Perceived economic benefits of telecom access at the Bottom of the Pyramid in emerging Asia

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1.0 Introduction

Much has been said of the benefits of access to telecommunication especially at the 'Bottom of the Pyramid'.[1] The economic as well as social benefits from such access can, in theory enable people to graduate from poverty and also contribute more widely to development. Thus it can be argued that inequality in access to telecom services can lead to limitations in fighting poverty.

Many in the 'ICT for development' movement highlight the benefits that telecommunication, the Internet and other information and communication technologies (broadly put, ICTs) can bring to the table in the fight against poverty. A number of studies have attempted to demonstrate the impacts of access on income at the macro-level. However supporting evidence for these arguments at the household level is limited at best.

This paper takes a unique look at telecom access and studies the perceived impacts of direct access to telecom services, that is, telephone ownership at a household level at the 'Bottom of the Pyramid' in five developing Asian countries. It focuses on the perceived economic impact (positive or negative) of telecom ownership in terms of the potential to increase indirect income generation capacity or save on expenditure or transactions costs. The findings reveal that some telecom users do perceive the economic benefits of direct access to be high, but this finding is not seen across the board for a number of reasons explained.

In order to understand the affordability dynamics of the findings, price elasticity of demand is modeled. The findings reiterate assertions of previous studies on the relative inelasticity at the BOP segment indicating no major changes in usage patterns would result from marginal price revisions.

The paper is based on a large sample survey of telecom users at the BOP in Pakistan, India, Sri Lanka, the Philippines and Thailand. Section 2 reviews the existing literature on the impacts of telecommunication. Section 3 explains the study design and methodology, and examines the difficulties faced in conducting a study of this nature and the methodological innovations undertaken. Section 4 explores in detail the impacts of telecom services at the BOP in the five countries. Section 5 explains the price elasticity of demand for phone calls. Section 6 concludes, looking at the policy implications from the study.

2.0 Literature Review

This literature review, by no means comprehensive, is to establish context to the current study by considering the existing literature on the impact of access to telecoms on the income earning potential particularly at the lower strata of society. The objective here is to understand to what extent greater access, argued also as more equitable access, can help fight poverty. We note that while telecom is only one component of the broader set of information and communication technologies (ICTs) and that the access to the Internet is also considered by many in dealing with the above issues, our focus is only on telecom.[2]

Many studies over time have concluded that access to telecom has a fairly strong impact on growth and economic development, as well as poverty reduction. Research into the impacts of telecommunication services at the macro-level is fairly rich. Hardy (1980), Cronin et al (1991), Parker and Hudson's (1995), Cronin et al.'s (1993), and more recently Roeller and Waverman (2001) as well as Waverman, Meschi and Fuss (2005) are just a few who have

[1] Prahalad (2004)
[2] This study finds that access to the Internet at the BOP is less than 2 percent in the South Asian countries and 10 percent or less in the Southeast Asian countries studied.

demonstrated the positive impacts of telecommunication on economic growth and development. Recently, some studies have focused on the relationship between access to telecoms and economic well-being of the poorer segments of society in several countries at a micro-level, as does this study. In theory, lowered transaction costs, inter alia through faster access to more accurate information should help the poor to directly increase their incomes, or indirectly through the more productive use of the time saved by placing a call. The significant fact is that empirical evidence of such income impacts at a generalized level is sparse. The studies which show concrete empirical evidence of the benefits at this micro-level are limited to specific markets, or groups of people, rather than the overall group of telecom users.

Most recently, and perhaps most notably, Jensen argues for the central role that information, and therefore ICTs play in the functioning of output markets in the developing world, thereby leading to increased incomes and/or decreased consumer prices. Through a survey of fishing units in three districts in India once a week from September 1996 to May 2001 (as mobile telecommunication was became available in the region), mobile adoption is seen to be associated with reduced price dispersion and wastage, as well as in increased fishermen's profits and consumer welfare. In generalising the results, however, the author cautions that such dramatic impacts may not be seen in markets where the commodity perishes so quickly, because the perishability of the good contributes to the large market inefficiencies that exist. (Jensen, 2007). Aker (2008) extending Jensen's work finds mobile phones reduced search costs and improved consumer and trader welfare in the grain markets in Niger,.

Another recent study of transaction costs incurred by farmers in the Matale district in Sri Lanka demonstrated that by replacing half of the trips made by the farmer to obtain information with telephone calls, the cost of information (the largest component of a farmer's transaction costs) could be reduced by one third; however, the proportion of *total* costs that would be reduced is in the region of three percent (Ratnadiwakara, 2008).

Donner (2005) consideres the call behaviour of 277 Rwandan micro-entrepreneurs, based on the call logs on their mobile phones and found that a large proportion of their calls were with non-business contacts, regarding non-business issues. However, Donner notes that just the mere contactability and resulting flexibility associated with having a mobile might still have impacts on productivity and therefore income.

Bangladesh is a widely cited example, where telecommunication is alleged to be particularly important in contributing to incomes of many poor families who depend on remittances from members working abroad. Richardson et al. (2000) found that the discussion of financial matters is a very important use of the phone among the rural poor, thus enabling financial transactions. In addition, phones are used as direct income generating devices in rural Bangladeshi villages through the 'resale of minutes'. This however is done with the support of micro-loans to make the initial purchase of the phone and subsidized call rates. Richardson et al. (2000) as well as Bayes et al. (1999) demonstrated the income benefits arising from this kind of business to be considerably large. However, these two phenomena are not commonly seen in other settings.

The welfare and livelihood benefits are clear when we focus on these isolated groups; however, when we step back and look at the benefits accruing to the wider set of telecom users, the benefits are harder to quantify.

Souter et al. (2005) assess the impact of telephones on the livelihoods of low-income rural communities in Mozambique, Tanzania and Gujarat (India). Impacts on financial capital are mixed, with most of it coming from saving travel time and cost or postage cost, but little impact on income generation is seen. Only the better-off (in terms of wealth and education) see greater benefits in income generation. Impacts on social capital through networking, especially within the family are large.

A small South African study of the use of telecommunication showed that while as a proportion of calls, the majority of calls among those studied were for social purposes, the social networks maintained by the telephone were key to reinforcing livelihoods, seeking

information for example about employment opportunities, securing remittances, finding housing etc. (Skuse & Cousins, 2008) Such social networks are key where the informal economy predominates.

The 'social' use of phones has also been seen in several other studies. Zainudeen, Samarajiva and Abeysuriya (2005), in a study conducted among financially constrained users in several localities in India and Sri Lanka found that the large majority of phone use was for 'keeping in touch' with family and friends rather than instrumental uses such as business and financial transactions. Bayes et al. (1999) also cite 'social cohesion' availed of by telecom users, especially in the case of Bangladesh where many families have members working abroad. Such 'social' use is not to be considered 'frivolous'; as the mere ability of families to stay in touch contributes to better quality of life. Bayes et al (1999) also note the non-economic benefits of phone access in rural Bangladeshi villages, such as improved law enforcement, disaster-communication, and increased social kinship.

On the whole, there appears to be a dearth of empirical evidence of the economic benefits of access to telecom among the wider populace in developing countries, as well as developed countries, at least available in the English language. Aside from empirical studies reported here, it is difficult to find substantial empirical evidence of benefits of telecom access on income; much of the evidence of income impacts at the BOP is anecdotal. For instance, NOKIA (2006, p.4) reports of fishermen in Porto da Manga, Brazil availing of '100-150 per cent' increases in revenues through improved catches and reduced storage losses enabled by communication with other fishermen as well as wholesalers through mobile phones. A similar phenomenon is seen among fishermen in Moree, Ghana, where mobiles are reportedly improving living standards, by allowing fishermen to cut out the 'middle man' (or women in this case) and increase their earnings (mobileafrica.net, December 2005)[3]. A study by de Silva (2005) on a project at Sri Lanka's largest wholesale agricultural market, where produce prices were available through an automated voice system accessible through mobile phones found that most farmers believed that they were able to get accurate prices through the system over the phone empowering them to bargain for higher prices.[4] Kantipuronline.com (October 2006) reports of farmers in rural Nepal being saved 3 hour journeys by foot to the nearest phone, allowing them to spend more time seeing to daily far activities;[5] i4d Magazine reports of agricultural and veterinary advice being made available through the phone in local languages to farmers in villages in Northern India (i4d, September 2006).[6]

Further empirical evidence at this micro-level is sparse; this paper attempts to contribute to the empirical literature at such a level, by examining the perceived benefits of direct access to telecom at the BOP.

When examining existing studies which attempt to estimate the elasticities of demand, two facts become clear. Firstly, much of the existing research into elasticity calculations is focused on the developed world. Secondly, many of the studies are based on aggregate-level data, rather than either at the household or user-level. Milne notes that 'national studies with sizeable samples give very much more reliable and applicable estimates than international studies; the latter mainly indicate orders of magnitude and directions of change' (2006: 32).

Of the limited research available on the developing world, Waverman et al (2005) estimate the price elasticity of demand (PED) for mobile phones, using data from 38 developing countries from 1996-2003. They find the demand to be rather elastic, with a PED of -1.5 given a mobile penetration of 8 percent. Frontier Economics (in a study for the GSMA) estimate the price elasticity for minutes of use (MOU) of -0.76 for prepaid MOUs, and -0.54 for post-paid MOUs in developing countries (GSMA, 2005; Appendix 2). Again, aggregate numbers are

[3] mobileafrica.com (December 2005) *Mobile Phone: A Tool For Modern Fishermen In Ghana*, by Mawutodzi K. Abissath

[4] http://www.globalfoodchainpartnerships.org/cairo/presentations/HarshadeSilva.pdf

[5] Kantipuronline.com (October 2006) *Hills are alive with the sound of cell phones*, By Lilaballav Ghimire, 30 October 2006. Retrieved on 6 November 2006, from http://www.kantipuronline.com/kolnews.php?&nid=89958

[6] i4d (September 2006) *Soochna Se Samadhan Sewa*, Phone-based agri info service for farmers. 28 September 2006, New Delhi, India. Retrieved on 06 November 2006 from http://www.i4donline.net/articles/current-article.asp?articleid=840&typ=Rendezvous

used. Wheatley attempts to estimate the PED through a cross-sectional study of 40 low income countries using aggregate figures (teledensity and monthly bill), resulting in a PED estimate of -0.66.

Besides the above cross country studies using aggregate data there are some others who have estimated price elasticity using household surveys. Toreo, Chowdry and Galdo (2002) using willingness-to-pay techniques conclude that both in Peru and Bangladesh the willingness-to-pay is higher than existing tariffs. However the problem with this analysis (and a number of others that use this technique) is that respondents are asked how much they would be willing to pay for a single call; without taking into consideration the total number of calls they would make at the given prices. A recent study by the Colombian regulator CRT (2005) estimates PED in that country in the range of -0.9 to 2.0.

The general finding in the literature is that the numerical estimates of PED vary widely due to several reasons; with methodological issues and the variation in the groups studied being the most important.

3.0 Research Methodology

3.1 Research Considerations: Defining the *Bottom of the Pyramid* for country-wise comparisons

The study was conducted in five emerging Asian countries, namely Pakistan, India, Sri Lanka, Philippines and Thailand. Given the necessity for cross country comparisons among the less privileged strata of society, the target groups had to be defined as close as possible in a universal manner. While income levels appeared to be relevant, the practicality of using it as an indicator was limited by its reliability and comparability across countries; the problems generated by spatial and temporal cost of living adjustments would have made comparisons difficult. In addition, past studies have revealed that Asians tend to overstate or understate their income. Given the study was to be among the lower income groups, the tendency would have been to overstate their income. Thus this parameter while indicative would not have been conclusive or reflective of the respondents' status. In this background, Socio Economic Classification (SEC) was used instead of Income to define the BOP.

SEC categorizes people in to groups A to E based on the education and occupational status of the Chief Wage Earner of the household. For the purposes of this study, the top and middle of the pyramid was defined as SEC A, B & C, while the BOP was defined as SEC D and E. Focus was on the lower end (SEC DE) while a small middle and upper end sample (SEC ABC) sample was covered for comparison purposes.

3.2 Target Group

Target respondents of the study were telecom users, defined as those who had used a phone (own or someone else's; paid for or free-of-charge) during the preceding 3 months. Respondents were males and females between the ages of 18 and 60, from rural and urban locations.

3.3 Research Design

Both quantitative and qualitative research modules were undertaken. The quantitative module consisted of face to face interviews conducted with the target respondent using a structured questionnaire. Interviews were conducted at home. Both households and respondents were randomly selected. The sample was designed to represent the BOP in each country so that the findings could be projected back to this segment.

Having designed the sample the next issue was the accuracy of usage data; accurately capturing the calling patterns and behavior at the BOP is a difficult task[7] While much telecom use research in the developed world is based on billing records, in developing countries where the majority share phones and almost the entirety use pre-paid mobiles, it is not possible to obtain bill details, and thus alternative methods have to be relied on, such as the

[7] Previous studies (Zainudeen et al., 2005) have cited the difficulties in recall data. See also Cohen and Lemish (2003) for discussion.

respondent's recall, mobile call logs or other more sophisticated and costly real-time measures.

As a result, the current study takes an innovative approach, recording phone use and behavior through the placement of a diary among respondents[8] Diaries were placed among 50 percent of randomly selected respondents for a period of two weeks.[9] Number of calls made or received, whose phone or where the phone was used; who the call was to or from; purpose of the call; time of the call; type of phone used; whether voice or Short Message Service (SMS) etc. were recorded. An incentive was provided for diary completion while random checks were conducted to ensure that recordings were being made. Across the five countries about 90 percent of diary panelists completed calling information, but responses on SMS (text message) details was low.

A multi-stage stratified cluster sampling by probability proportionate to size (PPS) technique was used to select the target number of urban and rural centers. After determining the number of centers to be selected from each cell (strata in respective provinces), urban and rural areas were selected again using PPS on a constant population interval on geographically ordered centers within each cell[10] In each selected centre, a common place such as a road, park, hospital etc. was designated the starting point for contacting households.[11] Only one respondent was selected from each household. In households with more than one valid respondent, the KISH grid (random number chart) was used to randomly select the respondent. Within each country, data was weighted by gender, province group /zone and SEC group (ABC vs. DE) to correct over or under-sampling in certain areas and socio economic groups.[12]

An overview of the sample size and composition is given in Table 1.

Table 1: Quantitative sample overview

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Country	Population	Sample Size			Error margin at 95 percent CI
		Urban	Rural	Total	
Pakistan	166m	900	912	1812	2.7%
India	1,000m	1645	2355	4000	1.5%
Sri Lanka	16m (excl. N&E provinces)	200	850	1050	3.0%
Philippines	87m	594	506	1100	3.0%
Thailand	65m	350	350	700	7.0%
Total sample size : 8662					

Table 2 provides the sample overview. Respondents included telecom users *as well as* non-users[13] All groups were conducted in the local language(s).[14]

[8] One of the very few examples of use of this approach is a British Telecom study examined in Mckenzie (1983). Interestingly, the authors were not able to locate any comprehensive studies using this approach in the literature for developing countries.

[9] Given the low literacy level of some of these countries, a literate person in the household was selected and trained to record the necessary information.

[10] For this purpose, the cumulative population of all geographically ordered centers was calculated within urban and rural areas of each province. To find out the sampling interval the total population of these centers was divided by the required number of cities to be sampled from that cell. To select the first center, a random number was generated. The center where that random number fell was the first selected center. By adding the sampling interval to that random number, the next center was selected and so on.

[11] Around each starting point, a maximum of ten interviews were conducted. The number of starting points was determined in accordance with the total number of interviews to be conducted in each center.

[12] As a result of weighting by SEC it should be noted that in reporting the results, in some countries the SEC ABC weighted sample size becomes larger than the SEC DE weighted sample size where the former group forms a higher proportion of the country's population.

[13] Someone who has not used any form of telecommunication during preceding 3 months.

[14] EGDs are longer than an average focus group – 3 hours or so as opposed to one and a half to two hours. The advantage is that respondents are not rushed an EGD.

Table 2: Sample country composition for Qualitative component

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Country	SEC DE only				Centres
	Users		Non-users		
	Males	Females	Males	Females	
Pakistan	2	2	1	1	Peshawar, Karachi, Lahore
India	2	2	1	1	Lucknow, Teravalure
Sri Lanka	2	2	1	1	Kurunegala, Moneragala
Philippines	2	2	1	1	Metro Manila, Batangas
Thailand	2	2	1	1	Chiang Mai
Total sample size :				30 EGDs	

4.0 Perceived economic benefits of telecom access

This section provides the context for the rest of the paper, considering usage and ownership issues at the BOP. After providing a backdrop to anchor the findings on, it goes on to look at impacts of access and usage of telecom services.

4.1 Equality in access, but not ownership

Terms like the 'next billion' and the 'bottom of the pyramid' have now become commonplace in the telecom industry. Emerging markets have accounted for 85 percent of new connections today;[15] China, India, as well as Russia and Brazil together have contributed 30 percent of the third billion subscribers alone. Mobile communication is spreading in emerging markets so rapidly that industry experts are predicting that many in the developing world will experience the Internet for the first time on a mobile rather than a personal computer. Of the 160 million new mobile connections in the first nine months of 2006,,China, India and Pakistan accounted for 70 percent of this growth[16].

However, as seen in Table 3, in 2006 the number of telephones per 100 population[17] in the Asian countries that this study considers suggest significant access inequalities with the number of fixed phones per 100 population ranging from 4 to 10 and the number of mobile phones per 100 population ranging from 13 to 48.

Table 3: Telephones per 100 population

	South Asia			Southeast Asia	
	Pakistan	**India**	**Sri Lanka**	**Philippines**	**Thailand**
Fixed (as at…)	4.16 (2006 Q4)	4.58 (2006 Q1)	9.50 (2006 Q4)	4.07 (2005 Q4)	10.25 (2005 Q4)
Mobile (as at…)	25.22 (2006 Q4)	8.82 (2006 Q1)	27.1 (2006 Q4)	41.30 (2005 Q4)	46.45 (2005 Q4)
Total	29.38	12.80	29.10	45.30	47.7
Source	PTA	TRAI	TRC	NTC	NTC
*lines in use (different from installed capacity)					

As such, much of the research and advocacy in the 'ICT for development' arena focuses on how countries can achieve 'universal access' to telephones, that is, a situation where everyone has a 'reasonable means of access to a publicly available telephone'[18] (Intven, 2000; Appendix C, p.15), and how the 'digital divide', that is the gap between the ICT 'haves' and 'have nots,' can be closed.

One of the most significant findings of this study is that accessibility in all five countries, was extremely high; that is of all those contacted (through the random selection process), more than 90 percent in all countries had used a phone at least once during the preceding three

[15] http://www.gsmworld.com/news/press_2008/press08_31.shtml, accessed 17 October 2006

[17] Also known as 'teledensity,' a telecom indicator which measures the level of telephone penetration in a country

[18] This is to be seen in contrast with the concept of 'universal service' whereby every individual household has a connection to a public telephone network (Intven, 2000; Appendix C, p.15)

months,[19] as seen in Figure 1. If this is the case for the whole country, then accessibility at the BOP can not be much lower. This finding therefore brings under scrutiny the real dimensions of the digital divide, that is said to exist; if almost 90 percent have access, then perhaps the 'have nots' in fact have *some* kind of reasonable access, but not necessarily ownership.

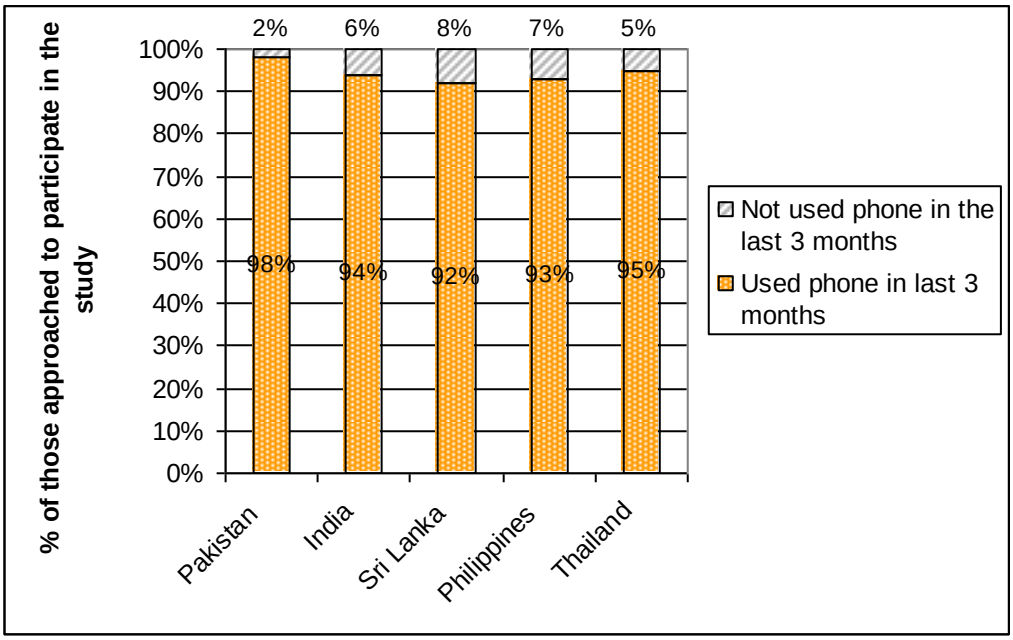

Figure 1: Use of a phone in the three months preceding the study.

However, what we find is that while people had access to many different modes of telecommunication (personal mobile phones, household fixed phones, public phones, neighbours' phones, relatives and friends' phones, etc.) ownership patterns varied significantly across the region as seen in Figure 2.

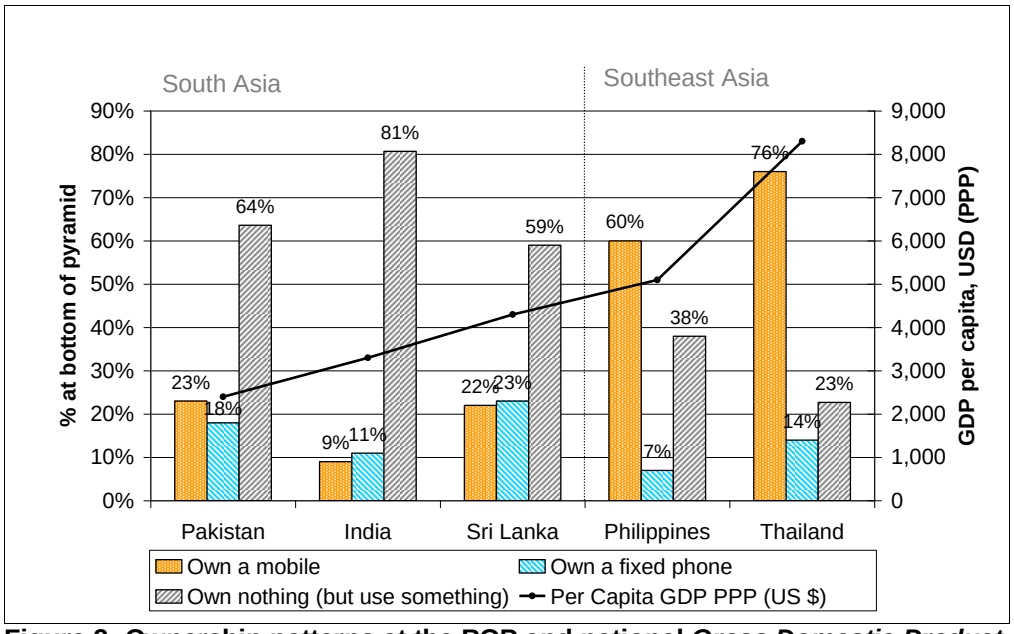

Figure 2: Ownership patterns at the BOP and national *Gross Domestic Product*

Ownership at the BOP was high in the richer Southeast Asian countries, with relatively higher levels of mobile ownership (with some instances of people owning more than one mobile

[19] That is, made or received a call, from any phone in the last three months; this was the criteria for participating in the study.

connection) and lower levels of fixed ownership.[20] Among the South Asian countries, overall phone ownership at the BOP was much lower, particularly in India.

However, even where ownership was low, non-owners had several options to access telecom, and did not have to travel far to use a phone—most could get to a phone in less than 5 minutes. Non-owners in Southeast Asia tended to use mobiles of other household members, or friends' and relatives' phones as their main method of communication reiterating the wider penetration of mobile phones. Non-owners in South Asia mostly relied on some kind of public phone (public call office, telecommunication centre or public phone booth) for telecommunication. This finding is important in the discussion of access to telecoms; whether universal service[21] should be a policy objective of developing country Governments through subsidies if universal access can be achieved through competition in the market.

The use of more than one SIM card was also seen across the region with Pakistan (12% of mobile owners), Philippines (12%) and Sri Lanka (9%) at the higher end. The reason for this could be to avail of different rates and/or promotions from different service providers at different times. All of the SIM cards owned may not necessarily be active.

In contrast to many developed countries, more than 90 percent of mobile owners at the BOP in all five countries were pre-paid subscribers as seen in Table 5. The primary reason for such being, prepaid connections allow for the control their expenditures. Except for Sri Lanka[22] and Thailand, the same pattern was seen in the SEC A, B and C sample as well.

Table 5. Type of mobile connection

	South Asia						**Southeast Asia**			
	Pakistan		**India**		**Sri Lanka**		**Philippines**		**Thailand**	
SEC group	ABC	DE	ABC	DE	ABC	DE	ABC	DE	ABC	DE
Pre Paid	99 %	99 %	94 %	95 %	80 %	92 %	95 %	99 %	86 %	96 %
Post Paid	1 %	1 %	6 %	4 %	20 %	8 %	5 %	1 %	14 %	4 %
Base (Mobile Owners)	287	246	210	309	198	104	75	605	304	267

4.2 Perceived impacts of direct access to a phone

Many studies over time have concluded that access to telecom has a fairly strong impact on growth and economic development. The literature survey contained in Section 2 discussed some of these. However, as pointed out in the literature survey, few of these findings have been empirically supported at the micro-level.

In general, two kinds of income benefits originating form telecom access can be distinguished. Firstly, direct income generation through the sale of telecom services, i.e., resale of minutes; i.e., the Grameen Village Phone model, where significant income benefits are seen across the board is an example. This paper does not examine such benefits. The second kind, which is the focus of this paper, are less direct, but can include the use of a phone by an auto-rickshaw driver to keep informed about hires, or the transaction cost savings made obtaining information over the phone as opposed to taking a bus ride into town to obtain that same information; in the latter case, both the monetary cost (bus fare) as well as the time cost can be considered. In theory, the time saved can be used in a more productive manner, perhaps having some impact on income.

The current study seeks to ascertain quantifiable evidence at the household level in the BOP of such income benefits. We look at how access to telecom among phone owners is

[20] Ownership of a fixed phone was defined at the household level, whereas that of a mobile phone was at an individual level.
[21] See footnote 18
[22] The Sri Lankan case can be explained by a 'post-paid' legacy; with Sri Lanka being the first country in South Asia to introduce mobile services in 1989, at which time, 'prepaid' packages had not yet evolved, and hence post-paid packages were the only alternative.

perceived to increase efficiency of daily activities at the BOP and how telephone owners at the BOP see that as translating to either a greater income earning or cost savings, if at all. In order to capture this, owners of phones were asked to rate on a five-point scale, inter alia, the extent of the impact that direct access (that is ownership – either through a personal mobile phone or household fixed phone) has had on:

a) the efficiency of their daily activities; and
b) their ability to earn more using the phone or save a certain expense that would have been incurred without the phone.

Across the five countries, those at the BOP strongly perceive that the efficiency of their daily activities had 'somewhat improved' due to telephone ownership. There was no major variation in the individual country perception with the ratings clustered around 4 on the scale. This is very much an intuitive finding and we have been able to support it using data with a high level of confidence.

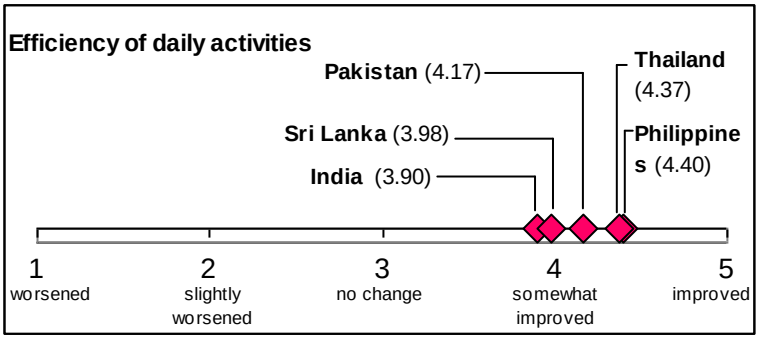

Figure 3: The impact of direct access to telecom on the efficiency of daily activities (mean response)

In general we find that the BOP valued highly the contactability any time, anywhere that (particularly) mobile communication allows. In fact, the contactability brought about through phones is one of the key reasons that was seen to be driving people to get their own connections. The ability to obtain information (any information) in an instant was also highly valued. Some interesting findings that emerged from the Pakistani qualitative studies, the only Muslim country where separation of men and women were relatively more pronounced, were that the males supported the notion that mobiles have reduced the dependence of females on the males in running general home errands.

When it comes to perceived economic benefits, there were mixed feelings at the BOP with the mean response ranging from 3.19 in Sri Lanka to 4.07 in the Philippines, as seen in Figure 4. Indians seemed to be obtaining the most economic benefits from direct access with a n increment of their perception score moving up from 3.90 for efficiency gains to 3.97 in ability to earn or save. On the other hand, Filipinos who perceive economic benefits at 4.07 however rated it lower than efficiency gains at 4.40. The highest negative responses were seen in Sri Lanka, where a quarter of Sri Lankan phone owners at the BOP feeling that direct access had in fact worsened their ability to earn or save. In all the countries except India, the mean responses on the first aspects (i.e., the efficiency of daily activities) were significantly lower at a 95 percent confidence interval than on the second (i.e., the ability to earn or save). In these countries, many respondents at the BOP do not see as much economic benefit arising from access to telecom as they do efficiency gains, with the cluster around 'somewhat improved' for efficiency gains (Figure 3) being spread out and towards 'no change' in terms of ability to earn or save (Figure 4). There appears to be a 'disconnect,' in people's perceptions between efficiency gains (for e.g. saving travel time and cost) and financial gains, which at the outset seems counter-intuitive. There are a number of possible reasons for this.

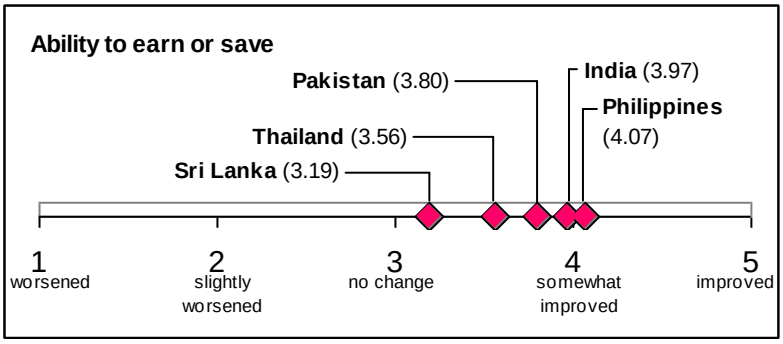

Figure 4: The impact of direct access to telecom on the ability to earn more using the phone or save a certain expense that would have been incurred without the phone (mean response)

Firstly, a reason for this finding that access to telecom is not necessarily seen as increasing the earning and cost saving potential is perhaps because people at the BOP do not use phones *directly* for business purposes (such as purchasing supplies, etc), as seen in the diary responses (Table 6 below), as well as in other studies (Zainudeen et al., 2005; Souter et. al, 2005). It appears that people may prefer other modes for their business communication, for example, Souter et al. (2005) found that face-to-face communication is 'overwhelmingly' the preferred mode for specific information relating to farming, business, education, and political or government matters. Perhaps changing historical and cultural factors in the region placing importance of face-to-face contact for business purposes may take time even though the benefits of using the phone instead seem theoretically more beneficial.

Table 6: Main purpose of calls (as a percent of all calls recorded in the sample)

	South Asia			Southeast Asia	
	Pakistan	India	Sri Lanka	Philippines	Thailand
Business	14%	14%	8%	15%	29%
Keep in touch with family/friends	82%	72%	65%	64%	70%
To check something or deliver message	4%	14%	27%	21%	2%
Base – total number of calls	16306	29748	6115	6467	16674

Another reason for this finding could be the relative importance of a barter economy at the BOP, whereby there is a large degree of overlap between family/friends and business contacts. As a result, the lines between economic transactions and social communications become blurred. For example, it may be implicit that one's brother looks after you when times are hard and although your brother is effectively your insurer, one may not assign a positive economic value to a weekly call to 'keep in touch' with one's brother; instead, one may only see it for the direct cost that is incurred. This is evident in the vast majority who stated that having access to the phone has enhanced their family and social relations, discussed later in this section.

A third reason for the relatively lower perception of economic benefits vis-à-vis efficiency benefits due to telecom ownership could be high perceptions of the cost of service; this could be the case in Sri Lanka, where startlingly, a quarter of phone owners felt that having access to a telephone had in fact worsened their ability to increase their incomes or make savings. Here, phone owners may feel that the cost of service (may or may not be actual) is greater than the benefits gained, thus leaving a net cost. For instance in Sri Lanka, the worst performer on this count, it was found that perceptions of how much it costs to make a call were higher than in other countries. Moreover, Sri Lanka is the only country among the five not to have a Calling Party Pays (CPP) regime, in that in Sri Lanka receiving a call on a mobile phone also attracts a charge.

Notwithstanding the above we find that in India, Pakistan and the Philippines, for example, more than 60 percent of those engaged in agriculture feel that access to telecom improves

both the efficiency of their daily activities as well as improving their ability to earn or save more, reinforcing the findings of Jensen, (2007), Akers (2008) and Ratnadiwakara (2008) discussed earlier. This goes to show that not only the cost, but also the availability of relevant information (for instance agricultural prices via phone and SMS etc.) perhaps plays an important role in translating efficiency gains in to financial gains.

Furthermore, a reason for the 'disconnect' could be the mere fact that there is a limited group within society who make direct earnings by using a phone, i.e., those that sell minutes and those that use the phone to sell their product or service; these are the kinds that are most likely to see a connection between the telephone and their earnings, if any.

The relevant point is that the efficiency gains that are created via greater access to telephony at the BOP are not necessarily seen as translating in to poverty alleviation through greater direct income generating potential. As discussed here there are a number of reasons for this outcome.

Besides the above impacts, the study also considered the impacts of access to telecoms in enhancing family and social relations; status and also in acting in an emergency.

Phone owners by and large testified that access to a phone can enhance their family and social relations (seen in Figure 5, as well as Table 6). This finding concurs with much of the existing research in the developing world; Souter et al (2005) find a highly important use of the phone in Gujarat (India), Mozambique and Tanzania is for 'social' purposes, such as maintaining contact with family. A separate study conducted in South Africa and Tanzania found that the benefits from mobile phones for communities include 'improved relationships' according to almost four fifths of those surveyed (Vodafone, 2005). A pilot study to the one under discussion in 11 localities in India and Sri Lanka found similar levels of use of the phone for 'keeping in touch' (Zainudeen, Samarajiva and Abeysuriya, 2005). Furthermore, early research carried out by Keller (1977) and Noble (1987), into the 'uses and gratifications' of conventional telephone use found social or relationship maintenance uses to be more prevalent than utilitarian, or instrumental uses. [23]

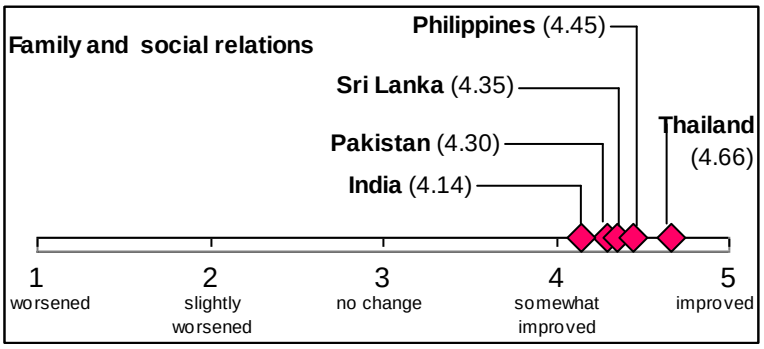

Figure 5: The impact of direct access to telecom on family and social relations (mean response)

The qualitative findings reinforced this sentiment, with many citing the importance of phones in maintaining relationships, building up new ones, and feeling connected to loved ones, as well as the outside world.

Except for Sri Lanka, around two-thirds of all telephone owners in the five countries seemed to feel that ownership of a telephone has enhanced their social status and recognition in their community; in Sri Lanka, just over one third feel this way. Similar results were seen by Zainudeen et al (2005), with a much weaker concern for the symbolic aspects (i.e., fashionability and improved social status) in Sri Lanka than in India, while Skuse & Cousins, (2008) report of South African mobile users using their mobiles to convey certain signals pertaining to their social status.

[23] Cited in Wei and Lo, 2006; p.56

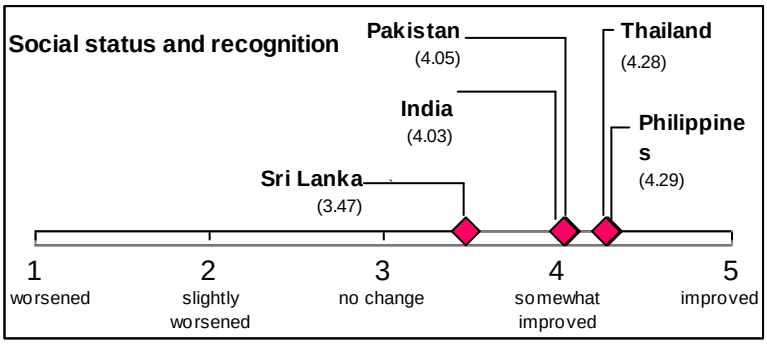

Figure 6: The impact of direct access to telecom on social status and recognition (mean response)

Even though not necessarily a direct positive relationship between owning a telephone and higher social status, it was found in the qualitative studies that in all countries, most feel that the fact that phones, in particular mobile phones are more accessible to people of all socio-economic backgrounds helps in reducing the 'gap' between the rich and the poor leading to a feeling of 'upliftment' among the poor. This finding perhaps has a lot more qualitative meaning in the inequality and poverty debate through social inclusion type arguments than can be established in this mainly quantitative study.

The biggest and most widespread impact of access to telephones at the BOP was in creating a sense of security; the ability to act in an emergency. The ability to contact someone or even get help in the event of conflict, illness or death or even a broken bicycle (cited by participants in the qualitative studies) for example is an important benefit of access. Souter et al. (2005) similarly found the most important use of phones in a study of the impact of telecom on rural livelihoods in India, Mozambique and Tanzania. This is intuitive, given the very nature of a telephone allowing instantaneous communication regardless of distance, most crucial during an emergency. One has to be careful though, in comparing this set of findings with tthose relating to Figure 5. Even if just one call is made for some emergency purpose (as opposed to many calls for social purposes over the same time period), the value of that one call could well be many times more than all the social calls put together.

As one might expect, elders tended to see more of a benefit, with the mean response for those aged 56 and over being significantly higher than that of the other age groups. The benefits of telecom, especially mobiles can also be seen in disaster management, from warning through response and recovery stages (Samarajiva, Knight-John, Anderson and Zainudeen, 2005).

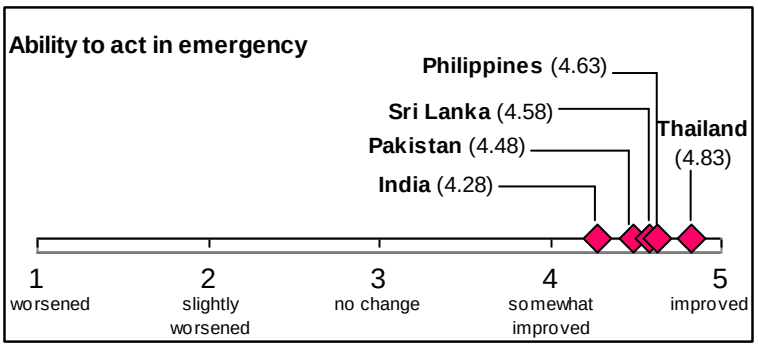

Figure 7: The impact of direct access to telecom on the ability to communicate in an emergency (mean response)

It emerged strongly from the qualitative studies that in Pakistan, the only predominantly Muslim country in the group where women are less independent and more home-oriented,

that access to a telephone helped women at home contact men in times of emergency making them feel much more secure.

5.0 Price Elasticity of Demand

One of the biggest problems in estimating price elasticity of demand (PED) for telecom services in developing country situations is the lack of accurate usage data. Unlike in developed countries where usage is easiliy obtainable from monthly bills for post-paid connections, the vast majority in developing countries, in the case of the current study in excess of 95 percent in all countries at the BOP have no billing records. The majority of them (59 percent) use commercial phones or other people's phones while about half of those who actually own phones have pre-paid connections (i.e. almost all mobile phone users) which do not generate any use records. Given recall data is of hardly any use in calculating elasticity, many studies in the past have relied on willingness-to-pay techniques to estimate PED. Here the problem is with respondents estimating per call willingness and not the actual number of calls made in a given situation. In this background we used both a willingness to pay and a diary technique as explained in the methodology section of this paper to estimate PED.

Milne (2006) provides a very intuitive argument for a changing structure of price elasticity in a hypothetical case. She argues that when phones become available for the first time in a low income community (this can be extended to the BOP) and usage charges or tariffs are relatively high (in terms of income) people will make limited number of essential calls. In such a scenario, even if the prices fall by a small amount the number of such calls; for instance in an emergency or substituting a telephone call for a bus ride to a city, will not increase by much. In other words PED will be relatively low (much less than -1). But, as prices fall and in a much cheaper service environment, she argues that people will start using the phone for many non-essential purposes; ranging from relationship maintenance and simple conveniences. Added to this, innovations in the marketplace that enable poorer people to purchase small denomination pre-paid calling cards to make phone calls with spending a few extra units of currency, it is intuitive that the number of calls made will improve significantly. Milne argues that when this happens, PED will rapidly rise towards -1 or even more than -1. In this context, it is interesting to consider the PED estimates this study has been able to generate. We shall only consider the case for Sri Lanka in this paper.

Here we assess the PED in the five countries through the responses to willingness to pay questions about how the user would change his/her demand for telecommunication services if the price changed by different amounts; then we estimate the price elasticity of demand for the Sri Lankan BOP using a Generalized Linear Model to confirm the general findings.[24]

In general we find that the demand for phone calls among BOP phone owners is inelastic. More than 70% of BOP phone owners in all five countries said that, if the cost of using the phone is halved, their phone usage increase would be less than the percentage decrease in the price or would not change at all.

[24] The same analysis could not be performed for the other four countries due to the non-availability of tariff structures for the other countries

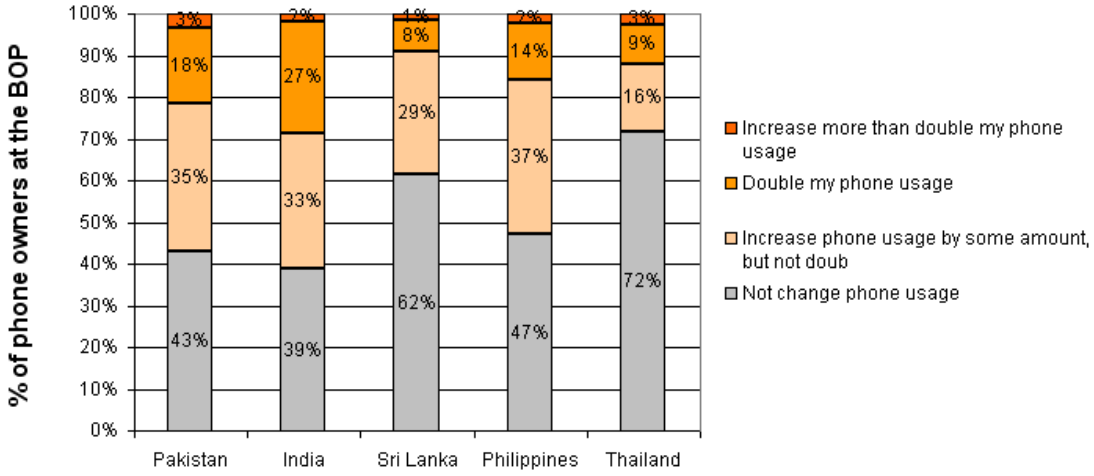

Figure 8: Change in phone usage if cost of using the phone is halved

When price increases are considered, the BOP appeared to be more responsive However, the majority of BOP phone owners in Pakistan, India, Sri Lanka and Philippines would not change their phone usage or would reduce by a percentage less than the percentage increase in the price. In Thailand, however, 56% said that their reduction of phone usage would be more than or equal to the percentage increase in cost.

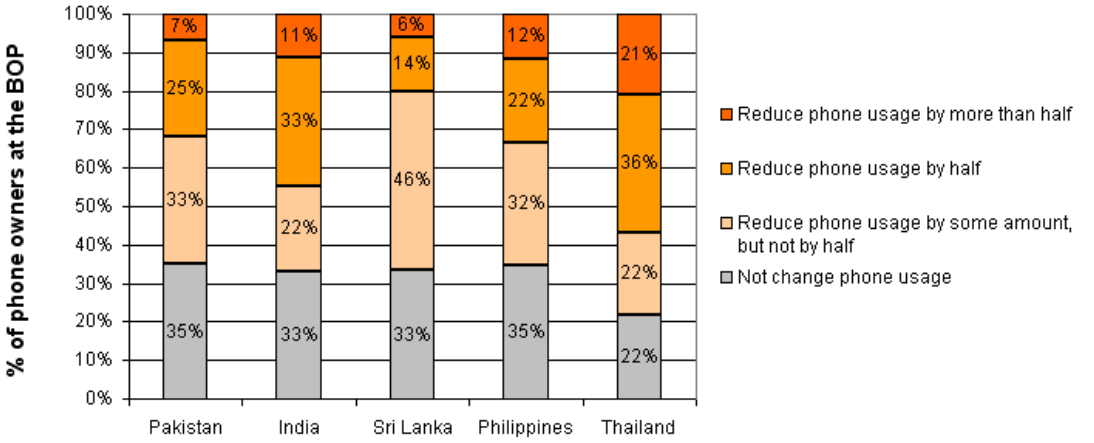

Figure 9: Change in phone usage if cost of using the phone is doubled

Statistical analysis of calls made (outgoing) for the purpose of 'keeping in touch', or social calls using a Generalized Linear Model also confirmed the inelastic nature of the demand for phone calls for Sri Lanka.[25]

A Generalized Linear Model was chosen because the data was not normally distributed. In fact, as can be seen from the following figure, the data follows a Poisson distribution with a mean of 1.86 calls for the two week period.

[25] The same analysis could not be performed for the other four countries due to the non-availability of tariff structures for the other countries

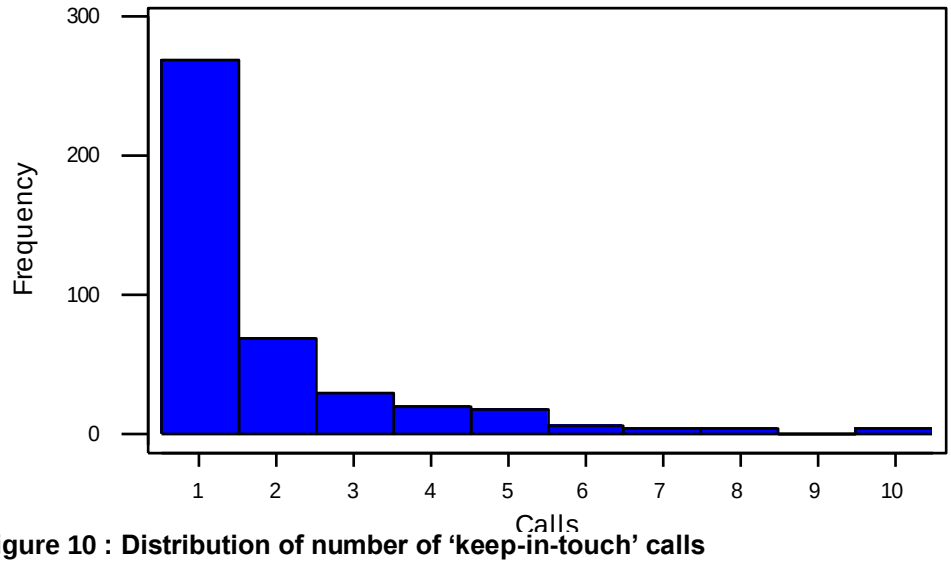

Figure 10 : Distribution of number of 'keep-in-touch' calls

The Generalized Linear Model is an extension of the General Linear Model to include response variables that follow any probability distribution in the exponential family of distributions and hence the number of calls would be appropriately analyzed as a Poisson random variable within the context of the Generalized Linear Model.

The Generalized Linear Model generated for this data set is as follows

$$\text{Ln}(\text{Mean No of calls made}) = 0.4979 - 0.0209(\text{Actual price}) + 0.0274\sqrt{(\text{Monthly HH income})}$$

This implies that, given all other factors constant, if the price per minute increases from the current level by one Rupee (LKR) the number of calls made will decrease by 2.1% in the price range of 0 to 20 Rupees per minute. That is, the Price Elasticity of demand for outgoing social calls at the BOP in Sri Lanka is - 0.15 at the average price of 7 Rupees per minute.

This estimate leads to the conclusion that small changes in prices may not have very significant increases in the usage pattern.

The preceding scenario is fairly reflective of Milne's (2006) explanation. The BOP in Sri Lanka seems to be in the middle of the transformation of moving from a low PED environment to one that is much higher. The mean number of calls made in the sample where diaries were placed was 11.6 for a two week period. While the actual amounts paid to make a phone call being usually higher than the list prices due to 55 percent using commercial and other peoples' (outside the household) to make their calls within this low income group could be contributing to the limitation of number calls made, the availability of very low denomination calling cards and innovations such as 'any amount reload' is perhaps relaxing that limitation somewhat. But, the fact remains that the number of calls placed is still fairly low.

Another supporting argument for the above outcome is to consider the impacts of direct access to a phone as perceived by the BOP in Sri Lanka. At the top is the possibility to make an emergency call (4.6 out of 5.0). The impact on creating efficiencies in daily activities (say substitute a bus journey to town by a phone call) was also fairly high at 4.0/5.0. These kinds of essential uses cannot by themselves generate high number of calls and is being reflected in the low elasticity and the limited number of calls. On the other hand the high impact of access on family and social relations (4.4/5.0) could be working towards higher PED and greater number of calls.

6.0 Concluding remarks

This study finds that almost everyone at the bottom of the pyramid in Pakistan, India, Sri Lanka, Philippines and Thailand have access to telecommunication services without having to spend any significant amount of time or money in getting to a telephone. Another way of interpreting this finding is that there appears to be universal access at the BOP in these countries, bringing to the forefront the validity of the argument of the existence of any significant inequality in access. However the gap between those who use telecom services and those who actually own a telecom device is extensive indicating a vast potential for greater ownership of telephones in the region. This potential could be as high as 150 million new connections between mid-2006 and mid-2008, given policy makers and operators could make such connections and use thereafter affordable.

Telephone ownership is perceived to provide large benefits in providing a sense of security in terms of acting in an emergency and in maintaining social relationships, as compared to benefiting financially though the potential for greater income earning ability and saving costs at the BOP. While the necessary condition for such is by and large met in terms of access improving efficiencies in daily activities, the problem seems to lie in the perceptions of meeting the sufficient condition of the net benefit of such efficiency gains being fulfilled. This being said, caution should be taken in interpreting the results as one aspect being more important than the other.

High prices, both perceived and actual (due to use of commercial and other people's phones) appear to be a considerable hindrance for users at the BOP, preventing phone owners (and in the same spirit, probably non-owning users) from availing of the net benefits of access. In Sri Lanka, where prices were found to be a particular issue, part of this could be explained by the Receiving Party Pays (RPP) regime in place, whereby both the caller and the callee incur charges for every call on a mobile phone.[26] Given that Sri Lanka is the only country out of the five who subscribe to this regime, it could be an explanation for the higher price perceptions, the sentiment that telecom access has worsened their economic capabilities as well as the low price elasticity of demand,[27] However, comparable estimates for the remaining four countries would be needed to ascertain this attribution.

Another equally or even more important issue is the inability at the BOP to clearly identify the link between efficiency gains and its transmission in to potential for greater income generation and/or cost saving. For instance, users at the BOP do not seem to see how instant access to important information might be helpful in making decisions that could enhance one's earning capacity or how gaining an hour (otherwise spent personally conveying a message by foot) could help reduce transactions costs. Telecom operators perhaps could change such perceptions through marketing campaigns and drawing attention to the fact that saving an hour could contribute to one's income, directly or indirectly.

These two issues will have to be tackled by both policy makers and telephone operators alike using their own comparative advantages to arrive at a win-win solution for all: fight poverty through growth and run profitable telecommunication companies.

Further investigation into this area could help understand the dynamics of the relationship between telecom access and income at the household level. Telephones alone will never be the silver bullet which brings the hundreds of millions of people out of poverty in emerging Asia, but the almost-universal access will most certainly aid in that process together with other supporting policies.

[26] Although as a means to get around this, most mobile operators allow varying numbers of minutes of 'free incoming' calls on different packages.

[27] In addition to the low usage and the preference for fixed phones seen in the data, but not reported in this paper

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Annex 1: Country-wise Quantitative sample composition

Table A1. Quantitative sample composition for Pakistan

Province	Urban	Rural	Total
Punjab	430	456	886
Sindh	300	168	468
NWFP	100	168	268
Baluchistan	70	120	190
Total	900	912	1812

Table A2. Quantitative sample composition for India

Region	State	Total Sample	Sample (SEC DE)				Sample (SEC ABC)
			Urban		Rural		
			Male	Female	Male	Female	
North	Uttar Pradesh	400	35	30	130	125	80
	Haryana	400	50	45	115	110	80
West	Rajasthan	400	40	40	120	120	80
	Gujarat	400	55	55	105	105	80
East	Bihar	400	15	15	145	145	80
	West Bengal	400	50	45	115	110	80
South	Tamil Nadu	400	75	70	90	85	80
	Karnataka	400	55	55	105	105	80
North East	Assam	400	25	25	135	135	80
	Arunanchal Pradesh	400	35	30	130	125	80
Total		4000	435	410	1190	1165	800

Table A3. Quantitative sample composition for Sri Lanka

Province	Urban	Rural	Total
Western	85	200	285
Central	20	140	160
Southern	20	125	145
North Western	20	115	135
North Central	15	70	85
Uva	20	85	105
Sabaragamuwa	20	115	135
Total	200	850	1050

SEC Split	ABC	250
	DE	800
	Total	1050

Table A4. Quantitative sample composition for Philippines

SEC	Total	Urban = 54 %	Rural = 46 %
ABC	100	54	46
DE	1000	540	460
TOTAL	1100	594	506

Areas covered: The study covered Metro Manila, Luzon, Visayas, Mindanao.

Table A5. Quantitative sample composition for Thailand

For the upcountry area, the study was conducted in four regions namely North, Northeast, Central and South. Two key provinces were selected to represent the regions

SEC	Upcountry Urban	Upcountry Rural	Total
Upper (AB)	50	50	100
Middle (C)	50	50	100
Low (DE)	250	250	500
Total	350	350	700