Connecting the 'Bottom of the Pyramid' – An Exploratory Case Study of India's Rural Communication Environment

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ABSTRACT

This paper is based on our exploratory study of a South Indian village in Chamrajanagar district of Karnataka. The study was to understand the rural communication environment and villagers' communication preferences. We examined people's lifestyle, working conditions and their communication eco-system. Our study revealed that villagers, unlike urban inhabitants, interacted with people outside the village only for specific, rather than casual purposes. Another interesting aspect of rural communication was the marginal use of the postal system and the ubiquitous use of pay phone, apart from word of mouth and face-to-face interactions. In fact, personal (face-to-face) interaction was usually preferred among villages in this region, over other kinds of communication, despite infrastructural constraints like poor transport services.

We also observed that communication frequency increased when status quo changed to one that required immediate attention. During the analysis we identified certain social, economic and cultural communication gaps (or problems). However, these problems were clear opportunities to connect the unconnected rural users, by deploying new communication systems and features. Here, we have highlighted some of our findings and possible design avenues based on these findings.

Categories and Subject Descriptors

Rural Communication Environment, ICT for Development

General Terms

Contextual Enquiry, Rural Urban Communication, Communication Gap, Media Exposure and Consumption, Low Cost Connectivity, Resource Sharing, Design Avenues, Emerging Markets

Keywords

Communication, Postal System, Village Kiosks, Content, Localization, Infrastructure, Education, Group Dynamics, Social Interaction, User Studies

1. BACKGROUND

Our village study was geared towards learning the rural communication eco-system and villagers' social interaction patterns. Through studies like ours, it would be possible to understand the needs of those, who are not yet effectively connected in the emerging market. This in turn can aid the development of communication devices, applications and services specifically for this segment.

Access to information and communication is essential for unconnected villages. Chowdhary [4] enumerates certain reasons for this. He posits that ease of communication can enable villagers to undertake useful economic activities. It can also ensure direct access to the market for villagers (who are primarily farmers) to sell their agricultural produce on a large scale. Furthermore, easy access to communication technology can connect families in the village with their relatives, who have migrated to cities.

Beyond such benefits in 'connecting', unconnected villagers, there are several reasons why a study of the rural communication environment is necessary. Enabling easy access to technology for the grassroots is important, because it can be effective in addressing the needs of the socio-economically disadvantaged sections of Indian society (most of which are found in villages). However, needs cannot be addressed without conducting empirical studies to understand ground realities, according to Keniston [6]. Our study is one such effort. It attempts to capture the needs of rural poor, whilst highlighting their exposure to technology and communication devices.

Many studies from the past have shown that understanding rural India's communication needs can help in accelerating the growth and development of villagers. According to Baijal [1], rural users are as strong a consumer base for various consumer goods companies (technology) as the urban populace. This is because nearly 70% of India is concentrated in villages. If these unconnected rural users were connected, it could help strengthen the national economy. In this regard, Baijal [1] asserts that India's mobile sector has a high potential for penetration, which is similar to the explosive growth in the telecommunication market.

It is also held that villages have the required resources and capabilities, which can be further enhanced for development of this kind. But, this can only be verified by undertaking an exploratory study like ours, which can help reveal both trends and problems in the rural market.

Studying rural communication environment can facilitate gathering of data on the content-rich flow of information, between rural and urban users. This is significant, because a large part of India's urban population migrates from rural areas through waves of urbanization, as Premi [11] points out. He further adds that

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rural migrants travel to cities that are geographically proximate. If this is so, it would be worthwhile to identify the cause and purpose of communication between rural migrants and their families in villages. Likewise, it would also be meaningful to examine information exchange among rural households. The present study addresses the latter.

In his research on rural telephony, Bhatnagar [3] suggests that villages do not contribute to telecom revenue. Consequently, policy makers should consider other avenues of value addition. In this regard, he avers that internet kiosks, voice, e-mails in local language and other services drawn from the internet are opportunity areas. But, are these indeed viable solutions for boosting rural communication? This can be verified by empirical studies like ours, which focus on the nature of rural communication and people's needs therein.

Others like Rajendran S [12] have highlighted supplementary means for addressing rural connectivity, like the Karnataka government's deployment of mini bus services (MBS). He asserts that villagers' use of MBS has reduced their connectivity problems. Apparently, school dropout rates have also reduced with this. Apart from MBS being used by school children, farmers also use it to transport their produce to distant urban centres and the local market. Despite the deployment of MBS in some regions, it still remains to be seen what infrastructural facilities exist in Karnataka's backward districts and how it has impacted rural lifestyle and communication. Our study in Chamrajanagar - one of Karnataka's most economically backward districts - is a step in this direction.

Studies like ours are significant in the South Asian context, because this region along with Sub Saharan Africa has the lowest ranking in terms of number of computers, use of internet and telephone lines per thousand people (Pohjola) [10]. On the other hand, countries in North America, Western Europe, East Asia and Pacific rank much higher.

2. THE VILLAGE STUDY

Context influences communication. In other words, the content, purpose, frequency of communication, as well as the means and media of communication are influenced by contextual factors surrounding users. Such factors include the local economy, working conditions, social dynamics, people's cultural perceptions, infrastructural facilities, exposure to media and education. This was reaffirmed by our ethnographic study of a village in Chamrajanagar district in Karnataka. Villagers here, communicated with people outside the village, only to fulfill specific objectives. Moreover, the frequency of communication increased with change in social, economic and physical circumstances. These included organizing for special occasions; inviting people for such occasions; calling for medical assistance; following up on one's medical status; and finally keeping in touch with immediate family members outside the village.

2.1 Research Questions and Sample

The study was geared towards answering certain fundamental research questions about communication in the village. These were as follows:

a) What is the typical lifestyle of people in a remote village?

b) With whom do villagers communicate and why?

c) How do they communicate with them?

d) What is the content of communication?

e) How often do they communicate?

f) What are the problems faced whilst communicating or getting information across?

To answer these questions, we conducted a field study with a purposive sample. This included 17 women, 7 men and 5 minor boys, i.e. 29 villagers in all. They were pointed out by our key respondents. Although the sample was skewed in terms of people that the key informants frequently interacted with, it was nonetheless, fairly representative. This is because our sample reflected the same socio-economic characteristics as the village populace. Our sample included only Hindus and schedule caste (lower social caste), daily wage farm workers. This was true of the village too. Similarly, our sample of respondents was semi-literate, economically backward and lacked mobile phones, television and personal transport, like others in the village. Finally, most of our women respondents undertook household activities and farm-related work, like other women in this village.

2.2 Research Techniques

For data collection in this study, empirical methods like silent observation and guided interviews with villagers were undertaken. Besides this, a pilot study was previously conducted on a smaller scale. Through this, it was possible to shortlist important activities (undertaken by villagers) for further investigation. The pilot study also enabled identifying key informants from within the community and establishing rapport with them. But, the most significant feature of this research was its eclectic approach. As members of a multidisciplinary research team, it was possible for us to engage in diverse observation techniques to discern quirks and patterns in respondents' lifestyle and inter-relations.

The Grounded Theory approach was subsequently applied for data analysis. This included rapid ethnography method and 'affinitizing' (David R. Millen, Holtzblatt and Bayer) [2][7]. In other words, raw data was grouped together to generate hierarchy of themes. In this manner, data was abstracted to higher levels. Concepts and themes that emerged from this process of hierarchy-building, enabled researchers to collectively generate ideas on possible connectivity applications and services.

Themes were chosen by putting all post-it notes (containing field observations and respondents' quotes) together, and then arranging them in piles, in terms of those notes that went together. Each pile or cluster was given a name, according to what best described all the items and contents under it (Ryan and Bernard) [13]. This name became a first level theme. Each cluster represented a basic theme related to social, economic, cultural, work-related and domestic issues. Themes were built from raw data that occurred most frequently, or were critical to the occurrence of others, or because they varied from our own expectations.

Subsequently, clusters with similar themes were placed together. In this way, the first-level themes were given a higher or second-level title. After the second-level hierarchy of themes was completed, a final theme was made. This was by identifying interrelationships between various higher level themes.

Thus, a hierarchy of themes was generated from the data through first and second-level themes. These higher level themes were

further compared to identify how each theme related to the other. This was used for (a) answering basic research questions about the village communication environment (content, purpose, means / media of communication); (b) details of villagers' socio-economic background and socio-cultural issues; (c) instances of possible communication gaps faced by people. During this phase of data analysis, researchers' insights were placed alongside the themes. These were brainstormed to generate likely design ideas for applications and services.

3. STUDY FINDINGS

This section contains our findings in terms of social, economic and cultural features of the village. It is based on silent observations and our open-ended questions to village respondents, in individual and collective, guided interview settings.

3.1 Village Socio-Economic Features and Communication

The study revealed certain critical issues, which influenced communication and interaction among people within the village. These also had a bearing on their interaction with other villages and towns. Some of our observations in this regard are as follows.

3.1.1 Work life balance

It was observed that all villagers, who were predominantly daily wage farmers, led hectic work lives. They had little time for leisure and other activities. This impacted their communication needs. Most people preferred to initiate communication events for specific reasons (like social events or for business purposes), rather than for casual conversations. They did not undertake communication unless it directly influenced their everyday lives.

Congruent with goal-specific communication, the frequency of communication was also goal-specific. It was driven by immediate social and economic circumstances of the villagers. Frequency increased if there was a change from status quo, like a sickness in the family; or if one or more family members moved out of the village to a different geographical location; or a social event occurred; or for financial reasons like loans or sale of produce and other similar situations. Depending on the individual context, the frequency of calls through pay-phone or personal visits was high at such times. It could be as many as daily or twice a week calls or personal visits, and as less as once a month.

3.1.2 Economic condition

The economic condition of all villagers was either poor, or very poor. However, few households had somewhat surmounted penury. Alongside poverty, there also existed limited purchasing power. Consequently, mobile phones and landlines were not common in this village. They were transformed into shared devices. Yet, their use was not free. Specific amounts were charged for calls, which were dependent on call-duration and whether calls were made to landlines or mobile phones. Charges for the former were lower than the latter.

Such costs attached to making phone calls, determined the manner by which communication was initiated through phone calls. It was also dependent on villagers' economic condition. People preferred to make calls through payphones, even when they had access to mobile phones. This was primarily because; calling from payphones was cheaper than calling from a mobile phone. Similarly, they also chose to receive calls on payphones, unless they had access to mobile phones. In the latter case, calls would be received on the mobile, since calls could be received for free.

3.1.3 Education

Level of formal and informal education (i.e. having received education from school or being functionally literate) influenced the means of communication used by villagers. Most villagers could not read or write. This led to the widespread use of payphones and limited use of the postal system.

Limited literacy also caused people to share one newspaper in the entire village. Those that could read and write the local language read the newspaper and passed on information to others. Although this was a constraint, people appeared contented with it. But, news and information was also consumed through the alternate medium of television. In fact, there was a high dependence on television for information and entertainment.

3.1.4 Social dynamics

Social dynamics in the village, greatly determined the use and access of communication or information devices. Men were perceived as decision-makers, while women were seen as homemakers. In fact, men not only purchased devices, they also controlled most channels of mediated communication. Women depended on men for the use of devices like mobile phones, television sets, CD (audio and video) players and radios.

This dependence caused women to have limited technology exposure. Hence, it was a communication gap. But, there was a positive side to this as well. Women equally shared the responsibility of initiating and receiving information through non-mediated communication (i.e. personal and human interaction).

3.1.5 Media consumption and resource sharing

Television was the prime source of entertainment for villagers as was mentioned earlier. Everyone preferred watching serials, movies and reality shows (like 'Crime Diary') in Kannada, followed by news programmes every evening. People infrequently visited movie halls, due to the distance and their own hectic work lives. People also had access to a daily newspaper (kept in the pay-phone kiosk -cum- grocery shop), in which headlines and astrological forecasts were keenly read. Radio had limited popularity, although people heard live cricket commentaries on it.

Despite such media consumption, not all village households owned televisions, mobile phones and CD players. Consequently, owners shared some of these resources - especially television - with friends. In fact, watching television shows together were social occasions for people. On the other hand, mobile phones were shared primarily with immediate family members.

3.1.6 Mobile phone usage and localized improvisation

The availability and access of mobile phones was scarce, with 7 mobile phones for a village of 160 households. Consequently, they were shared among immediate family members and close friends. Although owners lent their phones to acquaintances within the village (for emergency), it was considered a favour and had to be reciprocated in kind. As a result, mobile phones had restricted usage, as against pay phones that were used more often.

A primary factor that guided mobile phone usage was cost. It caused villagers to use their phones sparingly. They made few

calls (outgoing) on their mobile phones and instead preferred receiving calls (incoming). This was because call tariffs for incoming calls were cheaper than outgoing.

The issue of call tariffs was effectively addressed by villagers and their grey-market mobile phone, through the 'Dual SIM' (refer to Figure 1: A Dual SIM Card slot). The dual SIM is a nominally-priced (~ INR 100 and 150), small circuit that enables a mobile phone to support two SIM cards simultaneously, without opening the battery cover. A dummy SIM card is connected to two empty SIM card slots, where two different SIM cards can be inserted. This dummy SIM goes into the mobile phone SIM card slot, such that when the user turns on his phone, one SIM card gets enabled. Upon restarting, the second SIM card gets enabled.

The 'Dual SIM' was found to be useful for users, who wanted to switch between SIM cards for incoming and outgoing calls. They typically bought cards with the best plan and tariff rates – one that provided for cheap outgoing calls and the other for cheap (usually free) incoming calls. By alternating between SIM cards, people with limited economic means judiciously used their phones. The Dual SIM card slot is depicted in Figure 1.

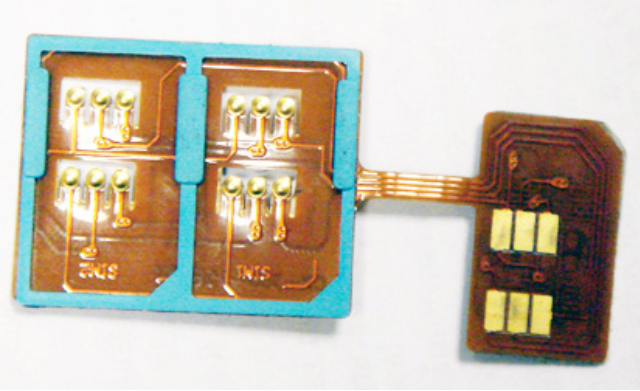

Figure 1: A Dual SIM Card slot

3.1.7 Special events

Multiple means of communication were used by villagers during special events like weddings, birth and death ceremonies, festivals and other social gatherings. Although the payphone was preferred for communication at other times; it was not used for such events. Social obligations within the rural community prevented use of telephones at such times, because they were considered impersonal in nature. In fact, personal visits to each other's homes were undertaken as a necessary follow-up to mediated communication during social events.

3.1.8 Gaps

In the course of our field visit, we observed many gaps in rural communication. Firstly, infrastructural facilities in the village were poor. People lacked efficient transport to commute to other villages and towns. This is because the state transport buses were erratic. Moreover, basic facilities like hospitals, post offices and banks were inaccessible. They were located in distant towns and cities, which made it difficult during emergencies.

Apart from lack of access to basic services, there was also no option to the single pay phone in the village. Consequently, there were instances of villagers traveling to the city (which was at least 20 kilometres away) for using payphones.

Yet another issue was lack of exposure to media and technology (specifically electronic gadgets and media information). Women (as mentioned before) could not operate the mobile phone and television on their own. They depended on men for this. However, the youth were more aware and proficient in operating mobile phones, television, CD players and radio.

Problems in communication occurred, because the medium used was sometimes unacceptable. Although most communication occurred through phone, they were considered inadequate for extending social invitations to people on special, shared occasions. They had to be followed up with personal visits.

There were gaps in the economic domain too. It manifested itself as lack of awareness among daily wage farmers, who worked within Chamrajanagar. This was specifically with regard to the physical location and nature of their employment for the next season. Daily wage workers, who traveled to the city, also faced uncertainty and were unaware about employment opportunities. Even village farmers, who depended on middlemen to sell their produce in the cities and towns, lacked information on market rates and consumer demands.

Thus far, the discussion has been on understanding how specific social and economic features of the village, influenced communication. In the following section, the means of communication used within the village will be highlighted.

3.2 Common and least used means of communication

Communication within this village in Chamrajanagar was primarily through word-of-mouth and informal interactions. Since most villagers belonged to the same social and economic background, community ties among them were strong. These strong ties fostered social and personal communication in the form of verbal interaction; personal visits to each other's homes; participating collectively in social events; and maintaining social bonds (through informal chats and information exchange).

There were few instances of economic communication too. This was specifically in the case of kiosk operators, village shop owners and anganwaadi workers, whose services / goods were bought by other villagers. Yet, verbal interaction, personal visits and informality were the preferred forms of communication.

On the other hand, the nature of interaction differed, when people from the village studied by us, communicated with those in other villages. This is depicted in Figure 2, where the thickness of arrows represents frequency of usage of communication means.

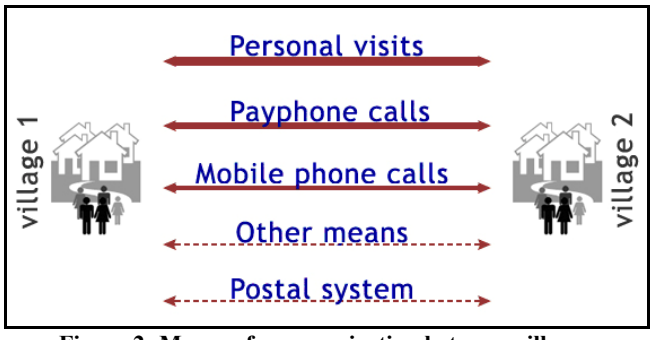

Figure 2: Means of communication between villages

The nature of communication between the village that we studied and neighbouring villages was primarily social in nature. People visited or called up their friends and relatives, regularly. There were certain instances of economic interaction as well, when villagers went to sell or buy goods. Another form of interaction was by availing educational facilities (since secondary schools were located only in villages outside the village we visited).

All this determined the means used for communication among villages. Personal visits between villages were most frequent, as is depicted through a thick line in figure 2. This was followed by communicating through the payphone. Instances of calling up each other through the mobile phone were fewer. Other means of communication like e-mail, or the internet were not used. Even the postal system was seldom used, as the dotted line suggests.

Unlike inter-village communication, interaction between the village and city was largely economic with few instances of social interaction. This is depicted in Figure 3, where the thickness of arrows represents frequency of usage of communication means, like in figure 2.

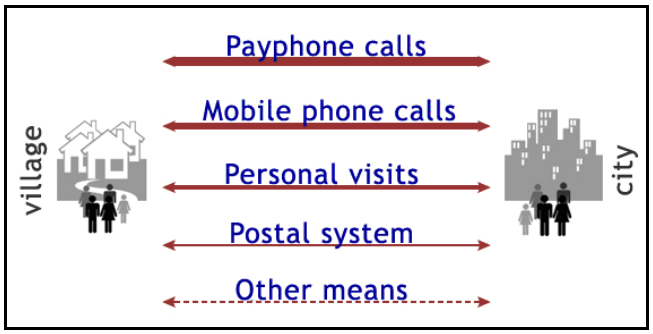

Figure 3: Means of communication between village and city

People from the village depended on the city, not only to sell their produce in the wholesale market, but also for employment opportunities. Apart from this, villagers also purchased goods and services that were absent in the village. Yet, personal visits to the city (mostly Chamrajanagar) were less frequent, as compared to visits to neighbouring villages. This was because cities were distantly located and state transport services were poor. Therefore, most information was disseminated and received through pay phones (depicted as a thick arrow), followed by mobile phone calls. As in the case of villages, e mail and other means of electronic communication were nil. On the other hand, postal communication existed and was higher than between villages.

From the above discussion it can be inferred that payphones were the most popular and frequently used means of communication. This was especially so among villagers, who had family members in neighbouring towns and cities. In fact, these family members in towns, spent as much as INR 40 per month on payphone calls to their relatives in villages. Such calls from family members would be received by villagers, on the village payphone for free.

However, our findings also revealed that people did not always use the local, village payphone, because they believed that the kiosk operator over-charged them. He did not have a billing machine. Besides, the electronic display of call duration faced the kiosk owner and not the customers. This engendered significant erosion of trust among villagers, who also felt that the kiosk owner held a virtual monopoly over them.

In order to increase their options, villagers used payphones in neighbouring townships. Here, billing machines were functional. Nevertheless, the village kiosk operator was individually known to every village household. This meant that they could depend on him to deliver messages to them, from people who called in their absence. Thus, the relationship between the kiosk operator and villagers determined the use of the payphone to a large extent.

Apart from payphones, people also used mobile phones, the postal system and undertook personal visits. Mobile phones were used as alternatives to the pay phone. Personal visits depended on geographical distance and were more common among villages, which were closer to each other than the city. The postal system was used largely to send and receive official information. The need for this was more between a village and a city, than within villages. Consequently, it existed in the former case.

4. RELEVANCE OF FINDINGS WITH PUBLISHED LITERATURE

Findings from this study have spawned several issues. These can be examined through similar research exercises in the future. But, they have also reaffirmed and qualified hypotheses of other researchers, who have worked in this field.

According to Pohjola [10], income levels and the cost of access to technology are critical to ICT (Information and Communication Technology) usage. Our study corroborated this. Villagers did not have easy access to technology and media like computers. It was beyond their means. However, televisions and mobile phones were present, albeit in limited numbers and as shared resources. Televisions were black and white, second-hand sets, like mobile phones that were also second hand purchases. This was to cut costs. Thus consumption of technology and media depended on purchasing power and economic levels.

Yet, Pohjola's [10] advice of raising people's education levels, cannot alone ensure acceptance of technology. It can only be done by providing ICT services and facilities that address people's socio-economic needs. Such needs are learnt through studies like ours. From the field visit, we found that villagers needed information on market rates of farm produce; employment opportunities in cities; and daily wage work in neighbouring farm lands. Technology that disseminates such information can have better chances of widespread adoption than others.

Similarly, our study shows that demand for ICT services has not increased due to income alone, as held by Pentland, Fletcher and Hasson [9]. They believe that rise in income and expenditure causes greater demand for newspapers, cable TV, telephone calls and mail. Our village study findings suggest that despite limited purchasing power, people felt the need to be connected outside the village through newspapers, telephone and the TV. The requirement for such services had increased primarily to maintain and strengthen family networks, uphold social obligations and retain contact with relatives and friends outside the village. Moreover, many people sold their farm produce to towns and cities and hence wanted to be connected (by landlines, or mobile phones or the newspapers) to urban centres.

Pentland, Fletcher and Hasson [9] also highlight the phenomenon of resource sharing by people as the means for cutting costs. However, sharing does not occur across the community as they have supposed. We found that resources were shared openly among core group members, like family members or relatives and

less with others. This was despite the fact that both core and non-core members belonged to the larger village community. Thus, group dynamics determined resource sharing.

Another factor that enables technology adoption is better infrastructure facilities, according to Bhatnagar and Pohjola. Our study corroborated this. Villagers could not avail of many facilities enjoyed by their urban counterparts, due to lack of easy access to basic services. Frequency of state transport buses was poor. Even medical facilities and schooling could only be availed from neighbouring villages.

All this has greatly constrained villagers from utilizing the benefits of modern technology. Yet, they are likely to use them if basic services are made available, cost effectively. For e.g. medical services and education can be made to reach them through a low cost device / system. With such services being resolved, it is quite likely that they would be keener to avail of other benefits that technology can offer. Thus, the conclusion drawn by Indian Institute of Information Technology – Bangalore (IIIT-B), about poor infrastructural facilities hindering rural technology programmes is only partially true. Technology that is cognizant of infrastructural problems can indeed be deployed.

Nevertheless, new services must be economical in order to be acceptable, as pointed out by Pentland, Fletcher and Hasson [9]. Villagers would be keen to use them, if they are not priced higher than presently available services. Our observations reaffirm this. Rural users did not want to own items beyond their means. Hence, solutions to address their technology needs should be inexpensive.

Pohjola [10] also suggests that technology has to be local for easy adoption. Localization has two aspects as mentioned in the IIIT-B report. These are linguistic localization and localizing the means of transmitting information. Our findings from the village confirm the former. Villagers, despite being semi-literate or illiterate were familiar with the local language (Kannada) in the print, visual and sound medium. This included newspapers, television programmes, advertisements / posters or hoardings and notices (including signage in public places). Even the small section of literate villagers had Kannada as the medium of instruction in schools. Although some knew a smattering of English, they were comfortable speaking, reading and writing in the local language. Besides, the mobile phone owners also preferred Kannada characters on their phones as menus and help tools.

Apart from the 'localization' need, we also found that villagers seldom initiated a communication event for a casual conversation or meeting. It was usually for a specific objective. This is similar to what Bhatnagar observes, i.e. communications in rural India is mostly need based, rather than for leisure. But, Bhatnagar's subsequent inference that services dependent on the Internet, can alone address rural users' needs, requires further verification. It is likely that villagers do not readily adapt to a mode of communication that they are unfamiliar with.

One of the means for dissemination of communication services and increase in ICT penetration, according to Bhatnagar and IIIT-B's studies are kiosks. They suggest that kiosk operators as members of the local community understand local needs and are geared towards providing localized services. However, there are several factors to be considered before projecting the kiosk model as ideal. In the case of the village we studied, the pay-phone kiosk owner was well respected. Yet, when long calls had to be made to distant cities and towns, people preferred to make it from Chamrajanagar city, which was at least 20 kilometres away. This is because they felt that their village kiosk over charged them and held a monopoly. They wanted to increase their options and call from other places. Thus, the role of the kiosk operator and people's relations with him are critical factors to be considered.

It is also suggested by IIIT-B's studies that kiosks enable effective development of extant, rural infrastructure. Although this might be true, it is worth considering alternatives, like existing self-help groups (SHGs) and rural, voluntary bodies that encourage people's participation. There were such promising, community action groups in the village we studied.

5. RECOMMENDATIONS

5.1 Future design avenues

Our findings in this study led us to consider future design avenues. These could serve as guidelines for addressing communication problems and lack of access to information among villagers in India.

Firstly, to address employment needs of daily wage, village farmers, a solution could be provided. This could map all tracts of land within certain distance from the village. It could disseminate information regarding location / distance of farmlands; of crops being grown in those plots; and estimated time frames of work. Similarly, information (through a push model) can be provided on possible employment opportunities in the city, according to people's professions. It could even be a 'channel' on the phone that gives employment updates to village hopefuls.

Secondly, the lack of access to secondary level education can be resolved through virtual classrooms. This could be through satellite like the recently launched 'edu-sat programmes' in some parts of rural India. It might also be worthwhile to consider an application, whereby voice commands turn into text and are displayed on the screen of a device and vice versa.

Villagers also mentioned that they could not determine whether their farm produce was in demand and would prove profitable. This can be resolved by providing regular updates, either through virtual connectivity to an online portal, or an asynchronous communication device. Information could be on the climatic condition in the region; its likely impact on crops; common diseases and how they can be tackled. Since farmers have sufficient, home-grown knowledge regarding crops, they can share their experiences with others.

Another problem was farmers' lack of direct access to the market. Enabling virtual linking up with the market or buyers could help such farmers. With this, they can showcase their produce to buyers in neighbouring cities. The latter could quote a price for it. Negotiations and price fixing could also be done virtually.

Apart from lack of connectivity, there also was constrained connectivity. There were some villagers, who had mobile phones and were thus 'connected'. Yet they had limited use for it. Lack of formal education made it difficult for them to send messages; manage their address book and menu options. This could be resolved by providing a photo-based phone book. Villagers could take a picture and put in a number, such that their phonebook does not display names and numbers but just the face.

With most villagers making personal calls to check if their friends and relatives were doing well; providing features like presence/

status indicators can be useful. These could be in the form of icons that one could set for happy, ok, unhappy and so on. By providing such status indicators, villagers could decide to call or take further action, upon checking the happy or sad icon / photo of their near and dear ones.

There was also the issue of conforming to social mores, whilst extending invitations for special occasions. For this, villagers undertook multiple means of communication. They called up each other, using the phone and also personally visited each other. One way to resolve this is through a feature that simulates postal invitations. It could be like sending an animation of a fancy invitation. People could construct their own invitations from various parts or symbols of their choice. This would show up on the recipient's screen, open up gracefully and then display the message (in colour). There could also be a feature that allows the message to be 'spoken' in the voice of the sender, when the recipient hits a button for it.

Last but not the least, is harnessing the potential of SHGs or voluntary groups that existed in the village. They can be made responsible for operating public call offices and provide a useful alternative to the kiosk. This is because members of groups in the village exhibited a high level of sharing and trust.

A technology solution could also be deployed to link up these SHGs to hospitals and doctors, in near-by townships. In case of an emergency, these groups could inform medical authorities and provide a summary of the medical problem. With this, any medical relief that arrives in the village will also be capable of providing first-aid here. This solution could assuage the lack of access to medical assistance in villages.

5.2 Things to consider

Most recommendations suggested above, for addressing rural communication needs, point towards deployment of ICT, which is multi-modal, rather than purely voice-enabled. Such an arrangement takes into account, problems like non availability of the person being reached; lack of acknowledgement for message received; and high investment of time for initiating or ending a communication event.

However, information needs of villagers will be inadequately addressed if devices and services replace traditional means like radios, newspapers and televisions. Therefore, extant information media should be complemented and not supplanted by new applications. Incremental deployment of these new systems will aid rural users to gain familiarity and eventually adopt them. Solutions should also take into account low levels of media exposure among people.

Adaptation and acceptance could be easier if communication solutions consider present lifestyle, division of labour, daily schedule and other environmental factors of rural users. They should be cognizant of socio-cultural dynamics of resource sharing in the village as well. These solutions should also not violate social factors like community norms, roles and beliefs.

Connectivity should also translate into immediate monetary benefit for rural users. This is because with their limited economic means, they visualize the future only as short and medium term, incremental goals, which must be quickly realized. Consonant with this outlook of villagers, the means to connectivity should be affordable and have short gestation cycles.

Finally, the intent should be on getting rural users connected to townships and cities, which act like a hub for them. There is an increasing dependence by villages on cities for their economic existence. This was in our study revealed too.

These are some recommendations based on our preliminary study. They are indicative in nature. Future research can reveal further needs of rural users. Understanding them is critical to sensitize technology developers, towards the underlying issues of connecting the unconnected in the emerging market.

6. CONCLUSION

Our study was a snapshot of the social, economic and cultural life of one village in Chamrajanagar district. It revealed how the village economy - that was primarily agricultural - was organized. In this context, it described the economic conditions and specific roles of daily wage earners, tenant farmers and landlords. Also examined, were the socio-economic relationships that people shared with each other.

It was found that despite their poor economic conditions, people lived as a close-knit community in the village. Yet, group dynamics led to alienation of those, who were not members of the core group. This determined sharing of mobile phones and televisions, such that inner-group members like family and close friends were given preference over others. Relationships and information exchange with others (not from the core group) was guided by trust, risk aversion and word-of-mouth.

Exposure to media and technology among villagers was also examined. It was found that most adults in the village – especially women – could not operate devices like mobile phones, CD players, radios and television sets. On the other hand, the younger members of most rural households had some experience in handling these devices. In fact, they operated them on behalf of older family members. Notwithstanding such varying levels of technology exposure, most villagers preferred to watch television programmes every evening for leisure.

Findings from the study also showed that people communicated with neighbouring villages, usually for social and personal matters. This included phone calls (through local pay phone) and personal visits. Interaction with cities and townships were mostly for economic reasons. These included sale or purchase of produce, as well as employment in the city. The most preferred means of communication were local pay phones and personal visits, although mobile phones were also used at times. Yet, all these means were used for specific communication.

The study revealed many things about rural communication needs and its local environment. Still, there are many other issues that need further examining. Since this was a one-time study on rural users, the next step could be a longitudinal or panel study of a village. Studies could be conducted during the harvest season, festivals and social events. This will illustrate how communication takes place during different time periods.

One of the limitations of this study was its focus on communication only between villages. Further studies can comprehensively examine how communication occurs from a village to neighbouring villages and cities, and trace it back to the village. This could help understand urban-rural communication better, than a sequestered study of the village like the present one.

Since our study addressed a single village in Karnataka, its conclusions cannot be generalized to India as a whole. However, it can be extrapolated to other villages with similar socio-economic and demographic profiles in the country. For widespread applicability at a national level, more villages at varying levels of social index, economic capital and infrastructural development should be studied, in a similar research endeavor.

Finally, action-oriented studies should be undertaken, whereby mobile devices for the village, are sponsored by the research team. These devices could be deployed within a village and its use could be monitored. Such an arrangement can help understand group dynamics and resource sharing in the village.

Thus, more studies at the grassroots level are essential. The knowledge gained from them, would be invaluable for addressing the connectivity needs of people, who are at the bottom of the social, economic and technology pyramid.

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8. REFERENCES

[1] Baijal, P. USO and Rural Connectivity: Not an Obligation but an Opportunity. Economic and Political Weekly, December 4 (2004), 5201-5203.

[2] Bayer, H and Holtzblatt, K. Contextual Design: Defining Customer-Centered Systems. Morgan Kauffman Publishers. San Francisco, CA. 1998.

[3] Bhatnagar, S. Enhancing Telecom Access in Rural India: Some Options. Paper presented at India Telecom Conference, Asia-Pacific Research Centre (Stanford University, November 2000).

[4] Chowdhary, T.H. Rural Communications. Presented in IEEE TENCON (Bombay, 1989), 808 – 810.

[5] Glaser B.G. Conceptualization: On Theory and Theorizing Using Grounded Theory. International Journal of Qualitative Methods, 1 (2), Spring 2002.

[6] Keniston, K. Grassroots ICT Projects in India: Some Preliminary Hypotheses. ASCI Journal of Management, Volume 31 (1&2). 2002.

[7] Millen, D.R. Rapid Ethnography: Time Deepening Strategies for HCI Field Research. (AT&T Labs – Research). New Jersey, 2000.

[8] Pandit, N.R. The Creation of Theory: A Recent Application of the Grounded Theory Method. Qualitative Report, Volume 2 (4), November 1996.

[9] Pentland, A. Fletcher, R and Hasson, A. Dak Net: Rethinking Connectivity in Developing Nations. Computer. IEEE Computer Society. January 2004, (78 – 83).

[10] Pohjola, M. The Adoption and Diffusion of ICT Across Countries: Patterns and Determinants. The New Economy Handbook. Academic Press, 2003.

[11] Premi, M.K. Migration to Cities in India in A reader in urban Sociology (eds) MSA Rao, C. Bhat and L.N. Kadekar. Orient Longman. Hyderabad, 1991. 99-141.

[12] Rajendran, S. Minibus for Villages: Improving Rural Connectivity. Economic and Political Weekly, August 30 (2003), 3627 – 3629.

[13] Ryan, G.W. and Bernard, R.H. Techniques to Identify Themes. Field Methods, Volume 15 (1), February 2003.

[14] Information and Communications Technologies for Development: A Comparative Analysis of Impacts and Costs from India by International Institute of Information Technology, Bangalore. A report for project funded by Department of Information Technology (DIT); Ministry of Communications and Information Technology, Government of India and Infosys Technologies, Bangalore. July 2005.