

Possibilities for the Use of Mobile Phones and More-than-voice Services to Improve the Economic Status of Female-headed Households at the BOP

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Abstract: *This paper considers a unique proposition; that given the evidence of women, with little access to formal finance, have been found to be much better at managing micro-enterprises and repayment when given the opportunity of microfinance at the emerging Asian bottom of the pyramid (BOP), whether the use of mobile phones and more-than-voice services could be used to improve the economic status of female-headed households at the emerging Asian BOP by ensuring appropriate information and access to manage their households. The initial results suggests that female-headed households are in fact economically worse off and that their phone use pattern, for economic-related services, is also less conducive for economic success than male-headed households in the emerging Asian BOP. This opens out a new area of thinking for development practitioners and commercial mobile phone service providers alike.*



LIRNEasia is a regional information and communication technology (ICT) policy and regulation research and capacity-building organization active across the Asia Pacific. Its mission is *to improve the lives of the people of the emerging Asia-Pacific by facilitating their use of ICTs and related infrastructures; by catalyzing the reform of laws, policies and regulations to enable those uses through the conduct of policy-relevant research, training and advocacy with emphasis on building in-situ expertise.* For further information see www.lirneasia.net | Contact: 12 Balcombe Place, Colombo 00800, Sri Lanka. +94 11 267 1160. [info\[at\]LIRNEasia\[dot\]net](mailto:info@LIRNEasia.net)



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1.0 Motivation

The motivation for this paper comes from the belief that mobile phones can be leveraged to uplift the economic status of female-headed households at the bottom of the pyramid (BOP) perhaps even more than those headed by men. There is increasing evidence that women are better than men at managing microfinance at the BOP, women micro-entrepreneurs have shown that they have what it takes to improve the conditions of their households if provided with the right tools. We posit that managing a household includes a number of elements of managing an enterprise; particularly ensuring its financial sustainability. Thus if female-headed households who appear to be financially worse off than male-headed households are provided with access to the right kind of economic-related information to manage the household via mobile phones processed by almost all of them, these women could possibly be helped out of their financial distress. We take a very initial look at this question in this paper.

2.0 Literature Review and Theoretical Framework

This section considers the literature on the use of mobile phones and economic benefits at the BOP and how, if at all, being a woman impacts such use and benefits. We then consider the literature on women's success in microfinance and micro-enterprises and also the impact of the use of mobile phones in the success of such enterprises. We then theorize that if significant differences exist in the economic conditions and the use of mobile phones between female-headed households and male-headed households then specific interventions could be designed to encourage greater use of mobile phones and more-than-voice services by female-headed households to improve the financial standing of female-headed households.

2.1 Adoption, use and economic benefits of mobile phones at the BOP

Clear evidence is now emerging that mobile phones are not only becoming ubiquitous but are making daily life easier, safer, more profitable and more enjoyable at the BOP. LIRNEasia, a regional think tank on ICT policy and regulation, studying the use of telephones in the emerging Asian region since 2004 has been able to map this process in the region providing perhaps the only such historically comparable analysis of the mobile phone revolution that is changing the

way men, women and children live and work in that part of the world.¹ (LIRNEasia, 2005; 2006; 2008-09; 2011) Giving credence to the general finding that the mobile phone is becoming an indispensable and useful tool for every-day life Agüero and de Silva (2010) find that mobile phone services have now moved closer to the regular consumption basket at the BOP; in that the service has shifted from being a luxury to a necessity in economic terms.

In this background, research on drivers of adoption of mobile phones at the BOP in general (de Silva and Ratnadiwakara 2011) and more-than-voice services on mobile phones (short message services or SMS, or applications for information on economic, entertainment or general matters, entertainment services, competitions etc.) at the BOP (Zainudeen and Ratnadiwakara 2008) have found that besides socio-demographic variables such as higher level of education and ability to spend that increase the odds of adoption, social pressure measured by the connectedness of a person's social network is also an important driver in the decision to adopt mobile phones as well as more-than-services. Unsurprisingly they also found that those who perceive higher levels of benefits of using phones have a higher tendency to use more than-voice services.

Earlier-referenced series of studies by LIRNEasia show that mobile phones at the BOP are being used for numerous purposes ranging from keeping in touch to entertainment to helping in cost-savings and income generation to acting in emergencies. Agüero and de Silva (2010; p.14) claim that "particularly, for the poor, it (mobile phones) has proven to work efficiently as an information enabler, to help enhance productivity, to overcome geographic limitations and to maintain and support social relationships or networks."

While it is accepted that mobile phones provide multiple benefits to users, to what extent the phone and the service they could enhance their economic wellbeing, has been the subject of much research over the years. Research into the impact of telecommunication services at the macro-level is fairly rich. Many studies over time have concluded that access to telecom has a strong impact on growth and economic development and on poverty reduction. Roeller and

¹ See <http://lirneasia.net/projects/icts-the-bottom-of-the-pyramid/> for a comprehensive list of LIRNEasia studies on use of telephones at the BOP

Waverman (2001) as well as Waverman, Meschi and Fuss (2005) are some widely cited studies that have demonstrated the positive impacts of people's access to telecommunication services and economic growth and development by considering the supply-side of the equation. However, at the micro-level or the demand-side perspective, the evidence has been mixed. Souter et al. (2005) assessing the impact of telephones on the livelihoods of low-income rural communities in Mozambique, Tanzania and Gujarat found impact on financial capital were mixed with most benefit coming from saving travel time but little impact on income generation. Several years later de Silva and Zainudeen (2008) considering a large sample emerging Asia BOP dataset also found little evidence to establish a direct link between perceived efficiency gains from reduced travel time and potential for greater income generation or cost saving. Even later (Samarajiva, 2011) points to the finding from a similar dataset but a more recent one where the main economic benefit of using a mobile phone is perceived by the BOP to be the reduction of travel; and not necessarily income generation or cost savings.

However, when specific industries have been considered, the results seem to be rather different. That mobile connectivity can help the fishermen access up-to-date information, fish prices at various locations along the beach of Kerala in India at reduced transaction costs thereby improving both consumer and producer surplus has been comprehensively discussed in the seminal paper by Jensen (2007). The findings have been supported by others; particularly (Aker, 2008; De Silva and Ratnadiwakara, 2010) by considering farmers in Niger and in Sri Lanka respectively. Some of these studies have contributed further to the literature by considering the economic benefit to farmers in the use of mobile phones for up-to-date agriculture information beyond prices; for instance on crop selection, finance, availability of fertilizer and on logistics etc.

Another widely-studied area is mobile phone-aided payments and remittances with services such as M-PESA of Kenya making an all new industry possible by leveraging existing inefficiencies of the traditional banking systems of some countries (Pulver 2009, Morawczynski and Pickens 2009). However, such services have not necessarily been widespread. Considering the use and potential for remittances using mobile phones at the emerging Asian BOP (Sivapragasam et al., 2010) found very little use but that the living standards of those who were using such services were better than those who did not. They and also Alampay (2009)

concluded that greater knowledge and trust of the services was essential for enhanced use of mobile remittances and the general use of mobile phones for financial transactions in this segment of society. Now, this change is beginning to take place and more and more mobile money services are being started while service providers are actively educating users on their benefits. A good example is the recent launch of mobile money service 'eZcash' in Sri Lanka (Dialog, 2012).

2.2 BOP women's phone use and their successful track-record in microfinance

In this scenario the gender difference in the adoption and the resulting benefits of mobile phones become important. Do men find the use of mobile phones more useful in their day-to-day lives than women, or do women leverage the use of mobile phones more? A number of studies have found that historically the use of phones by women has been lower than men in various parts of the world, be it in the developed or the developing world (Gurumurthy, 2004; Zainudeen, 2010). Souter et al. (2005) in a study among users in Africa and India that found significant gender differences, suggest that social norms and financial considerations could have impact upon the differences. Huyer et al. (2006) reporting a West African study posits that that women's use of mobile phones was mostly for personal and social reasons while men used mobile phones more for work-related reasons.

Zainudeen et al. (2008), using a large sample dataset from 2006, find that a significant gender divide in direct access to mobile phones (i.e., ownership) existed at the BOP in Pakistan and India while it was less so in Sri Lanka and by-and-large not present at the BOP in the Philippines and Thailand. However, the authors assert that even though differences in direct access existed, there was not much difference in the actual usage of phones except in Pakistan, which, they eluded to the Muslim dominated cultural and social context in that country. But, how much has changed over the years? It still seems to be the case that direct-access and use of mobile phones is higher among men than women at the emerging Asian BOP (except for Thailand) as indicated by the most recent LIRNEasia data for 2011 (Samarajiva, 2011).

While the ground conditions on the ownership and use of mobile phones by gender remain as it does, there is another area of research on gender that becomes relevant in considering what

role if any the now ubiquitous mobile phone could play in dealing with issues of gender and poverty. This is in the area of microfinance and micro-enterprise. The term micro-enterprise does not have a specific definition, but in the developing world it refers to generally large numbers of very small businesses or micro-entrepreneurs; say a 'Bangladeshi phone-lady' who sells phone calls to others in her neighbourhood (less now than it was sometime back), or a small vendor who sells vegetables on a push cart in a busy street in India or a cycle repairman in Pakistan. Given that micro-enterprises at the BOP hardly have any access to the formal commercial banking sector due to their small size and lack of collateral they often rely on micro-loans or microcredit for their financing needs. The Consultative Group to Assist the Poor (CGAP), the inter-development agency consortium working on expanding financial services to the poor in the developing world, defines microfinance as a service that "offers poor people access to basic financial services such as loans, savings, money transfer services and micro-insurance" microfinance institutions (MFI) in the specific form of non-government organizations or as part of cooperatives, community-based development institutions, credit unions and now even telecommunications service providers have now been established to provide such small-scale financial services. As discussed earlier remittances and money transfer services are beginning to take hold at the BOP in many countries. CGAP asserts that as such services become widely used with greater outreach to more people living in isolated areas they can become powerful instruments for reducing poverty, enabling them to build assets, increase incomes, and reduce their vulnerability to economic stress.

Microfinance is dominated by women; CGAP and Women's World Banking (WWB) estimate that over 80 percent of all microfinance clients around the world are women.² What is even more noteworthy is that there is voluminous research on women and microfinance which all point towards evidence on the greater success rate of women as opposed to men in microfinance for micro-enterprise. Evidence that women have proved to be better in meeting credit obligations than men have been found by many. For instance Kandakar et al. (1993), Ledgerwood (2002), Armendariz and Morduch (2005) as well as CGAP, IFAD and WWB all provide supporting evidence. In some of the early work Kandakar (1993) found that amongst Grameen Bank borrowers in Bangladesh the recovery rate for loans were as high as 97 percent for women

² There is evidence to suggest that women are discriminated against in the formal banking systems in some countries. For instance, Chowdury (2009) says women borrowers constitute only less than one percent in the formal financial sector in Bangladesh but at Grameen Bank ninety seven percent borrowers are women.

compared to 89 percent for men. Having observed such levels of repayment by women over the years, IFAD (2011; p.xx) asserts that “poor women also tend to have the best credit ratings”. In explaining such finding Ledgerwood (2002) argues that women generally have a higher sense of responsibility (than men) and are affected by social pressure in their demonstrated higher repayment and savings rates than men. But, considering another angle Rahman (2001) argues that women are more easily influenced by peer-pressure and the interventions of the loan-managers. MFI literature indicates that improving women’s ability to access microfinance services benefit the BOP families as a whole. Evidence show that poor women reinvest much more of their income from micro-enterprises in their families and communities than men do; financing such items as healthcare, education for their children and improving their living arrangements (Ledgerwood, 2002; themix.org 2010). However, it must be also noted that not all view microfinance in this light and serious allegations have been made that MFIs are exploiting poor women (The Hindu, 2011).

2.3 Information needs and sources of micro-enterprises and the use of mobile phones

In this background two important questions are, beyond the generalized link between microenterprises and mobile phones, what the specific information needs of microenterprises really are and to what extent they use mobile phones to obtain such information. Roldan and Wong (2008) in a study of micro-enterprises in Bangladesh find that mobile phones are used to access information on production techniques and potential buyers as well as for negotiating price, terms of payment, and delivery logistics. Donner et al. (2010) summarizing fourteen research studies that examine mobile phone use by micro and small enterprises in the developing world conclude that mobile phones help such enterprises become more productive through improvements to their sales and marketing as well as procurement processes. Lokanathan and Kapugama (2012) delve in to this topic by considering smallholders and micro-enterprises in agriculture in India, Bangladesh, Sri Lanka and Thailand. They find that for smallholders, the main information needs over an entire crop cycle are on fertilizer, market prices and pesticides depending on the stage of the crop cycle. For agricultural microenterprises, (limited here to collectors, traders, commission agents and retailers of agricultural produce) it was found that the main information needs to be market prices, sources and costs of inputs and information on transport in that order. The authors also found that the most important sources of information and advice were family, friends and peers besides their

own knowledge. In terms of the use of mobile phones to elicit information and advice mobile phones were second to face-to-face meetings and the most important 'economic' benefit of the phone was the ability to reduce travel costs, to paraphrase Donner (2010), in their sales and marketing and procurement processes.

2.4 Female-headed households as a proxy for women owned micro-enterprises to assess possible economic improvement of household via mobile phone use

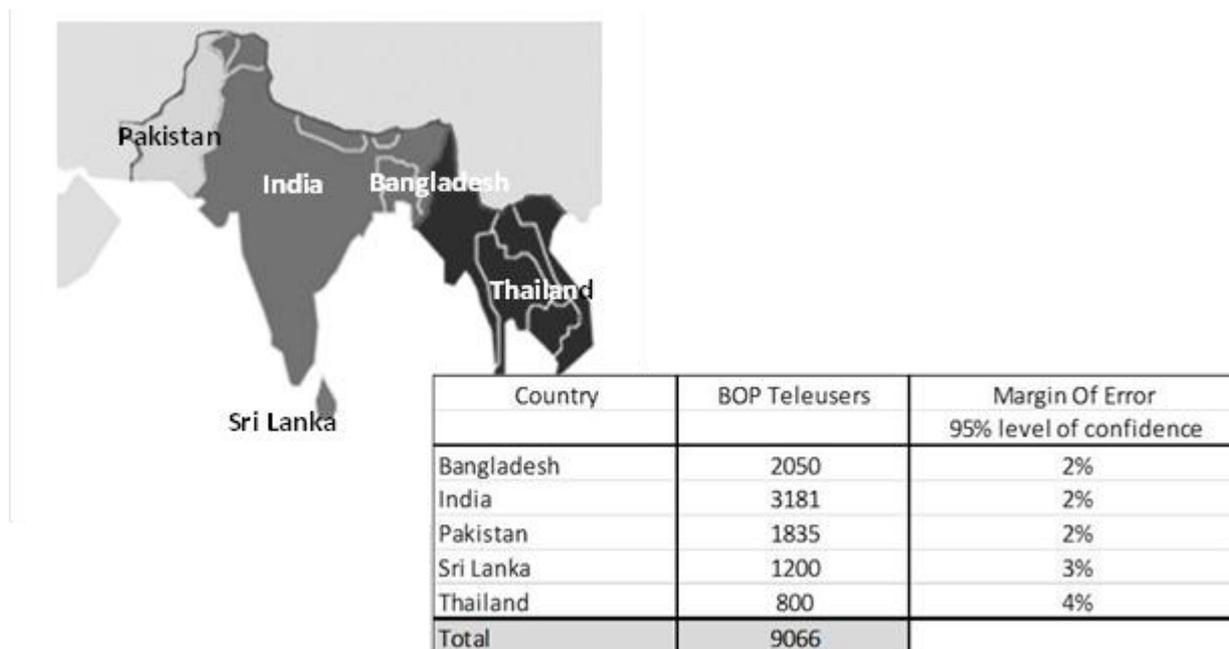
Given the already-acknowledged positions that women are more reliable and successful at managing microfinance for micro-enterprises and that the use of mobile phones can improve the economic wellbeing of such enterprises we theorize that greater use of mobile phones for business related purposes by female-headed households could improve the economic position of such households disproportionately to male-headed households. Here we assume that a woman heading a household is not very different to a woman running a micro-enterprise; in that unlike a woman who is not heading a household a woman heading a household has much more financial responsibility in ensuring the sustenance of that household just as in the case of a micro-enterprise. If we find that female-headed households are significantly different (lower or negative) to male-headed households both in economic terms and the use of mobile phones, then there is a strong and compelling case to promote greater use of phones and more-than-voice services among such households by designing and developing specific interventions. The findings and resulting policy perspectives can be used by the multitude of stakeholders working on women's empowerment issues ranging from governments to non-government organizations to MFIs to mobile phone service providers to design and develop programs and strategies to improve the economic conditions of female-headed households at the BOP.

3.0 Methodology and Data Description

This paper uses data from a multi-country study of ICT use at the BOP in Bangladesh, India, Pakistan, Sri Lanka and Thailand. The study titled Teleuse@BOP4 was conducted by LIRNEasia during the months of May-June 2011 and considered all at the BOP between the ages of 15 and 60 from both rural and urban locations. The only filter was that the respondents had to have used a telephone to make or receive at least one voice call in the three months prior to the survey. BOP was defined as Socio Economic Classification (SEC) groups D and E. SEC is a widely used method to categorize households in to groups based on the education and occupational status of the Chief Wage Earner of the household and ranges from A (top) to E (bottom).

The survey consisted for 9,066 face-to-face interviews. The sample was selected to allow for the findings of the study to be projected back to the BOP of each country by using a multi-stage stratified cluster sampling by probability proportionate to size (PPS) to select the target number of urban and rural centers. After determining the number of centers to be selected; urban and rural areas were selected again using PPS on a constant population interval on geographically ordered centers. In each selected centre, a common place such as a road, park, hospital etc. was designated the starting point for contacting households. Only one respondent was selected from each household using the KISH grid to be interviewed.

Figure 1: Study locations and composition of sample



Of the total 9,066 interviewed, 3,239 respondents were identified as chief wage earners of their respective households. The market research industry generally defines the Chief Wage Earner (CWE) as the person who makes the highest contribution towards household expenses. An overview of the sample with gender information is given in Table 1.

Table 1: Overview of the CWE sample

	Bangladesh	Pakistan	India	Sri Lanka	Thailand	Total
Male	723	553	894	311	254	2735
% within Country	96.0%	76.1%	87.0%	79.5%	74.5%	84.4%
Female	30	174	133	80	87	504
% within Country	4.0%	23.9%	13.0%	20.5%	25.5%	15.6%
Total	753	727	1,027	391	341	3,239

The data shows that men head the vast majority of households at the BOP in the selected emerging Asian region with the highest being Bangladesh and the lowest being Thailand; where a quarter of the BOP households are women-led. Next we consider the marital status of the CWE to assess the ‘support’ of a spouse in managing the affairs of households at the BOP as per Table 2.

Table 2: Marital status of the CWE sample

Gender	Status	Bangladesh	Pakistan	India	Sri Lanka	Thailand	Total
Male CWE	Married	690	427	804	277	210	2,408
		95.4%	77.2%	89.9%	89.1%	82.7%	88.0%
	Single – Unmarried	32	120	74	32	32	290
		4.4%	21.7%	8.3%	10.3%	12.6%	10.6%
	Married - Divorced	0	1	3	1	8	13
		0.0%	0.2%	0.3%	0.3%	3.1%	0.5%
	Married - Widowed	1	5	13	1	4	24
		0.1%	0.9%	1.5%	0.3%	1.6%	0.9%
	Total	723	553	894	311	254	2,735
Female CWE	Married	14	114	73	36	51	288
		46.7%	65.5%	55.3%	45.0%	58.6%	57.3%
	Single –	3	57	14	17	10	101

	Unmarried						
		10.0%	32.8%	10.6%	21.3%	11.5%	20.1%
	Married - Divorced	0	0	6	8	16	30
		0.0%	0.0%	4.5%	10.0%	18.4%	6.0%
	Married - Widowed	13	3	39	19	10	84
		43.3%	1.7%	29.5%	23.8%	11.5%	16.7%
	Total	30	174	132	80	87	503

Almost all men who head households are married (with some single) irrespective of the country. But in the case of female-headed households the proportion of widowed women and single women stand out. Divorced women heading households are also noticeable in the relatively two less-conservative countries in the sample; Thailand and Sri Lanka, while no such occurrences are found in the two relatively more conservative societies; Bangladesh and Pakistan. It is thus clear that at the BOP of the selected countries the marital status of the CWE is quite different in terms of whether a man or a woman is heading the household. The variability of the differences however, seem to be subject to the country of residence. Given our objective to determine the differences in economic success between men and female-headed households, and the possible interventions via mobile more-than-voice services by a multitude of stakeholders, this is an important finding in terms of designing and implementing such services. Next we examine the educational background of the gender-wise CWE sample at the BOP.

Table 3: Highest educational achievement of the CWE sample

	highest educational achievement	Bangladesh	Pakistan	India	Sri Lanka	Thailand	Total
Male CWE	No formal schooling	282	202	284	47	11	826
		39.0%	36.5%	31.9%	15.1%	4.3%	30.2%
	Primary	337	287	414	253	180	1471
		46.5%	51.9%	46.6%	81.1%	70.9%	53.8%
	Secondary	101	46	153	12	19	331
		14.0%	8.3%	17.2%	3.8%	7.5%	12.1%
	Tertiary	1	12	12	0	27	52
		0.1%	2.2%	1.3%	0.0%	10.6%	1.9%
	University	3	6	26	0	17	52
		0.4%	1.1%	2.9%	0.0%	6.7%	1.9%
	Total	724	553	889	312	254	2732
Female	No formal	14	33	70	14	7	138

CWE	schooling						
		46.7%	19.1%	52.6%	17.5%	8.0%	27.4%
	Primary	13	114	43	58	66	294
		43.3%	65.9%	32.3%	72.5%	75.0%	58.3%
	Secondary	2	14	19	8	6	49
		6.7%	8.1%	14.3%	10.0%	6.8%	9.7%
	Tertiary	0	8	0	0	6	14
		0.0%	4.6%	0.0%	0.0%	6.8%	2.8%
	University	1	4	1	0	3	9
		3.3%	2.3%	.8%	0.0%	3.4%	1.8%
	Total	30	173	133	80	88	504

Irrespective of their gender, majority of BOP household are led by a person having at most just a primary level education. Also striking is the fact that a large share of CWEs have never been to a school; more so women than men, up to almost half in Bangladesh and even more in India. While the low level of education of the CWE is one of the reasons for these households to be categorized at the BOP (SEC takes in to account education and occupation) the distinction between men and female-headed households is important for the purposes of our investigation for instance in training them to use and benefit from mobile phone technology based services.

4.0 Analysis and Discussion

In this section we first test to determine if the economic status of male-headed households and female-headed households are the same or if they are different. Thereafter we conduct a series of tests to determine if significant differences exist between male-headed versus female-headed households in the awareness, use and perceived benefits from mobile phones. If in both cases female-headed households are found to be behind male-headed households based on the previously discussed literature and theorization there will be opportunities to target female-headed households with appropriate mobile phone based services to improve their economic situation.

4.1 Economic status of male-headed and female-headed households

As the first step, we test the mean monthly income of male-headed households and households in the sample to see whether there is a significant difference between two means to positively conclude that the gender of the CWE is material in the economic success of the household. To check whether there is a significant difference between mean monthly income between male-headed households and female-headed households, the t-test for the difference

between means is carried out. The details of the analysis given in the table below indicate that with 95% of confidence it can be concluded that there is a significant difference between the two.

Table 4: Test for differences of mean monthly income of households in the CWE sample

	Total	Mean(USD)	Std.Dev.(USD)
Male CWE	852	58.73	36.19
Female CWE	51	48.02	36.34
Significance	0.04		

Male-headed households certainly earn more than female-headed households at the BOP in the selected emerging Asian countries with differences ranging between USD 0.5 to USD 20 per month across countries.³ This finding lends support to the position that female-headed households are indeed worse off than male-headed households in the continuing debate on poverty based on gender of the head-of-household, discussed comprehensively by Fuwa (2000). Having confirmed this position we now consider the use and perception of the mobile phone by the two groups.

4.2 Adoption and use of mobile phones and services

We find 95.21% (2604 out of 2735) of the men and 94.44% (476 out of 504) of the women who head their households prefer to use mobile phones over fixed line phones. Moreover, 73.64% (1916 out of 2604) of the men and 65.13% (310 out of 476) of the women who head their households use their own mobile phone as the most preferred communication medium over other alternatives such as common household mobile phone (6.5% vs. 13.7%) or other household member's mobile phone (7.3% vs. 11.3%). As seen in Table 5, besides making and receiving phone calls, the mobile phone is used heavily to send and receive missed calls both by men and women household heads; but much more so by men. As has been discussed inter alia by LIRNEasia in many of their presentations on the Teleuse@BOP series, the use of missed calls has grown as an innovative strategy to reduce communication expenses. They are used to

³ Note that we converted the incomes from country specific currencies to USD and included all households with a per capita income of not more than USD 2 per day. We found that there are on average 4.7 members lives in a CWE household and assumed CWE works for 25 days in a month for 2USD/day. Incidentally, the USD 2 per day per capita income has been used elsewhere (LIRNEasia, 2009) to show that the percentage of the population included in the BOP samples generally reflect the same percentage of the population living under USD 2 per day.

inform various pre-agreed messages such as having reached a destination or having completed an assigned task.

Table 5: Purpose of using the mobile phone by male CWEs vs female CWEs (% of mobile owning CWEs)⁴

	Male CWE		Female CWE	
Taking phone calls	1897	72.9%	306	64.3%
Receiving phone calls	1873	71.9%	300	63.0%
Sending and or receiving missed calls	1321	50.7%	155	32.6%
Sending and or receiving SMS	485	18.6%	105	22.1%
Taking photos and or videos	203	7.8%	29	6.1%
To play games	348	13.4%	40	8.4%
To listen to radio	261	10.0%	37	7.8%
To listen to music	297	11.4%	27	5.7%
As an organizer	119	4.6%	18	3.8%
To check my bill/credit	233	9.0%	71	14.9%
Send / Receive talk time/ load	86	3.3%	17	3.6%

In addition, the use of short message services (SMS) also appear to be significant but as opposed to the ‘missed call phenomenon’ the use of SMS seem to be higher among the women heads of households. Another interesting feature is the fairly significant use of the feature to check credit on their phone (almost all are pre-paid users) and the finding that women household heads using it more than men household heads. Over the years the phone has also been loaded with various instrumental features that can be effectively used to enhance the user’s day-to-day living. Immaterial of gender it was found that the flashlight, alarm clock, calendar, calculator, music player, FM radio, games and camera were some of the regularly used features.

Use of more than one SIM connection is a strategy used by some at the BOP to reduce communication costs by restricting calls within the same network. We find that most men and women heads of households use only 1 SIM connection (87%, i.e. 1584 out of 1814⁵ and 93%, i.e. 263 out of 284⁵ respectively) while a significantly higher number of men household heads (12.6%) use multiple SIMS (mainly two) than women household heads (7.4%).

⁴ These are CWEs who are using their own mobile phones.

⁵ CWE's who answered for this question were taken into consideration.

Having considered the adoption and use of phones and accompanying instrumental features as well as strategies to reduce communication expenses between men and female-headed households we now turn to the awareness of various more-than-voice services.

4.3 Awareness and use of more-than-voice services

In this section we test for the differences in awareness of economic-related more-than-voice services on mobile phones between men who head households and women who head households. The following four alternate hypotheses are tested: Hypothesis 1: Awareness of banking and financial services is higher among men headed households than women headed households; Hypothesis 2: Awareness of making and receiving a payments is higher among men headed households than women headed households; Hypothesis 3: Awareness of access to government services is higher among men headed households than women headed households; and Hypothesis 4: Awareness of livelihood related information is higher among men headed households than women headed households.⁵

The Chi-square test for proportions is used to test all hypotheses since we are dealing with categorical data. Note the data is for CWEs using their own mobile phones.

Table 6: (H1) Awareness of banking and financial more-than-voice services on mobile phones

H _a : Awareness of banking and financial services is higher among male-CWE than female-CWE			
Male	398 (15.2%% out of N _{male})	Female	66 (13.8% out of N _{female})
N _{male}	2,602	N _{female}	476
p-value		0.4674	
Result: Reject H _a at 95% level of confidence			

Table 7: (H2) Awareness of ability to make and to receive payments on mobile phones

H _a : Awareness of making and receiving a payments is higher among male-CWE than female-CWE
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⁵ The services have been described as the following in the questionnaire. **Banking and financial services:** Checking balance status in a bank account, mini-statements and checking of account history, monitoring term deposits, access to loan statements, ordering check books etc. **Making or receiving a payment:** Paying utility bills such as electricity/water bill, telephone bill, paying insurance premium, reloading mobile phone etc. as well as sending or receiving money/talk time to/from someone. **Governmental services:** Payment of property tax, applying for water/electricity/telephone connections, registration of birth and death, filing of passport forms, filing tax returns etc. **Livelihood related information:** Price alerts, market information, stock updates, business information, etc.

Male	674 (25.9% out of N _{male})	Female	98 (20.5% out of N _{female})
N _{male}	2,602	N _{female}	476
p-value		0.007	
Result: Accept H _a at 95% level of confidence			

Table 8: (H3) Awareness of ability to use mobile phone for government services

H _a : Awareness of access to government services is higher among male-CWE than female-CWE			
Male	261 (10% out of N _{male})	Female	30 (6.3% out of N _{female})
N _{male}	2,602	N _{female}	476
p-value		0.0053	
Result: Accept H _a at 95% level of confidence			

Table 9: (H4) Awareness of ability to use mobile phone for livelihood related information

H _a : Awareness of access to livelihood related information is higher among male-CWE than female-CWE			
Male	261 (10% out of N _{male})	Female	35 (7.4% out of N _{female})
N _{male}	2,602	N _{female}	476
p-value		0.0342	
Result: Accept H _a at 95% level of confidence			

As the above set tables indicate men who head households are more aware of economic-related more-than-voice services available on mobile phones than women who head households. The alternate hypotheses that male-CWE are more aware than women-CSE can be accepted in the case of payment, government and livelihood services, while only in the case of financial services that it cannot be accepted even though male-CWE seem to be slightly better in percentage terms. This is an important finding given the earlier discussion of the literature on the success of women in microfinance; in that they are better than men (no condition on being head of household) in repayment of such loans. Notwithstanding the gender-wise awareness of the four services above, we find only male-CWE are using any of the services though the numbers are very low at the BOP; only 1 male-CWE used banking and financial services, only 13 male-CWEs used payment services, and only 8 male-CWEs used a mobile phone to access government services in the entire sample.

Even though more-than-voice services as described earlier are not widely used at the BOP what

we find is that the mobile phone in general is used fairly regularly for economic-related activity as given below in table 10.

Table 10: (H5) Frequency of using mobile phone for financial, business, or work related communications; more than twice a week

H _a : Frequency of using mobile phone for financial, business or work related communications; more than twice a week, is higher among male-CWE than female-CWE			
Male	832 (44.25% out of N _{male})	Female	82 (23.8% out of N _{female})
N _{male}	1,880	N _{female}	344
p-value		0.000	
Result: Accept H _a at 95% level of confidence			

But again, as in the case with more-than-voice services men who head households were found to use the phone for economic-related communications much more than women who head households.

4.3 Efficiency improvements via mobile phones

Having considered the awareness and use of mobile phones and more-than-voce services the next area of consideration is the efficiency gains to the households as perceived by the men who head households and women who head households. The most significant efficiency gain via mobile phones has been documented by many (including multiple papers by LIRNEasia) as being the ability to reduce travel costs. We test for the accuracy of this position and also to ascertain if there is a gender difference in the perception.

Table 11: (H6) Ability to reduce travel by the use of mobile phones

H _a : Perceived ability to reduce travel via mobile phone is greater among male-CWE than female-CWE			
Male	1,567 (59.49% out of N _{male})	Female	289 (63.2% out of N _{female})
N _{male}	2,634	N _{female}	457
p-value		0.0655	
Result: Reject H _a at 95% level of confidence			

As depicted in table 11 both men and female CWEs agree that mobile phones have reduced their travel costs; in fact in terms of percentages, women are more positive than the men in this regard. Thereafter we test for the efficiency of general day-to-day work.

Table 12: (H7) Improving the efficiency of day-to-day work by the use of mobile phones

H _a : Female-CWE improved the efficiency of day to day work more than male-CWE via phone (Note H _a reversed)			
Male	1127 (45.6% out of N _{male})	Female	226 (53.4% out of N _{female})
N _{male}	2,468	N _{female}	423
p-value		0.001	
Result: Accept H _a at 95% level of confidence			

We find that women heads of households see greater benefits from mobile phones in improving their efficiency of day-to-day work than men heads of households, as shown in Table 12.

4.4 Perceptions of economic benefits of using mobile phones

We now consider the perceived economic benefits of using a mobile phone by considering the gender of the head of the household. Seven hypotheses are tested to assess if men who head households perceive that such benefits are greater than women who head households.

Table 13: (H8) Mobile phone improved ability to make more money (not direct selling of calls)

H _a : Perceived ability to make more money via mobile phones is greater among male-CWE than female-CWE			
Male	703 (28.7 % out of N _{male})	Female	76 (18.8 % out of N _{female})
N _{male}	2441	N _{female}	404
p-value		0.000	
Result: Accept H _a at 95% level of confidence			

Table 14: (H9) Mobile phone improved the ability to save money

H _a : Perceived ability to make more money via mobile phones is greater among male-CWE than female-CWE			
Male	1030 (39.5% out of N _{male})	Female	127 (28.7% out of N _{female})
N _{male}	2603	N _{female}	442
p-value		0.000	

Result: Accept H_a at 95% level of confidence

Table 15: (H10) Mobile phone improved the ability to find out about work opportunities

H _a : Perceived ability to find out about work opportunities via mobile phones is greater among male-CWE than female-CWE			
Male	697 (30.5% out of N _{male})	Female	90 (21.9% out of N _{female})
N _{male}	2284	N _{female}	410
p-value		0.0002	
Result: Accept H_a at 95% level of confidence			

Table 16: (H11) Mobile phone improved the ability to contact people related to work or job

H _a : Perceived ability to contact people related to work or job via mobile phones is greater among male-CWE than female-CWE			
Male	955 (42.2% out of N _{male})	Female	159 (40.8% out of N _{female})
N _{male}	2263	N _{female}	389
p-value		0.3124	
Result: Reject H_a at 95% level of confidence			

Table 17: (H12) Mobile phone improved the access to information needed in work or job

H _a : Perceived ability to access information needed for work or job via mobile phones is greater among male-CWE than female-CWE			
Male	652 (33% out of N _{male})	Female	120 (31.9% out of N _{female})
N _{male}	1973	N _{female}	376
p-value		0.3343	
Result: Reject H_a at 95% level of confidence			

Table 18: (H13) Mobile phone improved access to finance

H _a : Perceived ability to access finance via mobile phones is greater among male-CWE than female-CWE			
Male	559 (25.6% out of N _{male})	Female	67 (18.8% out of N _{female})
N _{male}	2182	N _{female}	356
p-value		0.0029	
Result: Accept H_a at 95% level of confidence			

Table 19: (H14) Mobile phone improved the ability to plan and make decisions related to livelihood

H _a : Perceived ability to plan and make decisions related to livelihood via mobile phones is greater among male-CWE than female-CWE			
Male	703 (31.5% out of N _{male})	Female	103 (28.8% out of N _{female})
N _{male}	2230	N _{female}	357
p-value		0.1556	
Result: Reject H _a at 95% level of confidence			

Saving money, contacting people with regard to work, finding out about work opportunities and obtaining information with respect to work as well as the ability to make livelihood decisions are all perceived to be relatively high by both men and women headed households. The ability to make money and access to finance on the other hand do not seem to be high in the perception list. In terms of the gender difference, except for issues concerning contacting people and obtaining information about work and decisions on livelihood decisions, men headed households perceive mobile phones to be statistically significantly more beneficial than women heading households.

4.5 Business and social relationship management

Building and maintaining relationships is important for success in economic activity. This is no different at the BOP. However, given there is no real demarcation between social and business calls among this group as pointed out by, inter alia, de Silva et al. (2011) building on Zainudeen et al. (2006) who implied that social and business communication is ‘blurred’, communicating with people beyond family would likely be even more beneficial for economic improvement than in other socioeconomic groups. In testing for proportions we find that in a typical week men who head households communicate significantly more with people outside their households or with friends and relatives (who are not household members) than women who head households do.

Table 20: (H15) Communication patterns for work and business

H _a : Communication with people outside the household is more among male-CWE than female-CWE			
Male	959 (35.2% out of N _{male})	Female	89 (17.9% out of N _{female})

N _{male}	2,722	N _{female}	497
p-value		0.000	
Result: Accept H _a at 95% level of confidence			

Thus what is becoming evident is that men household heads are using their mobile phones to build wider and or stronger networks than their women counterparts. This finding, in combination with the earlier finding that more men household heads use mobile phones for economic related activity than women household heads seem like an indication of a ‘self-induced gender bias’ in phone use to move towards greater economic success for the household. The table below shows men and women headed households ability to build a strong relationship with family (and friends).

Table 21: (H16) Communicating to improve relationship with family and friends

H _a : Perceived ability to improve relationship family and friends via mobile phones is greater among male-CWE than female-CWE			
Male	1,579 (62.1% out of N _{male})	Female	264 (61.3% out of N _{female})
N _{male}	2,542	N _{female}	430
p-value		0.388	
Result: Reject H _a at 95% level of confidence			

5.0 Policy Implications, Further Research and Concluding Thoughts

This paper was structured on the premise that given women are more reliable and successful at managing microfinance for micro-enterprises and that the use of mobile phones can improve the economic wellbeing of such enterprises by reducing transaction costs in obtaining relevant information and access to, inter alia, finance, if we find that female-headed households are significantly below male-headed households in (1) economic terms and (2) the use of mobile phones for economic related purposes, then there is a strong and compelling case to promote greater use of phones and more-than-voice services among such households by designing and developing specific interventions to improve their economic standing. Our assumption was that a woman heading a household is not very different to a woman running a micro-enterprise; in that unlike a woman who is not heading a household, a woman heading a household has much more financial responsibility in ensuring the sustenance of that household just as in the case of a micro-enterprise.

The results are clear on both counts. Yes, female-headed households are economically worse off than male-headed households. And yes, women who head households are, by and large, using their mobile phones in less beneficial ways to improve the economic situation of the household, and also perhaps as a result, perceive the benefits of mobile phones to be lesser than their counterpart men. This is while evidence is stacking up on how credit-worthy women micro entrepreneurs are, and how well women manage their microfinance liabilities.

Herein lays the opportunity for mobile phone service providers and stakeholders working on women’s empowerment issues to design and develop applications and strategies to target female-headed households to leverage mobile phones and more-than-voice services to improve their economic status. Take financial services for instance. In this paper we find that awareness and use of finance-money-payment related more-than-voice services are low among the BOP and within it that female-CWEs are significantly behind male-CWEs. At the same time we find that the variation in access to a bank account by female-headed households is significant among the BOP in the different countries as seen in Tables 22.

Table 22: Household (including CWE) access to a bank account

Gender		Bangladesh	Pakistan	India	Sri Lanka	Thailand	Total
Male CWE	Yes	200	60	434	277	206	1,177
		27.7%	10.8%	48.5%	89.1%	81.1%	43.0%
	No	523	493	461	34	48	1,559
		72.3%	89.2%	51.5%	10.9%	18.9%	57.0%
Total	Yes	723	553	895	311	254	2736
Female CWE		5	14	53	75	77	224
		17.2%	8.0%	40.5%	94.9%	88.5%	44.8%
	No	24	160	78	4	10	276
		82.8%	92.0%	59.5%	5.1%	11.5%	55.2%

Here we find that access to bank accounts by female-headed households range from 95 per cent in Sri Lanka to 17 per cent in Bangladesh to 8 per cent in Pakistan.⁶ In this situation how one builds on the microfinance success of women to leverage finance-related more-than-voice services to help uplift the woman-headed household at the BOP becomes an interesting question. It certainly looks possible to design services at least in Sri Lanka, Thailand and India

⁶ The main reason for large numbers of bank account holders in Si Lanka is due to a scheme where government social protection payment is paid in to a bank account.

but it needs to be kept in mind that just because women who participate in microfinance programs (self-selection) have been better than men it cannot necessarily be assumed all women, including those who head households, will be the same. In addition, several important issues must be borne in mind in designing any such service; including their very limited education level (primary) and how they build and maintain social networks focused on the family.

As discussed, this paper has been limited to the specific questions posed and analyses, given the available data. The initial findings thereby open up a new angle of research and there is much that needs to be done before one could conclusively be able to link these findings to how women's success at microfinance could be leveraged via mobile phones to improve the economic situation of female-headed households at the BOP in the emerging Asian region.

6.0 Limitations of the Study

In questionnaire, Chief Wage Earner is interpreted as the person in the house who makes the highest contribution towards household expenses. There may be situations in which the person who earns for the family and the person who spends that money are two different people. We believe that the person who earns for the family to bear the most part of the household expenses is the CWE mentioned in the paper.

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