Are the poor stuck in voice?

Conditions for adoption of more-than-voice mobile services[1]

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Abstract

Mobile phone access is widespread in Asia; voice connectivity has been achieved for the most part through intense competition, with prices being driven down to almost unsustainable levels. Against the backdrop of intense competition, new services and applications such as price information alerts, news alerts, as well as the set of applications under the mobile money umbrella, in addition to mobile Internet services may provide new revenue areas for operators, but also a way to reduce churn. They also offer a way to get information and services to customers at the bottom of the pyramid with lower transaction costs. This paper examines the use of such "more-than-voice" services among telecom users at the bottom of the pyramid in emerging Asia. Through a logistical regression model, it attempts to understand what factors can predict their use, in order to inform operators on how they can better serve these markets, and how policymakers can assist with policies which will favor greater access.

Keywords: *Access, Applications, Consumer, Demand, more-than-voice*

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Introduction

Globally, mobile phone connections overtook fixed phone connections in 2002. Recent research has shown that mobile phone access is widespread in the emerging Asian region. The ratio of mobile SIMs to fixed connections in India was 9.2:1 in 2008; this ratio was even high as 19.9:1 in Pakistan and 33.2:1 in Bangladesh, two other significant markets within the region (ITU, 2010). Even among low income earners within these markets, more than 90 percent of phone connections are mobile (LIRNE*asia*, 2009a).

New business models (Samarajiva, 2010) have evolved in these markets to survive the intense competition which has driven voice prices down to unprecedented levels (LIRNE*asia*, 2009b; Nokia, 2009) allowing many low income earners from the bottom of the pyramid (BOP) to get and stay connected.

Against the backdrop of intense competition, new services and applications such as price information services, news alerts, as well as the set of applications under the mobile money umbrella (banking, payments, remittances, etc), may provide new revenue areas for operators, but also a way to reduce churn.

Recent research has shown that mobile use to a large extent is constituted by voice, SMS and missed calls) at the BOP. However, a small, but not insignificant, share of mobile users are already using services *more-than-voice* (LIRNE*asia*, 2009a). Such services are still relatively new, and mostly positioned to serve the higher spending

segments of the markets.[4] However, even if the BOP use them in small amounts, aggregated demand could be large.

Many BOP consumers, especially in the developing world, will have their first experience with the Internet (or elements of it: information retrieval, payments, remote computing) through a mobile, rather than conventional desktop computer route (Samarajiva, 2009; Nokia, 2010).[5] This may be in the form of "conventional" Internet browsing, or through the kinds of more-than-voice services and applications mentioned above (Samarajiva, 2009).

However, beyond a handful of studies on mobile applications (e.g., Bhatnagar, 2010; Lokanathan and de Silva, 2010; Sirasoontorn, 2010; Zainudeen, Samarajiva and Sivapragasam, 2010) and mobile Internet use (e.g., Chigona, et al., 2009; Gitau, et al., 2010; Kreutzer, 2009) little is known about the actual use of mobiles for more-than-voice in these populations.

This paper will investigate awareness and use of such *more-than-voice* services among BOP mobile phone users (those belonging to socio-economic classification groups D and E, corresponding roughly to those earning less than USD 2 day; see Zainudeen, 2009; p.4). The paper will draw from a data set of 9,540 BOP telecom users in six emerging Asian countries (Bangladesh, India, Pakistan, Philippines, Sri Lanka and Thailand). Through logistic regression, it will model the adoption of such services among mobile users to understand what affects these users. The paper will also look at the barriers to service uptake, based on further qualitative research conducted in the same

[4] With exceptions such as CellBazaar in Bangladesh (Zainudeen, Samarajiva and Sivapragasam, 2010) and BuzzCity's myGamma in Singapore, India and Thailand (Sirasoontorn, 2010).

[5] Indeed, by 2010 India was second only to the USA in mobile Internet use, according to a study reported by Nokia (2010)

countries. The findings will be used to understand and draw recommendations on how operators can better serve these markets, and on how policymakers can facilitate greater access.

Theoretical background

Much of the literature on technology adoption can be divided into three "schools of thought" (Pederson and Ling, 2002): the diffusion, adoption and domestication schools of thought. "Diffusion" research broadly describes the "S-shaped function" (Rogers, 1962), the pattern by which technologies are typically adopted by a group of people over time; according to this, different categories of adopters can be classified (innovators, early adopters, early majority, late majority and laggards). "Adoption" research focuses on the decision to adopt and tries to explain the different factors which influence that decision at an individual level; several models have evolved over time, which are briefly discussed below. "Domestication" research typically tries to understand how ICTs are "domesticated" when brought into the home (Silverstone et al., 1992).

This paper fits within the adoption school in analyzing the adoption of mobile services more-than-voice at the BOP. The widely applied technology adoption models have mostly evolved from the Theory of Reasoned Action (TRA), originally postulated by Fishbein and Azjen (1975). The TRA explains adoption decisions (or more specifically behavioral intentions) as being influenced by attitudes and social norms. Several applications have led to the extension of the TRA to include additional factors which have been seen as influencing the adoption decision.

The theory of planned behavior (TPB) is one such extension, where perceived behavioral control is factored in (Azjen, 1985). The technology acceptance model (TAM) goes another step further, to include the perceived usefulness and perceived ease of use of the technology as determinants of technology adoption (Davis, 1989). The unified theory of acceptance and use of technology (UTAUT) factors in social influences, in addition to mediating factors such as gender, age, etc. (Venkatesh et al., 2003). UTAUT combines elements from the most widely used models.

Pedersen and Ling (2002) distinguish between studies on the adoption of mobile terminals versus the actual services, noting that little attention has been paid to the latter. They add that nevertheless, learnings from the former can no doubt inform the latter, an argument that this paper also supports. Furthermore, within service-oriented studies, focus has been on adoption of basic services (voice and SMS) rather than "the kind of complex and integrating services that will be typical of 3G services like e.g. mobile commerce services" (p.4).

Data and Descriptive Statistics

This paper is based on data from a multi-country study of ICT use at the "bottom of the pyramid" (BOP) in emerging Asia conducted by LIRNEasia. The study was conducted in 2008 and 2009 among those who had used a telephone (not necessarily owned) to make or receive voice calls in the previous three months[6] in Bangladesh, India, Pakistan, the Philippines, Sri Lanka and Thailand.

[6] Phone use in the previous three months included making or receiving a telephone call (but not SMS) on any phone whether owned or not.

The BOP was defined as the two lowest socioeconomic groups (SEC),[7] D and E, with the exception of the Philippines, where only SEC group E was considered.[8]

The quantitative component comprised 9,540 face-to-face interviews among those who had used a telephone (not necessarily owned) in the previous three months.[9] 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.

With the exception of India (where the majority of states were covered) all regions of each country were covered. Multi-stage stratified random sampling was undertaken, whereby primary sampling units (regions) were randomly selected. Within each selected region urban and rural centers were randomly selected. Within selected urban and rural centers, a common place such as a road, park or hospital was designated as the starting point for contacting households using either the right-hand-rule or the left-hand-rule. A fixed number of interviews were conducted around each starting point. The number of starting points selected from each centre was determined in proportion to the population of the selected centre. After a completed interview, three[10] houses were skipped in urban areas[11] to minimize neighborhood bias in the sample.

[7] SEC categorizes people in to groups A to E based on the education and occupational (as well as a few other parameters in certain countries) of the chief wage earner of the household. SEC is closely correlated to an income level of around USD 2 a day in five of the six countries studied, thereby allowing for cross-country comparisons. SEC was used to define the BOP rather than income levels due to the problems generated by spatial and temporal cost of living adjustments, which would make cross-country comparisons difficult. In addition, problems of over or under reporting could affect the correct classification of BOP respondents.

[8] The SEC D and E population of the Philippines constitutes 92 percent of the population, whereas the SEC E population, constitutes 38 percent, corresponding with the population living on USD 2 per day.

[9] Phone use in the previous three months included making or receiving a telephone call (but not SMS) on any phone whether owned or not.

[10] 4 in India

[11] Due to the large distances between houses in some rural areas, the skipping procedure was not followed; instead the next house was visited.

One respondent was selected per household; in households with more than one eligible respondent, the Kish grid (random number chart) was used to randomly select the respondent. Within each country, data was weighted by gender, province group (or zone) and urban rural proportions to correct over- or under-sampling in certain areas and socioeconomic groups. An overview of the sample size and composition is given in Table 1.

Table 1: Sample Size and Composition

	Respondents	Margin of error @ 95% CL (%)
Bangladesh	2,050	2.8%
Pakistan[12]	1,814	2.3%
India	3,152	1.7%
Sri Lanka[13]	924	3.3%
Philippines[14]	800	3.1%
Thailand[15]	800	3.5%
Total	9,540	

A survey was administered among selected respondents, with general ICT access and ownership questions, and more detailed questions on mobile usage, including awareness and use of Mobile2.0 services, and use of mobile Internet services.

All respondents were asked whether they were aware that the following kinds of Mobile2.0 service may be accessed through telephones or computers; the responses are summarized in Table 2:

1. Banking and financial
2. Payments
3. Government (local, state or central)
4. Health
5. Participation in competitions, polls, or other live TV/radio programs
6. General information

[12] Excludes tribal regions
[13] Excludes conflict regions
[14] Excludes SEC D
[15] Sample excludes Bangkok because the SEC D and E population in Bangkok is small

7. Agricultural/fisheries information

Awareness of services was below 20 percent in the three lower mobile penetration countries (Bangladesh, Pakistan and India), while it was closer to two thirds in the three higher penetration countries (Sri Lanka, Philippines and Thailand) in the study.

Those that answered positively were then asked whether they actually used such services (either regularly or not). All respondents were also asked whether they have used the Internet and from where (a computer or mobile). For the purpose of this paper, we therefore considered as those who use at least one of the Mobile2.0 services[16] or had used the Internet via a mobile phone as "more-than-voice users". Table 3 shows that usage of the individual Mobile2.0 services among the BOP in the six countries was on the whole not very high, and further that it was still in its nascent stages in the three low penetration countries; mobile Internet use followed a similar pattern. Given the low bases in the three low penetration countries, the logistic regression analysis that follows only considers the higher usage countries (Sri Lanka, the Philippines and Thailand), in order to understand the factors relating to more-than-voice usage at the BOP. Table 4 provides a breakdown of the country and total samples among three kinds of more-thanbey-voice users: those who use Mobile2.0 services only, and those who use both mobile Internet and Mobile2.0 services; and those who don't use any more-than-voice services.

Table 2: Awareness of Mobile2.0 and Internet Services (% of BOP Teleusers)

	Bangladesh (n=2,050)	Pakistan (n=1,814)	India (n=3,152)	Sri Lanka (n=924)	Philippines (n=800)	Thailand (n=800)	Total sample (n= 9,540)
Banking and financial	6	7	3	34	23	23	11
Payments	4	11	2	29	41	25	12

[16] Either on a regular basis or not.

Government (local, state or central)	3	5	2	35	24	9	8
Health	9	8	4	37	19	9	11
Participation in competitions, polls, or other live TV/radio programs	7	10	10	59	51	48	21
General information	1	9	3	39	18	41	12
Agricultural / fisheries information	4	4	1	21	13	6	6
One or more Mobile2.0 services	13	18	15	68	64	58	28
Internet (in general)	44	43	37	77	90	80	44

Source: Teleuse@BOP3 survey data

Table 3: Use of Mobile2.0 Services (% of BOP teleusers who are aware of services)

	Bangladesh (n=262)	Pakistan (n=328)	India (n=466)	Sri Lanka (n=632)	Philippines (n=511)	Thailand (n=462)	Total sample (n= 2,660)
Banking and financial	6	12	18	6	7	15	10
Payments	9	20	16	12	11	23	15
Government (local, state or central)	7	8	4	8	8	2	7
Health	11	9	16	22	6	17	15
Participation in competitions, polls, or other live TV/radio programs	4	7	12	9	14	19	12
General information		17	17	8	11	37	20
Agricultural / fisheries information	5	7	4	3	7	7	5
One or more Mobile2.0 services	9	21	18	26	17	36	22
Internet via mobile phone	0	1	0	2	12	6	4

Source: Teleuse@BOP3 survey data

Table 4: Use of More than Voice Services

	Mobile2.0 service use only	Mobile 2.0 and mobile Internet use	Non-users	Total sample
Sri Lanka	120	25	779	924
Philippines	1	62	737	800

Thailand	81	104	615	800
Total	202	191	2,131	2,524

Source: Teleuse@BOP3 survey data

Table 5 summarizes the profiles of more-than-voice users in the three countries under consideration.[17] The Chi-Square value given in the table indicates where there are significant associations between the concerned variable and more-than-voice use. The significance level established in Chi-square significance tests, with probability of 0.05 or less, is commonly interpreted as the justification for rejecting the null hypothesis that variables are not related in some way.

The data shows that more-than-voice users at the BOP in Sri Lanka, Philippines and Thailand are likely to:

- Be mobile phone owners (as against non-owner users)
- Have a relatively higher level of education
- Belong to a upper level socio-economic classification group (SEC D)
- Have a television in the household
- Have owned a mobile phone for a longer period
- Have a more connected social network (i.e., a higher share of their top five contacts own phones)
- Have paid a relatively higher amount to purchase their mobile handset
- Have access to electricity in the household
- Be younger; and
- Have used the Internet in the past either through a mobile or a computer

Table 5: Characteristics of More-than-Voice Services Users in Sri Lanka, the Philippines and Thailand

	% using more-than-voice services	Sample Size	Pearson Chi-Square	P - Value	Significance of the difference
Mobile phone ownership					
Own	19.0%	1,608	40.334	0.000	Significant at 99.9%

[17] Table A1 in the Appendices provides a country-wise break-down of the Pearson Chi squared significance test results.

Don’t own	9.5%	916			
Gender					
Male	14.8%	1,262	1.088	0.297	Not significant
Female	16.3%	1,262			
Education					
Secondary or lower	14.3%	2,211	20.623	0.000	Significant at 99.9%
Higher than secondary	24.3%	313			
Urban/rural					
Urban	15.6%	1,188	0.000	0.998	Not Significant
Rural	15.6%	1,336			
Socio-economic classification group					
SEC D	21.8%	1,213	69.974	0.000	Significant at 99.9%
SEC E	9.8%	1,311			
TV in household					
Yes	16.4%	2,279	12.607	0.000	Significant at 99.9%
No	7.8%	245			
Duration (in months) of mobile ownership					
Less than 6 months	9.7%	1,064	48.542	0.000	Significant at 99.9%
More than 6 months	19.9%	1,460			
Number of top five contacts that own a phone					
0	0.0%	7	46.613	0.000	Significant at 99.9%
1	5.6%	177			
2	8.8%	294			
3	12.5%	393			
4	12.4%	217			
5	19.6%	1,436			
Access to electricity in household					
Yes	15.9%	2,379	4.095	0.043	Significant at 95%
No	9.7%	145			
Age					
15-24	20.9%	762	42.223	0.000	Significant at 99.9%
25-34	16.9%	724			
35-49	12.7%	731			
50-60	6.2%	307			
Employed					
Yes	14.3%	1,473	4.178	0.410	Not Significant
No	17.3%	1,051			
Internet access through computer and/or mobile					
Yes	39.5%	483	261.142	0.000	Significant at 99.9%
No	9.9%	2,041			
Average daily Income					
Less than USD 1 per day	16.3%	1,189	0.674	0.222	Not Significant

More than USD 1 per day	15.1%	1,303

Source: Authors

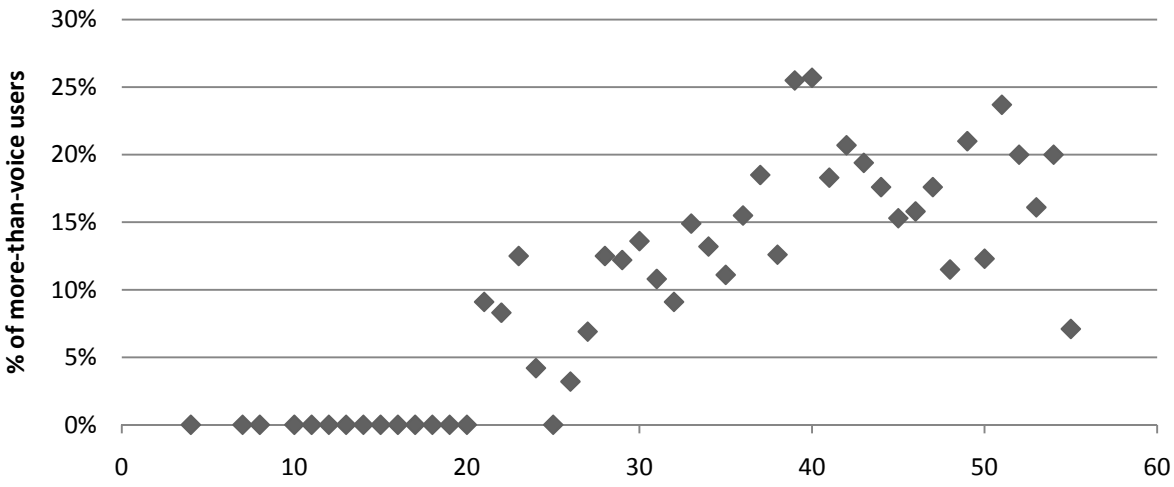
Respondents were also asked to rate on a five point scale how they perceived telephone access to have impacted twelve aspects[18] of their lives (where "one" indicated that access had worsened that particular aspect, and "five" indicated that access had improved it).

An index, ranging from 12 to 60 was created by adding the responses to each of above aspect. A higher value implies the respondent perceives more benefit in terms of the 12 aspects mentioned in using phones and vice versa.

Figure 1 illustrates the strong positive association between the perceived benefits and use of more-than-voice services at the BOP in the study countries. People who perceive higher levels of benefits of using phones have a higher tendency to use more-than-voice services. It is clear from the figure that when the Index value less than 20, no use of more-than-voice services is observed and gradual increase in more-than-voice service usage can be seen as the index value increases. Therefore this data are seen as a valid proxy for the "performance expectancy" postulated by UTAUT.

Figure 1: Scatter plot of Perceived benefits index for BOP more-than-voice service users in Sri Lanka, the Philippines and Thailand

[18] Ranging from economic benefits, to social benefits to emergency communication.



Model and findings

Based on the associations discussed in the previous section, in this section we present a statistical model that will help in understanding the nature of the relationship between an individual's characteristics and usage of more-than-voice services. Here we take individual's characteristics as independent variables and examine how these variables will explain the differences in more-than-voice service usage.

A logistic regression gives each independent variable a coefficient B_i which measures the predictor variable's contribution to variations in the dependent variable. The logistic model formula computes the probability of the selected response as a function of the values of the predictor variables.

To arrive at the probability, these coefficients should be applied to a logistic function. I.e., if each independent variable X_1, X_2, X_3, … X_n has respective coefficients of B_1,B_2, B_3, … B_n and a constant of B_0, the probability of the event of interest Y happening is given by:

$$P(Y) = \frac{1}{1 + e^{-\sum_{i=0}^{n} B_i X_i}}$$

From the each coefficient, a corresponding odds ratio is computed. The odds ratio is a way of presenting probability of an event. The odds of an event happening indicates the probability that the event will happen divided by the probability that the event will not happen.

The odds ratio implies for each unit increment of the independent variable, the odds of the concerned dependent variable (using more-than-voice services in this case) changes by a percentage of *Odds Ratio – 1*. For example, if the age variable has an odds ratio of 0.98, for each unit increase in age while fixing the value of other independent variables, the odds of using more-than-voice services falls by 2 percent.

The independent variables used in the model are explained in the Table 6 below. The output of the model can be seen in Table 7.

Table 6: Summary of Variable Information

Variable	Variable information
Age squared	Squared value of respondent's age
Gender	0 = male, 1= female
Ln (monthly personal income)	Natural log of respondent's monthly personal income
Secondary education	0 = no, 1= yes
Tertiary education	0 = no, 1= yes
Walk time to nearest town	Value in minutes; proxy for ruralness of respondent's location
Duration of mobile ownership	Number of months respondent has owned a mobile; 0 if non-owner
% of phone-owning contacts	% of closest five contacts who own a phone
Sum of perceived benefits	Index of perceived benefits ranging from 12-60
Handset cost	USD cost of the respondent's handset when purchased
Internet through computers	Use of the Internet via a computer; 0 = no, 1 = yes
Philippines	Country dummy for Philippines; 1 = respondent is from Philippines, 0 otherwise
Thailand	Country dummy for Thailand; 1 = respondent is from Thailand, 0 otherwise
Constant	Constant

Table 7: Logistic Regression Output

	Coeffi cient	Odds Ratio	Signific ance

Age squared	-0.001	0.999	0.09
Gender	-0.153	0.858	0.04
Secondary education	0.242	1.274	0.00
Tertiary education	0.391	1.478	0.00
Walk time to nearest town	-0.012	0.988	0.19
Duration of mobile ownership	0.013	1.013	0.02
% of phone-owning contacts	0.820	2.270	0.00
Sum of perceived benefits	0.078	1.081	0.00
Internet through computers	1.958	7.085	0.00
Philippines	-1.789	0.167	0.00
Thailand	-1.160	0.313	0.00
Constant	-6.340	0.000	0.00
n = 2524; Nagelkerke R Square: 0.354			

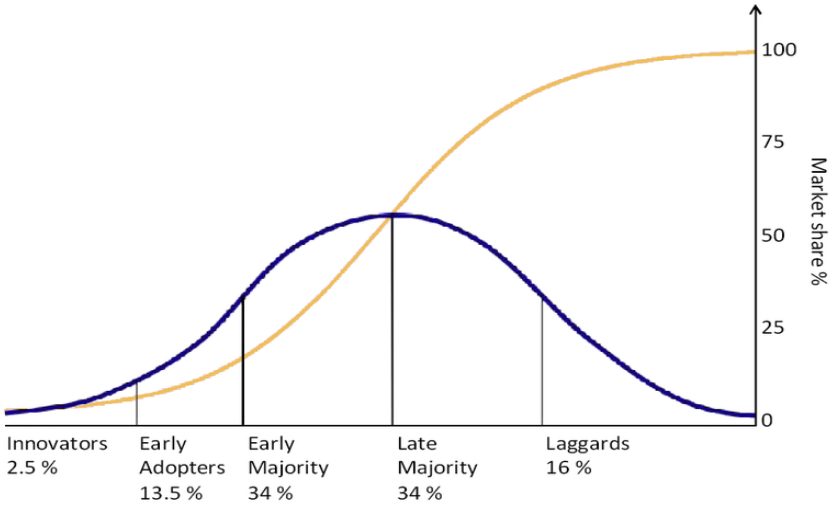
From this model we can observe that probability of using more-than-voice services decreases when the respondent is female, and increases with the respondent's level of education. Mobile owners, who have owned mobiles for longer durations are more likely to use more-than-voice services. The "connectedness" of the respondent's network (given by the percentage of the respondent's main five contacts that own phones), higher level of perceived benefits from using phones, having used the Internet from a computer all have positive impacts on the probability of more-than-voice services. The use of the Internet via a computer and the connectedness of the respondent's network have the greatest impacts. Age is a significant predictor of more-than-voice usage, though at a lower (90%) level of significance; younger respondents are more likely to adopt more-than-voice services. The measure of how rural the respondent's location is (the walk time to the nearest town) is not a significant predictor of more-than-voice use. Interestingly, the natural log of respondent's monthly personal income was not a significant variable, and thus does not appear in the logit output.

Discussion of findings

According to Rogers' classification, the BOP more-than-voice service adopters (as a percentage of the entire sample) that are considered in the analysis fall into the innovators, early adopter and the early majority categories of adopters (i.e., falling within the first 34% of adopters; Figure 2 and Table 8). The findings in Table 7 confirm that as expected (based on prior research and theory) they are among the younger in age and the more educated than current non-users, and were in fact among the earlier adopters of mobile phones too. Those who use the Internet through computers are more likely to take up more than voice services too, as would be expected.

Surprisingly the data did not find that higher income earners were more likely to use more-than-voice services than lower income earners at the BOP.

Figure 2: The diffusion of innovations according to Rogers[19] (1962)



Source: http://en.wikipedia.org/wiki/File:Diffusionofideas.PNG

Table 8: More than Voice Use (% of BOP Teleusers)[20]

[19] Successive groups of consumers adopting the new technology shown in blue; its market share shown in yellow will eventually reach the saturation level

	Sri Lanka (n=924)	Philippines (n=800)	Thailand (n=800)
***One or more* more-than-voice service**	16	8	23

Source: Teleuse@BOP3 survey data

Education can be considered a "facilitating condition" (Venkatesh et al.) for the adoption of new technology, and it is a significant predictor of the use of mobile services more-than-voice at the BOP in the study countries. It is expected that the duration of mobile ownership would proxy for some degree of technical efficacy (or the skills), as the latter would increase with the former; this is a significant factor in determining the probability of more-than-voice service usage. The significance of handset costs suggests that the BOP more-than-voice service users may be using more advanced handsets than non-users. The country variables are significant indicating that there are country-level effects impacting the probability of using more-than-voice services; Sri Lanka is used as a reference category and therefore its effects are captured in the respective constants. These country-level effects would include cultural factors, overall infrastructure levels, inter alia. The "walk-time to nearest town" variable would be expected to account for some infrastructural differences urban areas, therefore it is surprising that it does not have an impact on the uptake of more-than-voice services in this model. This indicates that rural BOP mobile users are as important a market segment as urban ones with respect to more-than-voice.

The connectedness of the respondent's social network also has an impact on more-than-voice service adoption; the social pressure or influence (also seen to affect the

[20] The percentages presented in this table differ from those presented in Table 3 due to the difference in the base of the respective tables.

decision to adopt a mobile phone among the respondents in the current study; de Silva et al., 2009) exerted by these networks is confirmed by the result of the model, consistent with the UTAUT model, indicating that social influence has an impact on the probability of using more-than-voice services. This is an important finding, which implies that even though it is the more educated segments, who are younger and have had greater experience with mobiles who will become more-than-voice users first, social influence will ensure that those in their networks – some of which will include those in the lower tiers – similarly become users; the social influence among those new users will in turn lead to those within their networks to become connected, and so on. Social influence is thus an important channel through which the rest of the BOP can be carried into the market. Therefore group or "affinity" marketing strategies (through group discounts, etc) are likely to be useful ways of increasing service diffusion.

This being said, it is important to also understand the barriers to greater use/adoption; further qualitative investigation shows that most non-users either feel that such services are not applicable to them, or they simply don't know how to use them. In addition, many feel that the pricing of these services is too high; most of their prepaid credit had been eaten up when trying to access these services. Those that are aware of these services report that they do not use these services as the same content can be obtained through cheaper alternatives (e.g., news or weather updates via TV or even word of mouth). Innovations in pricing strategies (akin to "sachet pricing") are needed to enable prepaid users to make use of the services without their prepaid balance being depleted through a single transaction.

Conclusions

Evidence that the developing world is connecting to the Internet through mobiles is mounting. The mobile phone offers an increasingly ubiquitous way to deliver information and services as well as transact with the BOP. Though use of such services at the BOP in emerging Asia is currently low, it is expected to grow with increasing service affordability and uptake of data-enabled mobile phones as well as mobile broadband connections.

This paper examines the factors affecting the adoption (or usage) of more-than-voice services, among BOP teleusers in emerging Asia. Awareness and use of these services in Bangladesh, Pakistan and India is seen to be very low. Awareness of such services was seen to be relatively high in Sri Lanka, the Philippines and Thailand, however use was seen to be low, particularly regular use.

While it is apparent that it is the younger, more educated, more experienced segments which are likely to become users first, the impact of social influence is important. This will be an important channel through which many current non-users at the BOP may be brought into the market, given appropriate pricing strategies which take into account the irregular income patterns among the poor need to be developed also.

The paper also showed that the poorer segments of the BOP and the rural BOP are as likely to use more than voice services than the less poor and urban segments, respectively. This shows that the market is beginning to find ways to overcome the barriers or transaction costs of providing services *beyond* voice to these previously under-served segments. It suggests that the budget telecom network model (Samarajiva, 2009),

which evolved among several South Asian mobile operators in 2007, may already be being extended into other services.

This being said, the furthering of more-than-voice service uptake and expansion will no doubt be enhanced by a conducive policy and regulatory environment (e.g., proper licensing and spectrum management, clear policies on mobile payment services, etc.).

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Appendix 1

Table A1: Country-wise Indication of Pearson Chi-squared Significance Test Results Presented in Table 4

	Sri Lanka	Philippines	Thailand
Mobile phone ownership	++	++	++
Gender	-	+	+
Education	++	+	+
Urban/rural	-	-	++
Socio-economic classification group	+	NA	++
TV in household	-	-	+
Duration (in months) of mobile ownership	++	+	++
Number of top five contacts that own a phone	++	++	++
Access to electricity in household	-	-	-
Age	++	-	++
Employed	+	-	+
Internet access through computer and/or mobile	++	++	++
Daily Income	-	-	+

Note: ++ Differences significant at 95%; + differences significant at 90%; - difference not significant.

Table A2: Variables tested and found to be insignificant

Variable	Remarks
Access to electricity	0 = no, 1= yes
Television in the household	0 = no, 1= yes