of calls made per day being 150. The number of STD calls was 50 and ISD calls about three*.

Mudra had started a drive to cut down their telephone bills by (i) using time limiting cut-offs for all outgoing calls (local and STD); (ii) using faxes for communication rather than voice and (iii) E-Mail. These steps, we were informed, had cut down the DoT billings by nearly half during the last two years.

Arvind Mills Ltd.

Arvind Mills is one of DoT's major customers, accounting for about 25 per cent of the revenues from major users. This company has heavy export operations and thus ISD (international) calls were very important to them. Arvind is the fourth largest manufacturer of denim in the world, and most of the company's production of denim is exported in the form of cloth to overseas garment manufacturers. Arvind also manufactures its own jeans mainly for domestic consumption. The company has a corporate office at Ashram Road and a factory at Naroda, about 12 km away. Each unit maintains an exchange.

Communication between these units has been a major problem and hence the company has leased a circuit exclusively for communication between the corporate office and the factory.

Arvind Mills is setting up another factory on the outskirts of Ahmedabad, 25 km from the corporate office. Its major concern was communication with these factories. The company executives were not hopeful of getting additional lines; they were thinking of VHF/UHF links, which are inefficient and noisy.

Arvind Mills earlier had its corporate office at Naroda from where it shifted to its new location at Ashram Road a few years back. A substantial portion of the communication requirements shifted to the corporate office, but this being in the busy Ashram Road and under the jurisdiction of the heavily overloaded Navrangpura Exchange, it could get only 30 lines for its new office (it had applied for 50 lines but with "much effort," they could get only 30). At the same time, the factory unit had surplus capacity on its board, which, however, belongs to another exchange which is a lightly loaded exchange. This has resulted in a relatively easy accessibility of the factory exchange number and very poor accessibility of the corporate office (call success rate: 10%).

As in the case of Mudra, Arvind is also taking drastic steps to cut down its telephone bills through use of faxes and E-Mails.

Core Healthcare Ltd.

Core Healthcare has its corporate office in the busy C.G. Road, and a major factory at Sanand, about 50 km away. More factories are under construction. The company has extensive international operations since exports forms about 30 per cent of turnover.

Thus, STD and ISD calls are vital for this company. A major problem for Core is that of communication between the factory and the office. Since a majority of its clients are doctors, it was felt by the company that accessibility of incoming calls was very crucial, since the doctors do not make repeated attempts to contact the company (our experiments for call success showed a success rate of 90%).

The company at present uses wireless for communication between the factory and the office. This is cheap but unsatisfactory. Though the company has applied for two hot lines, even after seven years, it has not been possible to obtain the lines from DoT (these hot lines involve availability of lines in some intermediate rural exchanges also). In the meanwhile, the company pays heavy STD bills even for communicating with its factories, although the bills are being brought down through using fax instead of voice and E-Mail in lieu of faxes. During the last two years, the telephone bills of the company have been reduced by 50 per cent. Due to the dispersed factories, the organization is seriously considering setting up its own microwave network (with clearance from DoT). Once this is installed, the recurring expenses will be very small.

In all the three organizations, the persons interviewed felt that within their constraints, DoT was doing a fairly satisfactory job. But this was still far from satisfactory. Even if one or two lines are down, it affects their working, and one or two lines are down

* These numbers have been arrived at through interviews of 20 executives at different levels and different functions.

every day. Hence, constant liaison with DoT becomes necessary; in fact, usually, one person is almost exclusively on this job. Generally, the lines are restored on the same day unless it is a cable fault, which is quite common in the monsoon season.

All the companies studied booked people for the job of sending less urgent faxes between 7 p.m. and 9 p.m. to avail of the concessional tariffs, but very rarely beyond 9 p.m. They encouraged their executives to make STDs to their outstation colleagues beyond 9 p.m. but could not identify to what extent this attempt was successful. Now, with the revised tariff structures, it would seem that the companies would end up paying at one third rates rather than half rates by employing people beyond 8.30 p.m. to send their faxes, and hence may save their bills (with consequent losses to DoT).

Policy Implications: The study of corporate houses raises some important issues which would have major policy implications. Hence, it would be worthwhile exploring these issues through more in-depth studies. These issues are as follows:

* There is no doubt that the corporate sector is going to be the sought after segment in the coming years, both by DoT and private service providers. What are their data and voice requirements in the coming years? How is this mix changing? To what extent is communication through conventional systems (voice and fax) giving way to far less expensive systems like E-Mail and internet? With major shifts towards these means of communication, there could be substantial reductions in the revenues generated for telephone operators.

* The image of DoT among users has been generally positive. But, is this simply because of the monopoly status of DoT? How will these perceptions change after increased competition sets in, leading to enhanced expectations and changes in technologies?

* Will leased circuits and hot lines become less or more common in the coming years? Clearly, the need for leasing circuits arises due to the inadequate sources provided at present by DoT on the normal channels. But, with multiple offices/units becoming more common, efficient communication between them will become more and more important. At present, quite unsatisfactory methods such as wireless are adopted. What planning should DoT do to address the needs of this segment?

* In the coming years, especially with higher levels of tariffs, corporate consumers are going to be more in demand. What role should the TRAI play in ensuring a certain agreed upon levels of service?

Conclusions and Issues for Further Research

As mentioned earlier, this study is not designed to provide any clearcut answers to any of the questions involving policy but it does point to certain issues which need to be addressed through a series of larger studies. A number of such issues is identified along the course of this paper, which are summarized here by grouping them under three heads: (i) policy questions related to provision of facilities; (ii) those influencing the usage patterns and (iii) policy questions related to service of facilities.

Provision Related Issues

Dependence of Booking Patterns on Tariffs and Waiting Periods: The study indicates that demand for new telephones may be quite sensitive to steep hikes in the booking charges and tariffs. The existing levels are perceived as high by a substantial section of the owners as well as non-owners and it is clear from the OYT scheme drawing much less response as compared to non-OYT schemes, that people are willing to wait even for one or two years rather than pay the connection charges which are perceived to be high. In the meanwhile, they do not appear to mind using the neighbours' phones and PCOs. With progressive reduction in waiting periods, it is doubtful whether the demands will be very high with connection charges of the order of the present OYT connection charges. An interesting area of study would be the shift in booking patterns with progressive clearance of waiting list over a period of time.

Demand Estimation: The estimation of demand needs to be done carefully through multiple indicators, both direct and indirect. Direct questioning would try to assess the willingness of customers to book new telephones or additional lines with different connection charges; indirect methods would tend to use econometric models, using possession of other durables as surrogates.

Encouragement of Private Exchanges: An interesting policy option that emerges is the use of private exchanges. They seem to be reasonably efficient and give the same service at a fraction of the initial upfront cost. From the DoT's point of view, it would imply more efficient utilization of facilities.

Rules for Release of OYT and Non-OYT Lines: The present basis for allocation of lines being released between OYT and non-OYT schemes needs to be reviewed especially with the reduction of OYT waiting periods to very small levels in large number of exchanges. There is also a need to lay down a priority rule for applications for additional lines by corporate houses and by private exchanges.

Usage Related Issues

Charging for Local Calls Based on the Duration of the Call: With the progressive introduction of electronic exchanges, the local calls are metered as one call for every three minutes. This seems to have had an influence on the duration of calls made. An interesting option will be to reduce the duration per call after a certain limit, six minutes to one minute per call or two minutes per call.

Sensitivity of Demand to Tariffs: The impact of usage of telephones with different tariffs and structures will give an idea of the sensitivity of the demand for use of telephones on the tariffs and upfront charges. The recent change in the tariff structure gives an opportunity to conduct a study of the shifts in the patterns of calling in each time slots.

Service Related Issues

Satisfaction Levels: It would seem that the satisfaction level of individual consumers is reasonably high in the case of individuals, less so with self-employed professionals and small businessmen and less with corporate customers. In other words, satisfaction level seems to be in inverse proportion to the importance of the customers. With competition from private customers likely to materialize shortly, DoT needs to look at its own service standards with greater care than it has done in the past. The private providers need to set standards for competition.

Replacement of Voice by Fax and E-Mail: Increasingly, fax and E-Mail are replacing voice conversation especially in the corporate sector. The pattern of shifts needs to be studied since it has major implications for the revenue of the service providers.

Appendix 1: Data Collected from Respondents

1. Basic data about the respondents such as age, education, occupation, consumer durables possessed, income (turnover in the case of small businessmen) and position in the organization (in the case of corporate interviewers) and whether he/she owned a telephone/fax machine/PC modem.
2. *Present Usage Pattern*
   - 2.1. The number of calls made and received per day with break-up between local calls, STD (domestic long distance) and ISD (international) calls.
   - 2.2. Types of calls made: business/official, personal, social, etc.
   - 2.3. Average length of calls of each type.
   - 2.4. Time of the day when calls are made.
   - 2.5. Usage of telephone/lines for data requirements such as fax/E-Mail.
3. *Satisfaction with the Quality of Services*
   - 3.1. Problems faced.
   - 3.2. Frequency of breakdowns and response time of repairing.
   - 3.3. Satisfaction levels with the performance of the system as well as personnel (repair staff, supervisors and executives).
   - 3.4. Satisfaction levels with the tariffs.

These data were cross-tabulated with basic data of individuals studied, especially education, occupation and income to reveal patterns.

4. *Demand*
   - 4.1. Interest in acquiring a new phone (for non owners) or additional phones/fax facilities (for owners).
   - 4.2. Sensitivity of the willingness to book new or additional telephones and of usage to (i) booking charges; (ii) tariffs; and (iii) service levels.
   - 4.3. Constraints in getting connections and facilities.
5. *Additional Data Collected from Corporate Respondents*
   - 5.1. Company data such as the turnover of the company, the nature of its business(es) and the scope of its operations.
   - 5.2. The existing facilities and the data on their local (PABX) exchanges; their pattern of earmarking of lines for different types of needs, such as incoming calls, direct lines and for outgoing calls.
   - 5.3. Usage of other means of communication such as fax, E-Mail and leased circuits from DoT.
   - 5.4. The corporate rules for phone calls, for example, need clearance for STD calls from higher ups, cut-offs after some duration, and timing for making expensive calls (for example, at reduced tariffs).
   - 5.5. Their technology planning for future communication needs.

Policy for Releasing and Charging for Special Lines: For high revenue yielding circuits such as hot lines and leased circuits, the present rates seem to be unreasonable. It is possible that with some lower rates, there will be much better demand for these lines and it may be more cost effective, both from the DoT's point view as well as from the customers' point of view. The fears that these will divert the capacity of lines from waiting individual customers may not be serious since the rentals from such lines can be used to cross-subsidize more individual lines.

Role of TRAI in Setting Standards of Service: The TRAI needs to define its role in setting standards of service. With competing providers, it may be necessary to set the standards and the penalties for failing to meet those standards both on the part of the DoT ar the part of service providers.

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