# Can voice services alone uplift the Bottom of the Pyramid? *How awareness and usage of VAS in M-phones help the BOP to elevate their social status*

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*Abstract:* *This paper considers the drivers of moving from awareness to use of more-than-voice services in five countries using data from LIRNEasia's Teleuse at BOP4, a large survey conducted in 2011 and to compare and contrast the same across countries to see how country differences maybe impacting on this process. In the analysis Thailand is not considered. The paper reflects the relationship between awareness, usage and impact of usage of more than voice services.*

*Key Words:* *mobile telecommunication, BOP, mobile phone, more-than-voice, value-added-services*

## 1.0    Background and Motivation

Adoption of mobile telephones has increased dramatically in the world over the last half a decade or so, and for all practical purposes the mobile phone has now become a ubiquitous device with all strata of society.  LIRNE*asia*, an Asian region ICT policy and regulation think tank, has been at the forefront of conducting research on the use of mobile telephones at the bottom of the pyramid (BOP) in emerging Asia and its findings over this period show how rapidly adoption of mobile phones took place and also how wide spread its use is at the BOP.[1] A wide range of demand-side issues from access to expenditure to use to perception of benefits of mobile phones in the region have been discussed at LIRNE*asia*, by among others, Moonasinge et al (2006), de Silva and Zainudeen (2008), de Silva et al (2010, 2011), Ageuro and de Silva (2011), Sivapragasam et al (2011) using a unique series of region-wide large sample household surveys titled Teleuse at the BOP.  In addition to demand-side issues, Samarajiva (2009) analyzing the supply-side, coined the phrase 'budget telecom model' to explain the new business model implemented by operators in the region to drive the rapid expansion at the lower end of society with declining revenues at the margin while maintaining overall profitability in operations within an intensely competitive environment, not always ideally regulated.

While early research on adoption at the regional BOP using technology adoption models focused on voice telephony (de Silva et. al. 2008), later studies even though very few in number, for instance, Zainudeen and Ratnadivakara (2012) considered the adoption of more-than-voice services among the same group.   These studies found that beyond socio-demographic factors, connectedness of the potential adopter was important; in the sense of social pressure by the adopters close group of contacts would weigh heavily in the decision to adopt.

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[1] Teleuse at the bottom of the pyramid or Teleuse@BOP is a unique series of demand side studies on ICT usage among bottom of the pyramid. This paper consists of its fourth series which is Teleuse@BOP4 conducted in 2011. It was focused on mobile phones for value generation at the BOP, against the backdrop of an emerging knowledge-based economy. For more information visit http://lirneasia.net/projects/icts-the-bottom-of-the-pyramid

Notwithstanding the lack of convergence in a theoretical basis that could be empirically validated for the adoption of more-than-voice services data began to suggest that many BOP users in the region were having their first experience with the Internet (or elements of it) through a mobile device, rather than a conventional desktop computer (Samarajiva, 2009; Nokia, 2010). Expanding, Samarajiva (2009) showed that this was either in the form of 'conventional' Internet browsing or through more-than-voice services and applications such as price information, news alerts, payments and remittances etc.

In this background, researchers at LIRNE*asia* have begun to focus on drivers of adoption of more-than-voice services.  Papers on what factors drive SMS adoption at one end (Kang & Maity, 2012) to whether those using entertainment-based more-than-voice services could become platform to promote other services including productivity-based ones at the other end (de Silva and Ratnadiwakara, 2012) are being pursued.  Study of whether the BOP are stuck in voice by Zainudeen and Ratnadiwakara (2012) shows that use of more-than-voice services is very low among them. They have also mentioned in their discussion that usage may be low due to the lack of awareness of more-than-voice services among BOP teleusers.

Therefore this paper considers the drivers of moving from awareness to use of more-than-voice services in five countries using data from LIRNE*asia*'s Teleuse at BOP4, a large sample survey conducted in 2011 and to compare and contrast the same across countries to see how country differences maybe impacting on this process. In the analysis Thailand is not considered. The paper reflects the relationship between awareness, usage and impact of usage of the more than voice services.

The section two of this paper gives a brief introduction about the collected works on the technology adoption. It also describes the models that have been used to understand the technology adoption by the society. Methodology and data are described in the section three of the paper. That includes the sampling technique that was used and the methods that were used to collect data. Section four explains the data analysis with hypothesis testing for dependencies and correlations and briefly explains relationships that affect awareness and use.

## 2.0    Theoretical Framework

Previous work on understanding technology adoption research can be divided in to three groups; diffusion, adoption and domestication. Diffusion of innovations is a theory which search for the answers to how, why and at what rate new ideas and technology spread through cultures (Rogers, 2003). Literature shows that the research on the topic is based on explaining a logistic curve which is also known as an S shape distribution. It tries to describe how the market shares eventually reach its saturation level when successive groups of consumers adopt the new technology (Rogers, 2003).

Adoption research is based on identifying factors and relationships that affect the adoption and influences that decision at an individual level. Theory of reasoned action (TRA), widely used in adoption research which predicts behavioral intention, comprise of predictions of attitude and behavior. TRA has later been extended to include additional factors which have been seen as influencing the adoption decision; consisting of attitude toward behavior, subjective norm behavioral intention, and actual behavior (Perloff, 1993).

Silverstone in 1990 introduced a concept of domestication of information and communication technologies (ICT). The theory is based on the social shaping of technology and studies how technology can be incorporated into everyday routines of personal life. Here we use the word domestication in the context of adoption and use of technology in everyday life (Silverstone and Hirsch, 1992). Domestication research often uses demographic variables such as gender and age as proxies for identifying a distinction between end-user contexts (Pedersen, P., 2003).

Therefore this paper is a collection of concepts of adoption and domestication research. In this background we attempt to determine the factors that affect awareness, relationship between usage of more-than-voice services with respect to awareness of it without focusing on theory or framework.  This paper seeks to find the impact of awareness and usage of more-than-voice services to improve the abilities of bottom of the pyramid which is mentioned below. To begin with the paper considers awareness of more-than -voice services and usage of those services by

the bottom of the pyramid. Zainudeen and Ratnadiwakara(2012) suggest that usage of those services are affected by several factors, where lack of education is a critical factor. As a result the BOP is not aware of the more-than-voice services. The motivation of this research is driven by the interest to identify the factors that affect the awareness of more-than-voice services of BOP teleuser and to identify the relationship between the usage and the awareness of more-than-voice services. Then the study extends to determine how awareness and usage impact the ability of bottom of the pyramid to make money, save money, find work opportunities and to improve efficiency of day to day work.

## 3.0    Methodology and Data Description

As referred earlier, this paper is based on data from a multi-country study of ICT use at the BOP in emerging Asia conducted by LIRNE*asia* called Teleuse@BOP4. The study was conducted in 2011 among those who had used a telephone (not necessarily owned) between the ages of 15-60 to make or receive a call within three months prior to the survey in Bangladesh, India, Pakistan, Sri Lanka and Thailand.

To ensure the representation of target groups (BOP), within the countries, equi-probable multi staged stratified sampling method was used with the probability proportionate to determine the samples. The total sample of teleusers for the survey comprise of 9066 who were interviewed face to face. Regions within the countries to be sampled were randomly selected during the T@BOP3 study and have remained same for the latest study.

In each selected region, a common place such as a road, park, hospital etc. was selected as a starting point for contacting a household. The interviewer will then list all the members aged 15-60 and then using a Kish grid one member from the household was selected. Interviews were conducted in the respondent's mother tongue to ensure maximum accuracy of information. The figure 1 describes the study locations, and composition of the sample.
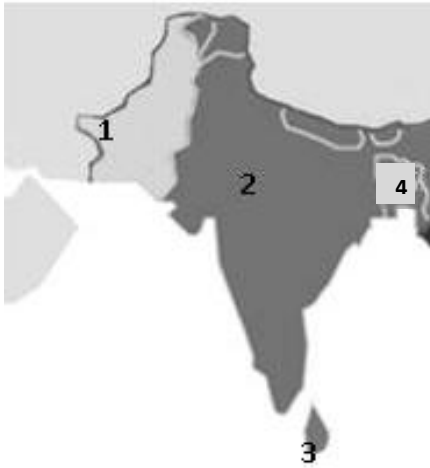
Figure 1. Study Locations



Table 1. Sample Size and Composition

| Country | BOP Teleusers | Margin Of Error |
|---|---|---|
| | | 95% Level Of Confidence |
| Pakistan(1) | 1835 | 2% |
| India(2) | 3181 | 2% |
| Sri Lanka(3) | 1200 | 3% |
| Bangladesh(4) | 2050 | 2% |
| | 8266 | |

The interviews comprised of a lengthy questionnaire comprising among others questions on mobile phones and more-than-voice services. All the sample units were questioned on awareness and use of following more-than-voice services.

- Banking and financial services
- Services for making or receiving payments
- Government services
- Health services
- Services for the competition polls or other live TV/radio programs
- Entertainment related services
- Livelihood related services
- Other general services

## 4.0     Awareness of More-Than-Voice Services

We find awareness of more-than-voice services among the teleusers in the region low as given in the Table 2. The highest awareness was for making and receiving payments at 23 percent. Awareness of all other services except entertainment related services is below 20 percent. Awareness of government services is the least known.

Table 2: Awareness of more-than-voice services in the region

| Service | Yes(%) | No(%) |
|---|---|---|
| Awareness of Banking and Financial Services | 16.8 | 83.2 |
| Awareness of making or receiving payments | 23.2 | 76.8 |
| Awareness of government services | 9.4 | 90.6 |
| Awareness of health services | 15.2 | 84.8 |
| Awareness of competition polls or particiapation in other progrmas on TV or radio | 18.1 | 81.9 |
| Awareness of Entertainment related information services | 22 | 78 |
| Awareness of livelihood related information | 9.3 | 90.7 |
| Awareness of other general information | 17.2 | 82.8 |

Principle component analysis[2] was conducted to identify the meaningful underlying variables that affect the awareness of more-than-voice services. The analysis resulted in identifying three major components; country of residence, occupation and highest educational achievement that account for major variability in awareness of more-than-voice services.

Table 3: Awareness of More than voice services with respect to country of residence

| Service | Bangladesh(%) | Pakistan(%) | India(%) | Sri Lanka(%) |
|---|---|---|---|---|
| Awareness of banking and financial Services | 19 | 11.3 | 14 | 26.6 |
| Awareness of making or receiving payments | 37.3 | 30.8 | 9.5 | 26.4 |
| Awareness of government services | 17.2 | 4.1 | 7.4 | 10.8 |
| Awareness of health services | 37.7 | 1.7 | 7.2 | 24.8 |
| Awareness of competition polls or participation in other programs on TV or radio | 27.2 | 4.1 | 3.7 | 52.1 |
| Awareness of entertainment related information services | 27.3 | 15.4 | 3.9 | 53.7 |
| Awareness of livelihood related information | 15.6 | 2 | 27 | 27 |
| Awareness of other general information | 27.9 | 4.7 | 3.7 | 41.9 |

Awareness of more-than-voice services with respect to country is shown in the Table 3 above. From the Table 3, it can be seen that mobile users in Sri Lanka and Bangladesh are more aware in comparison to mobile users in Pakistan and India. Chi square test of independency was

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[2] Principal component analysis (PCA) is a multivariate technique that analyzes a data table in which observations are described by several inter-correlated quantitative dependent variables. Its goal is to extract the important information from the table, to represent it as a set of new orthogonal variables called principal components, and to display the pattern of similarity of the observations.

carried out to identify the dependency between the variables as described in the following cases.

Case 1: Null hypothesis that is awareness of more-than-voice services is independent of the country vs the alternative hypothesis that is awareness of the more-than-voice services depends on the country was tested with 5% level of significance. From the chi square test it can be concluded with 95% level of confidence that awareness of more than voice services depends on country.

Case 2: Awareness of more-than-voice services with respective to occupation is the next concern. A significant fact is that people who are waiting for jobs seem to be well aware of more-than-voice services. It can be seen that skilled workers are more aware of the services than unskilled workers. According to the cross tabulation results it can be seen that most of the BOP users are aware of entertainment related services. From the chi square test it can be concluded that awareness depends on the occupation with 95% level of confidence.

Case 3: Teleusers who have the university level education seems to be using the mobile value added services more. It can be seen that mobile phone users who had primary schooling seem to be using entertainment related services and money making or receiving services most. This may be due to their lack of knowledge on technology (Zainudeen and Ratnadiwakara, 2012). Teleusers who have no formal schooling seems to be not aware of more-than-voice services. From the chi square test it can be concluded that awareness depends on the education with 95% level of confidence.

## 4.1    Usage of more-than-voice services

It can be seen that in most of the countries there is very little usage of more-than-voice in comparison to awareness. In Table 3, it can be seen that the nineteen percent of users in Bangladesh are aware of banking and financial services but when it comes to the usage of those services, it seems very low, i.e. 6.25% from the number of users who are aware of those services. From table 4, it can be seen that Sri Lanka is using the more-than-voice services more

with respect to the other countries. Chi square test provides the evidence to say with 99% level of confidence that usage depends on the country.

Table 4: Usage of more-than-voice services with respect to country

| Service | Bangladesh | Pakistan | India | Sri Lanka |
|---|---|---|---|---|
| Usage of Banking and Financial Services | 6.25 | 12.50 | 37.50 | 43.75 |
| Usage of making or receiving payments | 35.71 | 7.14 | 7.14 | 50.00 |
| Usage of health services | 38.10 | 2.38 | 30.95 | 28.57 |
| Usage of competition polls or participation in other programs on TV or radio | 4.26 | 1.06 | 2.13 | 92.55 |
| Usage of Entertainment related information services | 25.51 | 13.27 | 14.29 | 46.94 |
| Usage of livelihood related information | 12.50 | 0.00 | 43.75 | 43.75 |
| Usage of other general information | 25.00 | 1.56 | 9.38 | 64.06 |

Even though the awareness is high to some extent the usage seems to follow a different numbers. Only a handful of them are using the services. Chi square test of independency provide evidence with 95% level of confidence that usage depends on the occupation.

When it comes to usage of more-than-voice services with respect to the education it seems only university educated teleusers are using more-than-voice services. The data shows that teleusers of primary schooling mostly use only entertainment related services. Chi square test of independency provide evidence with 95% level of confidence that usage depends on the education.

## 4.2    Correlation between awareness and usage of more-than-voice sServices

The respondents were asked whether they are aware of the service or not, and whether they are using the service or not. Responses were recorded for the awareness and usage which are in nominal scale. Nominal scale data are also known as nominal category which uses labels to name the different categories. There is no relationship or any order between the categories. Since the data is in nominal scale, to find out the relationship between the two variables mean square contingency coefficient (also known as phi coefficient) was calculated. The null hypothesis is that there is no significant correlation between awareness and usage vs the alternative hypothesis that there is a significant correlation between awareness and usage was

tested. The correlation analysis, as given in the Table 5 shows that there is a strong positive correlation between the awareness of more-than-voice services and the usage of it. There is a significant relationship between the awareness of entertainment related and the usage of that service eventhough the correlation value is very low.

Table 5: Correlation between awareness of more-than-voice services and usage

| | Usage of Banking and Financial Usages | |
| --- | --- | --- |
| | Phi Value | Significance Value |
| Awareness of Banking and Financial Services | 0.126 | 0 |
| | Usage of Making receiving payements | |
| | Phi Value | Significance Value |
| Awareness of Making or receving payments | 0.103 | 0 |
| | Usage of government services | |
| | Phi Value | Significance Value |
| Awareness of government services | 0.046 | 0 |
| | Usage of health services | |
| | Phi Value | Significance Value |
| Awareness of health services | 0.163 | 0 |
| | Usage of entertainement relaetd services | |
| | Phi Value | Significance Value |
| Awareness of entertainement related services | 0.23 | 0 |
| | Usage of livelihood related information | |
| | Phi Value | Significance Value |
| Awareness of livelihood related information | 0.131 | 0 |
| | Usage of comptetion polls | |
| | Phi Value | Significance Value |
| Awareness of competition polls | 0.229 | 0 |
| | Usage of Other general services | |
| | Phi Value | Significance Value |
| Awareness of other general services | 0.206 | 0 |

## 4.3    Impact of Awareness and Usage on Domestication

We now test the relationships between the awareness, usage and impact of usage of these services for BOP. Domestication is in the sense of improvements in making money, saving money, finding employment/ work opportunities, efficiency of day to day work.

Chi square test of independency provide evidence with 95% level of confidence that ability of making money depends on awareness of banking and financial services, services for making or receiving money, government services, health services, competition polls or participation in other programs on TV or radio. The same test extends to see the dependency between the usage of more-than-voice services to improve the ability to make money. According to the test it can be concluded with 95% level of confidence that ability to making money depends on usage of competition polls or participation in other programs on TV or radio. A binary logistic regression model can be formed to identify the factors that are related to the ability of making money. Logistic model gives the probability of the selected response, i.e. ability of making money as a function of predictor variables (independent variable), i.e. factors mentioned above.

Table 6: Logistic regression output for ability of making money

| Variable | Coefficient | Odds Ratio | p-value |
|---|---|---|---|
| Awareness of banking & financial services | 0.498 | 1.646 | 0 |
| Awareness of making or receiving payments | 0.148 | 1.159 | 0.026 |
| Awareness of government services | 0.321 | 1.379 | 0.001 |
| Awareness of health services | -0.354 | 0.702 | 0 |
| Awareness of competition polls | -0.398 | 0.672 | 0 |
| Awareness of livelihood related services | -0.328 | 0.721 | 0.001 |
| Awareness of other general services | 0.23 | 1.258 | 0.003 |
| Usage of banking & financial services | 0.109 | 1.115 | 0.001 |
| Usage of entertainment related services | 0.383 | 1.467 | 0.07 |

Logistic model gives that awareness of banking and financial services, awareness of making or receiving payments, awareness of government services, usage of health services, awareness of other general services, usage of banking and financial services and usage of entertainment related services helps to increase the probability of making money through mobile phones. Awareness of health services, awareness of competition polls and awareness of livelihood related services tend to decrease the probability of money making ability through the mobile phones.

Dependency was checked using the chi square test and then the binary logistic model was taken for the other four domestication variables such as money saving ability, finding employment opportunities, and improving the efficiency of day-to-day work.

It is a significant fact that improvement in money saving ability depends on awareness of banking and financial services, services for making or receiving money, government services and as well as usage of competition polls, usage of other general information. According to the logistic model it can be concluded that probability of saving money improves if the users is aware of banking and financial services, services for making or receiving payments, government services, health services, entertainment related service, livelihood related services, other general services. Probability of money saving ability improves if the user can use livelihood related services, entertainment related services and other general services.

It can be seen that the probability of finding employment opportunities can be increased by knowing banking and financial related services, money making or receiving payments, government services, entertainment related services and other general services. Also it can be concluded that usage of money receiving or payment services, usage of livelihood related services and entertainment related services elevate the probability of finding employment opportunities.

Efficiency of the day to day work depends on the awareness of banking and financial related services, money making or receiving payments, government services, competition polls, entertainment related services, livelihood related, and other general services, it also depends on usage of money making or receiving payments, competition polls, entertainment related services as well. The binary logistic provides evidence that the probability of improving efficiency of the users day to day work intensify mostly if the user is aware of banking and related services, money making ore receiving payments, government services, competition polls, entertainment related services, other general services. Usage of money making or receiving services, health services, improves the probability as well.

**5.0    Discussion**

This paper examines the factors affecting the awareness of more-than-voice services, among BOP teleusers in emerging Asia. Awareness and use of these services in Pakistan and India seems to be very low. Awareness of such services was seen to be relatively high in Sri Lanka, and Bangladesh. However usage of these services is very low thorough out the region with Sri Lanka having the highest usage numbers in the region.

There are three major variables that affect the awareness of more than voice services namely country, educational achievement and occupation of the BOP where awareness is positively correlated with the usage of more-than-voice services.

The other factor is that usage of mobile phones improved money making ability, money saving ability, finding employment opportunities, efficiency of day today work and social status/ recognition in the community. With the use of binary logistic regression some models have been developed. To improve the money making ability one has to be aware and use more-than-voice services like competition polls more. To improve the money saving ability one has to be aware of competition polls and he has to use the health services and other general services. Through awareness of competition polls and use of health services increases the probability of finding more job opportunities. Logistic model shows that awareness of banking and financial services, livelihood related services, and usage of health services and usage of health services increases the probability of reduce traveling. To improve the efficiency of day to day work teleusers have to be more aware of completion polls. We have used the binary logistic model since it is the most suitable regression analysis method for the categorical variable. These models can also be modeled by the simple linear regression but the accuracy of the model and explanation of the model will not have a better implication of the real world situation. These models shows that awareness is needed to improve the ability of above mentioned situations. But the usage seems not be showing a relationship like for awareness. This may be due to the

low usage of more-than-voice services among BOP but one can check over time whether the usage has any impact on ability of making money, saving money as mentioned earlier.

It seems that BOP is in the verge of adopting to the more-than-voice services. Awareness would lead them to use of these service.

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