Research Article

The Future of the Public Payphone: Findings from a Study on Telecom Use at the Bottom of the Pyramid in South and Southeast Asia

Nirmali Sivapragasam
nirmali.r.s@gmail.com
Graduate Student
Lee Kuan Yew School of
Public Policy
National University of
Singapore
469C, Bukit Timah Road
Oei Tiong Ham
Singapore 259772
+65 6516 4845

Juhee Kang
kangjuhe@msu.edu
PhD Student
Michigan State University
Department of
Telecommunication,
Information Studies &
Media (TISM)
409 Communication Arts &
Sciences Building
East Lansing, MI 48824
USA

Abstract

Public payphones, such as traditional payphone booths, have been in use since the late 19th century. However, with growing telephone ownership, particularly of mobile telephones, demand for public payphones has experienced a decline in recent years, in both developed and developing countries. Despite this, provision of public payphones continues to be a part of universal service obligations in some South Asian countries. This article examines the changing demand for these phones in developing countries, particularly in the context of low-income earners, through two consecutive surveys of bottom of the pyramid telecom users in 2006 and 2008 in six South and Southeast Asian countries. The study finds that, although demand for public payphones is declining in general, they still play a role among the poorest of the poor, and even among mobile owners. It recommends alternative forms of public payphones based on mobile technologies and suggests more inclusive mobile services for all.

1. Introduction

Public payphones, such as telephone booths, have been in use since the late 19th century (American Public Communications Council, n.d.). Such phones have long served as a useful mode of communication, especially in times of emergency, travel, or the absence of household telephony. However, with the emergence of mobile telephony, personal phone ownership has dramatically increased over the last decade, surpassing five billion connections in 2010 (ITU, 2011; Wireless Intelligence, 2010), while the demand for public payphones has declined.

Statistics from developed countries reveal a considerable decline, both in supply and demand, of public payphones from the early 2000s onward. In the United States, for example, the number of payphones in operation experienced a consistent year-on-year decline from its peak of 2.1 million in 1999 to fewer than 750,000 in 2009 (Federal Communications Commission, 2010). Similarly, the Australian Communications and Media Authority (2008) reported a 30% decline in the number of payphones in operation, along with a 31% decline in the number of calls made from payphones between 2003–2004 and 2007–2008. In addition, the UK's British Telecom reported a 50% decline in public payphone calls in the previous three years (The Highland Council, 2008).

However, the story is somewhat different in developing countries. In South Asia, the supply of public payphones has been gradually increasing over the last decade, due to the commitment of governments to achiev-

ing universal service through shared access. Meanwhile, the number of mobile phones has recently surged in the Asia-Pacific region, with average mobile subscriptions reaching 69.2 per 100 inhabitants (ITU, 2011). Such a trend raises the question of the extent to which personal mobile ownership reduces the demand for public payphones, and whether mobile phones can supplant public payphones in developing countries. Nevertheless, it may be too early to assume that developing countries will shortly follow the trend of their higher-income counterparts, and that the provision of public payphones will no longer be needed in this region in the near future. Although personal phone ownership levels are rising in developing Asia, penetration rates are still considerably lower than those of higher-income countries. Coupled with other contextual factors, such as considerably higher poverty levels and lower standards of living compared with developed countries, such socioeconomic differences imply that public telephony may still, although to perhaps a lesser extent, play an important role in connecting people—particularly among low-income earners or the bottom of the pyramid (BoP) (Galperin & Mariscal, 2007; Zainudeen, Samarajiva, & Abeysuriya, 2005).

This paper examines the changing demand for public payphones in developing countries, drawing on findings from two quantitative and qualitative studies of information and communication technology (ICT) use at the BoP in six emerging Asian countries: Bangladesh, Pakistan, India, Sri Lanka, the Philippines, and Thailand. It examines the extent to which demand for public payphones is shifting among low-income populations, and how alternative forms of public payphones can meet their changing needs.

2. Public Payphones in Developing Countries

Definition
While public payphones in developed countries usually imply telephone booths, other types also exist[1]

in developing countries. In India and Pakistan, for example, pay-per-use fixed-line phones offering local and international call facilities are available at local public call offices (PCOs), usually managed by an attendant or owner. In other countries, telecenters, which provide phone access, usually along with other facilities such as photocopying and fax services, are also common. Often, local shops and offices also offer their phone lines to villagers for a fee. Reflecting such variety, the "public payphone," in this article, is defined as any type of phone available for public use in exchange for a fee. This can include, but is not limited to, traditional payphone booths (manned or automated, with payment either by coin or card), PCOs, and phones available at telecenters and other shops, be they either privately or publicly owned.

Trends
Unlike in developed countries, the supply of public phones has been increasing gradually in most of the countries in these studies over the last decade. Based on data published by the International Telecommunication Union (ITU) and national regulatory authorities (Figure 1), four of the six countries in this study (Pakistan, India, Sri Lanka, and Thailand) experienced overall increases in the number of public phones in operation[2] between 1997 and 2007.

This past trend of increasing public payphone supply has reflected the commitments by some South Asian governments to provide citizens with universal access via such services. In fact, several South Asian governments established universal service schemes after telecommunication sector reforms in the late 1990s. These generally aimed at ensuring the provision of "basic telecommunications services" to all, where the operational definition of "basic telecommunication services" was often centered on traditional fixed-line telephony, or in some cases, a minimum level of Internet access. In this light, shared-access models via public payphones or telecenters were considered to be efficient ways to provide access to basic services by many govern-

---

1. The ITU's definition of public telephones includes coin and card-operated phones, as well as public payphones in call offices and private places, as well as mobile public telephones. All public telephones, regardless of capacity, are counted. See ITU (2010).
2. In the cases of Bangladesh and the Philippines, the number of public payphones in operation has increased since 1997, but the data beyond 2004 and 2001, respectively, was publicly unavailable. However, the total number of payphones in these countries was relatively insignificant compared to their respective population sizes, as well as to other countries under the study (i.e., fewer than 15,200 in the Philippines and 1,500 in Bangladesh).
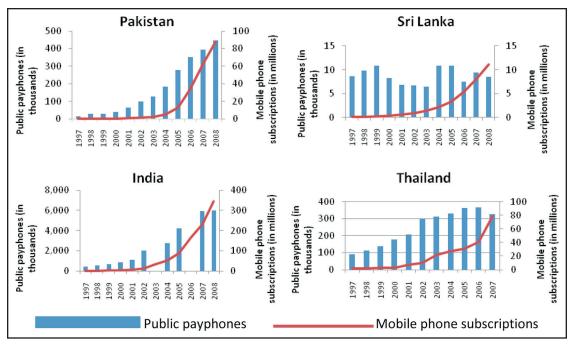
Figure 1. Growing Public and Mobile Phone Penetration in South Asia.

Source: ITU (2011), Pakistan Telecommunication Authority (2008); Telecom Regulatory Authority of India (2009); and Telecommunications Regulatory Commission of Sri Lanka (n.d.a.).

ments not only in Asia, but also in Latin America and Africa.

For instance, five of the six countries in the study have established universal services obligations (USO) to ensure universal access in rural and remote areas (see Table 1). Only Bangladesh does not have specific policies on universal services, although it recently set up a Social Obligation Fund in its 2010 Telecom Act. Often, these policies specify the provision of shared access via payphones, PCOs, or community telecenters; subsidies from a universal service fund (USF) are given to service providers to assist them with the costs of installation and maintenance of such services in less profitable areas.

Nevertheless, these policies do not take full account of the exponential growth of mobile services. As shown in Figure 1, comparative growth rates between public payphones and mobiles differed considerably, with mobiles recording much higher growth rates than their public payphone counterparts. In India, the number of PCOs grew at a compound average growth rate (CAGR) of 25% between 1997 and 2008, although overall year-on-year growth is in decline. In contrast, mobile phone

growth had a CAGR of 65% over the same time period. Data for Pakistan and Sri Lanka reveal similar findings.

Responding to the surge of mobile phones in the region, the number of public payphones in operation has shown the first sign of decline in the last few years. For instance, in India, the number of PCOs decreased for the first time in 2009, from 5.98 million in 2008 to 5.52 million in 2009, while in Pakistan, the number of "card payphones" fell from 449,121 to 405,359 over the same time period (Pakistan Telecommunication Authority, 2009; Telecom Regulatory Authority of India, 2010).

Current Challenges

While universal service policies are well-grounded in the government's goodwill to provide equal access for all, installing and maintaining public payphones, particularly fixed payphone booths, remains costly. Such modes of public telephony incur high sunk costs in installation, as well as in operation and maintenance, such as collecting coins, fixing broken equipment, and upgrading phones on a regular basis. In Chile, where cost-efficient payphone subsidy programs were successfully implemented, the

Table 1. Examples of Universal Service Obligations on Payphone Provision.

Country	USO	Key Points
India	Yes	2002 Universal Service Obligations Fund (USOF) specifies • Replacement of outdated Village Public Telephones (VPTs) and the provision of rural private phones in unconnected villages. • Provision of VPTs in every revenue village[a] and the installation of a second public payphone where public call offices were absent in villages exceeding population sizes of 2,000.
Pakistan	Yes	2005 Universal Service Fund (USF) Policy specifies • Public access points, including payphones, PCOs, and telecenters. • Basic telephone services accessed from public access points, as well as private lines. • Internet access services to adequately support multiple terminals at telecenters at suitable speeds.
Sri Lanka	Yes	Rural Payphone Subsidy Scheme offers a subsidy for • Existing and prospective payphone operators for each incremental rural payphone installation.
Philippines	Yes	2005 Universal service policy specifies • Provision of "voice services that were offered through the use of traditional switched networks," usually via village payphones or telecenters (the definition is now expanding toward broadband services).
Thailand	Yes	2005 Universal service policy rules specify • Installation of at least three public payphones per village. • Installation of at least two public payphones in schools, hospitals, and public institutions within the given time limit.
Bangladesh	No	No clear policy, but the Social Obligation Fund was established in 2010; its disbursement plan has not been clarified yet.

Note: a. A "revenue village" is a small administrative region in India, one that has definite boundaries and was identified as per Census 2001.
Source: Economic Times, 2008; Government of Pakistan, n.d.; Hussain, 2011; IT and Telecommunication Division; ITU, n.d.; Ministry of Information Technology; Nikomborirak, 2008; Soriano, 2007; Souter et al., 2005; Telecommunications Regulatory Commission of Sri Lanka, n.d.b.

average subsidy cost per payphone was US$3,600 per payphone, or US$10 per inhabitant served (Wellenius, 2002). The cost is likely to be higher in countries where rural populations are higher, or where subsidy programs are inefficiently managed.

Despite high costs, however, some argue that the service can be profitable when alternative means of access are not available. For instance, Torero et al. (2003) analyzed the willingness to pay for public telephony among rural population groups in Bangladesh and Peru, finding that respondents were willing to pay higher fees than they were currently charged; this suggests that a public payphone business can be profitable, even without the help of subsidy schemes. However, this study did not take full account of growing competition from mobile phones. With the rapid increase in mobile phone ownership levels, even in rural areas, a decline in demand for public payphones has forced many to downsize operations or close down altogether (Sey,

2008; Stern, 2003). In India, new reports published as early as 2003 highlight India's shrinking PCO industry, a result of mobile price wars that pushed tariffs down to levels even lower than those offered by PCOs (Kurup, 2008; Patnaik, 2003).

From a societal perspective, it has been suggested that the transition from the use of public payphones to mobiles can, on the whole, generate efficiency and welfare gains. Studies such as Stern (2003) analyze the welfare gains associated with users switching from public payphones to mobiles, such as lower opportunity costs (in terms of the time and money spent on locating a payphone/ public payphone, compared with a mobile, which is potentially available anytime and anywhere) and the growing number of services available on a mobile (e.g., health information, disaster warnings, and other services). She argues that such welfare gains may offset the negative welfare effects faced by those without access to personal phones. In addi-

Table 2. The Status of Personal Telephony in the Six Selected Countries.

	Bangladesh	India	Pakistan	Philippines	Sri Lanka	Thailand
Population (in millions)	162.2	1,198.0	180.8	91.9	20.2	67.7
GDP per capita, PPP	1,286	2,993	2,369	3,216	4,333	7,260
Percentage of population living on US$2 or less a day	81%	76%	60%	45%	40%	12%
Fixed-line phones per 100 inhabitants (2009)	0.94	3.09	1.95	7.37	16.98	10.63
Mobile subscriptions per 100 inhabitants (2009)	32.3	43.83	52.18	100.26	69.65	97.33

Source: ITU (2011); UNDP (HDI, 2011): the latest between 2000–2006; World Bank (2011): constant 2005 international $.

tion, if more public payphone providers (particularly small enterprises such as grocery shops, etc.) were led to innovate in the face of growing competition with mobile operators, this would lead to more (and possibly, more competitively priced) services being made available, contributing to a positive effect on welfare.

However, such arguments are best applied in the context of developed countries, where alternative modes of access are available. As noted earlier, in the cases of developing countries, such as those in South Asia, although mobile adoption rates are expanding rapidly, there still remains a considerable proportion of people without access to either a fixed-line or mobile phone. As shown in Table 2, with the exception of the Philippines and Thailand, mobile phone penetration rates have not reached levels of universal service. In Bangladesh, for instance, the total cost of mobile ownership is the lowest in the world (Nokia, 2009), but penetration rates, at the end of 2010, were still less than half of the population, as the number of active SIM cards was still 68.6 million at the end of 2010 (Bangladesh Telecommunication Regulatory Commission, n.d.). Furthermore, this figure is likely to be much lower when accounting for users owning more than one active SIM card, a phenomenon observed in the GSM-based mobile market.

Considering the rapid diffusion of mobile phones in recent years, the presence of mobile non-users can be thought of as a temporary problem. However, we are uncertain how long this temporary problem will last. It is also questionable whether or not mobile phones will eventually be adopted by all, or whether that progression will halt at a certain

point, leaving a segment of the poor unable to afford personal mobile phones. In such cases, decisions to close down loss-making public payphones can be seen as a threat to population segments without alternative means of access to phone services. In the best-case scenario, this would mean a longer walk to the nearest available phone, and in the worst case, it could be that no phone is available at all.

Governments in developing countries are thus faced with the challenge of reassessing the need for continued subsidized expansion of traditional public telephony. Such issues are multifaceted in nature, involving the interests of government and industry, as well as the often unheard voices of the poor. In particular, the current use of public payphones among the poor has not been explored in detail. In this context, we explore the nature of the demand among the lower-income and less-educated in the selected six Asian countries. We ask questions of the extent to which demand for public payphones has been affected by increasing mobile phone adoption among the poor, and discuss whether the provision of payphones, at least in their present form, should continue.

3. Method

This article is based on data from a cross-country study of ICT use at the BoP in six emerging Asian countries: Bangladesh, India, Pakistan, the Philippines, Sri Lanka, and Thailand. The study has been conducted three times since 2005, the last time being between 2008 and 2009, consisting of a sample size of 9,540 BoP teleusers. BoP was defined as the two lowest socioeconomic groups (SEC),
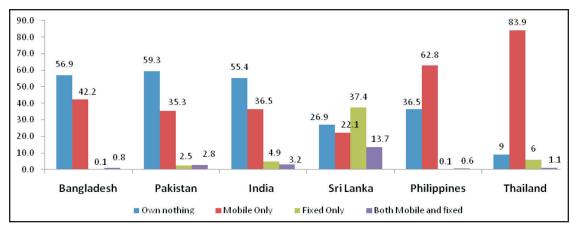
Figure 2. Type of Phone Ownership Among the BoP (% of BoP Teleusers).

D and E,[3] with the exception of the Philippines, where only SEC group E was considered. Teleusers were defined as those who had used a telephone, but not necessarily owned a phone, to make and/or receive a call in the previous three months. Methodological details of the data collection process, as well as details on the target population of the study, can be found in de Silva, Ratnadiwakara, and Zainudeen (the lead article in this special issue).

4. Demand for Public Payphones Among the BoP

Does the BoP Own Phones?

A considerable variation in phone ownership levels between the six countries was found (Figure 2). In Thailand, the majority of BoP respondents (84%) owned mobile phones, and only one in 10 people did not own any type of phone at all. In other countries, however, phone ownership is still far from universal. The Philippines had a reasonably high level of mobile ownership (63%), but almost 37% of respondents still had no access to a personal phone. While Sri Lanka had an exceptionally high level of fixed-line owners (37%), a quarter of the respondents reported no ownership. The lack of phone ownership was more prevalent in Pakistan, Bangladesh, and India, where the majority of the BoP population (59%, 57%, and 55% respectively) had neither mobile nor fixed-line phones.

Is Public Payphone Usage Decreasing?

However, even in the countries with low levels of phone ownership, dependence on public payphones is declining. Excluding Thailand, each country experienced a decline in respondents citing public payphones as their most frequently used phone between 2006 and 2008 (Figure 3). Interestingly, the greatest decline in use was seen in India and Pakistan, which reported the highest level of public payphone dependence in 2006. In India, for instance, the percentage of frequent public phone users almost halved, dropping from 63% to 33%. Pakistan and Sri Lanka also showed a sharp decrease in the proportion of respondents citing the public payphone as their most frequently used phone (dropping from 26% to 8%, and from 21% to 7%, respectively). Thailand and the Philippines showed a consistently low proportion of public payphone users between 2006 and 2008.

One reason for this decline is, as assumed, increasing mobile adoption. Between 2006 and 2008, the number of respondents citing a personal mobile phone as their most frequently used phone tripled in India, while other countries also showed a considerable increase (Figure 3). The qualitative component of the study also revealed similar findings, with rural phone booth owners in India, for example, reporting a decline in demand for their services due to growing mobile ownership. These findings corroborate similar studies conducted in

---

3. *Defined by the chief wage earner's education and occupation (as well as a few other parameters in certain countries), but closely correlated to an income level of around US$2 a day in five of the six countries studied.*
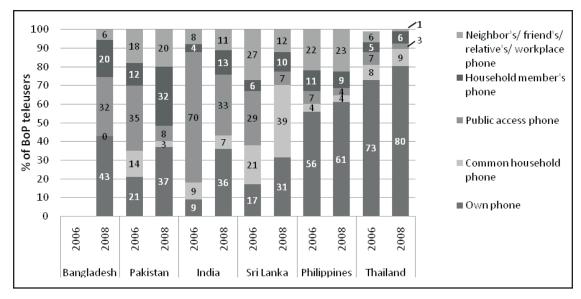
Figure 3. Comparison of Most Frequently Used Modes of Telecommunication at the BoP between 2006 and 2008 (% of BoP teleusers).

Africa, as well. Gillwald and Stork's (2008) 2007–2008 study on ICT access and use in 17 countries in Africa also found mobile substitution to be one of the major reasons given for not using payphones in the African region.

Furthermore, it is noteworthy to see that there was a considerable percentage of non-owners using phones owned by family members, neighbors, and friends, which could be a potential reason for decreasing demand for public payphones. With increasingly available and affordable mobile phone devices and services (LIRNE*asia*, 2010; Nokia, 2009), it seems that the practice of sharing access devices (Sey, 2009; Steenson & Donner, 2009) within one's social network has increased, particularly in Pakistan and India. This indicates that phone access is not so "black and white," with a dichotomous division of "personal mobile" and "public telephone," which further implies indirect effects of growing mobile ownership of others on one's demand for public payphone use.

Who Are the Public Payphone Users?
Although dependence on public payphones is declining in general, some demand for public payphones, even among phone owners, still exists. Respondents who cited the public payphone as their most frequently used phone tended to be rural dwellers (83.7%), and among the poorest of the

poor (SEC E, 62%); the majority also had either primary or no formal education (67.8%) and did not own a mobile (97.9%) (Table 3). Males tended to be more frequent users of public payphones than females. According to the qualitative study, this is likely, in part, due to social stigma faced by women frequently using phones in public spaces, especially in Pakistan and Bangladesh. Most respondents used public payphones either in proximity to them (i.e., those at shops near home, 40%) or at a public payphone booth (38%).

Among non-owners, the primary reason for not using public payphones was due to a lack of other options in most countries (Sri Lanka, Pakistan, India, and Thailand; see Figure 4). Other reasons included lower costs and accessibility at any time. Interestingly, the study found that some mobile owners also used public payphones when their mobile was not available due to low credit or battery and coverage issues (Figure 5). Similar studies conducted in Africa reveal similar findings. Gillwald and Stork (2008) found that, in countries such as Tanzania and Zambia, a whopping 96% and 93% of respondents owning a SIM card or mobile phone had used a payphone in the last three months. Considering the difficulties faced in topping-up and recharging batteries in remote areas, the benefits that alternative modes of access provide mobile phone owners are likely substantial.

Table 3. Demographics of Public Payphone Users (% of Respondents Using the Public Payphone as Their Most Frequently Used Phone).

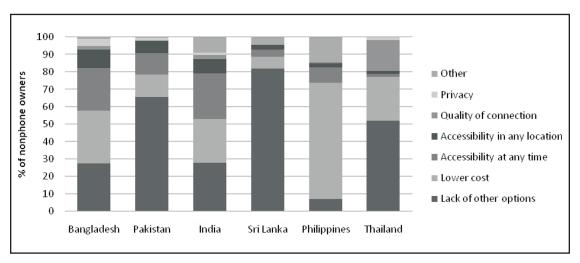|	Mobile Owner	Non-Owner	Male	Female	Urban	Rural	SEC D	SEC E	Secondary Education or higher	Primary Education or lower
%	2.1	97.9	57.4	42.6	16.3	83.7	38.0	62.0	32.3	67.7

Figure 4. Main Reason for Public Payphone Use Among Nonphone Owners (%).

5. Policy Recommendations

This study confirms that, in the face of growing mobile ownership, demand for public payphones among the BoP is generally on the decline. In light of this, the present policy stance of promoting the expansion of such services is questionable, at the least. We recommend that governments rethink the scale of present strategies and acknowledge the need for empirical evidence to support such decisions. However, given that phone ownership levels are still far from universal, some government assistance may still be needed to ensure that at least a basic level of public payphone access is available to the most marginalized communities. We recommend that governments reform the current definition and scope of universal service policies in a technology-neutral manner, as well as to design effective subsidy programs to serve the needs of the marginalized. If the government *is* to intervene in the market, it is recommended that funds be designated to promote cost-effective and accessible technologies, such as mobile-based public payphones

over the traditional payphone booth, as well as to provide targeted support to those who need it the most.

Mobile-Based Public Payphones

Mobile-based PCOs incur lower start-up and maintenance costs than their fixed-line counterparts. Popularized by initiatives such as Grameenphone's Village Phone program in Bangladesh and similar programs in other countries (Knight-John, Zainudeen, & Khan, 2005; Oestmann, 2003), already, an increasing number of telecommunication centers and PCOs are replacing their fixed-line phones with wireless local loop (WLL)- or mobile-based phones (Pakistan Telecommunications Authority, 2008; Sey, 2008). The Indian government is also increasingly shifting its focus from public payphones to mobile phones or Internet services, as they continue to re-specify their universal service policies in a technology-neutral manner. One public payphone shop owner from the qualitative study revealed that such a switch had lowered his business's overhead costs, since he could now operate within a smaller square-foot
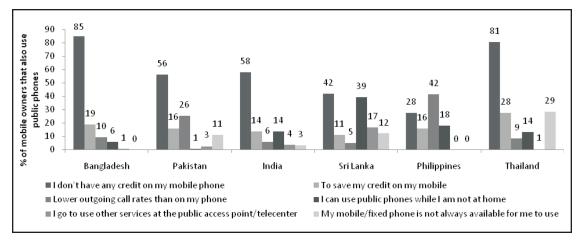
Figure 5. Main Reason for Public Phone Use Among Mobile Owners (%).

area. He could also earn money from home, due to the flexibility of offering services via mobile phones. Furthermore, in situations where calls were made to other mobile phones, it also reduced his operational costs, as mobile-to-mobile tariffs are often cheaper than fixed-to-mobile tariffs.

Rather than subsidizing incumbent telecom operators in setting up payphone booths in each village, governments can instead support local PCOs in providing mobile public payphones to villagers at a discounted or government-mandated fee. These could include, for example, direct subsidies of operation and maintenance costs, the provision of mobile SIM cards and credit transfers to PCO operators, or business incubation support if the operator would wish to expand their scope of services to include Internet facilities. Alternatively, governments can collaborate with mobile operators in expanding such services to underserved areas. Vodacom's Community Services in South Africa is a good example of an initiative where a mobile operator has carried out its universal access obligation by operating mobile PCO franchises. The mobile operator provides a modified shipping container to locate five cellular lines to local franchisers at a pre-approved location; the service has proven successful, and even profitable, with 133,000 cell phone lines running through 4,000 containers across South Africa (Vodacom, 2010).

Inclusive Mobile Services

As discussed earlier, in the longer term, the transition from the use of public payphones to that of mobiles can generate greater welfare gains for soci-ety overall. During the transition, governments need to ensure that telecom services remain both accessible and affordable to all citizens. Support can come in various ways, through providing SIM cards, free or discounted top-up vouchers, and affordable devices to the poor. Such support can also lay the groundwork for other value-added services, such as SMS-based government services, emergency alerts, mobile-banking, and health and education services.

Governments can also promote competition in the mobile industry and pro-poor consumer policies that encourage mobile adoption among the poor. According to Sey (2008), electronic mobile credit transfers expedited mobile adoption among the poor in Ghana, since there was no minimum cap on top-up recharges, allowing people to replenish their phone credit in small amounts, even of a few minutes, whenever needed. Similar pro-poor policies, such as tax reduction on tariffs and low-cost devices, can also make mobile services more affordable and accessible to the poor.

6. Conclusion

This article has shown that dependence on public payphones as a frequently used mode of communication among the BoP has significantly declined between 2006 and 2008, particularly in South Asia. This is due in large part to a rise in mobile ownership levels, driven by the increasing affordability of mobile phone subscriptions and handsets. However, although dependency on public payphones is falling, they still play a role among the poorest of the poor,

and even among phone owners. The article argued that the current policy of predominantly fixed-line-based public payphone provision in most countries may soon encounter problems of sustainability. Using their "latecomer advantages," governments in developing countries should consider using universal service funds to encourage the use of innovative technologies and strategies, such as mobile-based public payphones, which are more cost-effective and, hence, more sustainable. Furthermore, steps should be taken to encourage more inclusive and accessible mobile services for all. ∎

References

American Public Communications Council (APCC) (n.d.). *From coin to cutting edge: A brief history of the payphone.* Retrieved from http://www.apcc.net/i4a/pages/index.cfm?pageid=39

Australian Communications and Media Authority (ACMA). (2008). *ACMA communications report 2007–08.* Retrieved from http://www.acma.gov.au/webwr/_assets/main/lib310777/complete07-08_comms_report.zip

Bangladesh Telecommunication Regulation Commission. (n.d.). *Mobile phone subscribers in Bangladesh.* Retrieved from http://www.btrc.gov.bd/

Economic Times. (2008, September 13). Every village to have public telephone service by 2009-end. Retrieved from http://economictimes.indiatimes.com/News/News-By-Industry/Telecom/Every-village-to-have-public-telephone-service-by-2009-end/articleshow/3477658.cms

Federal Communications Commission (FCC). (2010). *Trends in telephone service.* Retrieved from http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-284932A1.pdf

Galperin, H., & Mariscal, J. (2007). *Mobile telephony and poverty in Latin America and the Caribbean.* DIRSI Working Paper. Retrieved from http://www.eng.uwi.tt/depts/elec/ic/dirsi/REGIONAL_FINAL_english.pdf

Gillwald, A., & Stork, C. (2008). *ICT access and usage in Africa.* Retrieved from http://www.researchictafrica.net/publications/Towards_Evidence-based_ICT_Policy_and_Regulation_-_Volume_1/RIA%20Policy%20Paper%20Vol%201%20Paper%202%20-%20ICT%20Access%20and%20Usage%20in%20Africa%202008.pdf

Government of India, Ministry of Communications & IT, Department of Telecommunications. (n.d.). *Office of the Administrator, USOF.* Retrieved from http://www.dot.gov.in/uso/usoindex.htm

Hussain, F. (2011). Sector performance review in Bangladesh: Results and analysis of the 2011 telecom regulatory environment survey.

International Telecommunications Union (ITU). (2011). *Information and communication technology (ICT) statistics.* Retrieved from http://www.itu.int/ITU-D/ict/index.html

International Telecommunications Union (ITU). (n.d.). *The universal service obligation fund (USOF) in India—An overview.* Retrieved from http://www.itu.int/ITU-D/treg/related-links/links-docs/USOF-India.pdf

IT and Telecommunication Division, Ministry of Information Technology, Government of Pakistan (n.d.). Universal Service Fund Policy. Retrieved from http://www.usf.org.pk/FCKeditor/editor/filemanager/connectors/aspx/UserFiles/USF-Policy.pdf

Knight-John, M., Zainudeen, A., & Khan, A. S. (2005). An investigation of the replicability of a microfinance approach for extending telecom access to marginal customers. In W. H. Melody & A. Mahan (Eds.), *Diversifying participation in network development: Case studies and research from WDR Research Cycle 3.* Montevideo: LIRNE.NET. Available at http://www.regulateonline.org/content/view/1044/63/1/1

Kurup, R. S. (2008, February 11). Mobile price war may spell doom for PCOs. *The Business Standard.* Retrieved from http://www.business-standard.com/india/news/mobile-price-war-may-spell-doom-for-pcos/313252

LIRNE*asia.* (2010). *Mobile benchmarks, February 2010.* Retrieved from http://lirneasia.net/wp-content/uploads/2007/08/10-02-SA-Baskets-explained-v1-2.pdf

Nikomborirak, D. (2008). *Telecom regulatory and policy environment in Thailand: Results and anal-*

ysis of the 2008 TRE Survey. LIRNEasia. Retrieved from http://www.lirneasia.net/wp-content/uploads/2009/07/TRE_Thailand_Final_2008Nov11.pdf

Nokia. (2009). Affordability key in bringing digital inclusion. *Expanding Horizons (1/2009),* 10–12. Retrieved from http://expandinghorizons.nokia.com/issues/?issue=ExpandingHorizonsQ12009

Oestmann, S. (2003). *Mobile operators: Their contribution to universal service and public access.* Retrieved from http://rru.worldbank.org/Documents/PapersLinks/Mobile_operators.pdf

Pakistan Telecommunication Authority (PTA). (2008). *Annual report.* Retrieved from http://www.pta.gov.pk/annual-reports/annrep0708/ch_05.pdf

Pakistan Telecommunication Authority (PTA). (2009). *Annual report.* Retrieved from http://www.pta.gov.pk/annual-reports/annrep0809/ch_06.pdf

Patnaik, I. (2003, July 16). Creative destruction. *The Business Standard.* Retrieved from http://www.business-standard.com/india/news/creative-destruction/136740

Sey, A. (2008). *Where did all the payphones go? Intermediaries, innovation and insecurity in the mobile phone industry.* Paper presented at the International Communication Association Pre-Conference on Mobile Communication, "The Global and Globalizing Dimensions of Mobile Communication: Developing or Developed?" Montreal, Canada.

Sey, A. (2009). Exploring mobile phone-sharing practices in Ghana. *Info, 11*(2), 66–78. doi: 10.1108/14636690910941894.

Soriano, R. C. (2007). Universal access in the Philippines: A review of policies and strategies. Paper submitted to the CPRsouth 2007 Conference: Research for Improving ICT governance in the Asia-Pacific, December 2007, Chennai, India.

Souter, D., Christopher, G., Jain, R., Mascarenhas, O., McKemey, K., & Scott, N. (2005). *The economic impact of telecommunications on rural livelihoods and poverty reduction: A study of rural communities in India (Gujarat), Mozambique and Tanzania.* DFID KaR Project 8347. Retrieved

from http://www.telafrica.org/R8347/files/pdfs/FinalReport.pdf

Stern, A. (2003). *Demise of the payphone industry: Assessing the welfare implications.* (Senior Economic Thesis, Haverford College, 2003). Retrieved from http://triceratops.brynmawr.edu/dspace/bitstream/10066/593/1/2003SternA.pdf

Steenson, M., & Donner, J. (2009). Beyond the personal and private: Modes of mobile phone sharing in urban India. In R. Ling & S. C. Campbell (Eds.), *The reconstruction of space and time: Mobile communication practices* (pp. 231–250). Piscataway, NJ: Transaction Publishers.

Torero, M. (2003). Willingness to pay for the rural telephone service in Bangladesh and Peru. *Information Economics and Policy, 15*(3), 327–361. Retrieved from http://linkinghub.elsevier.com/retrieve/pii/S0167624503000027

Telecom Regulatory Authority of India. (2009). *The Indian telecom services performance indicators, October–December 2008.* Retrieved from http://www.trai.gov.in/WriteReadData/trai/upload/Reports/46/Report1apr09.pdf

Telecom Regulatory Authority of India. (2010). *The Indian telecom services performance indicators, October–December 2009.* Retrieved from http://www.trai.gov.in/WriteReadData/trai/upload/Reports/50/IndicatorReport6apr10.pdf

Telecommunications Regulatory Commission of Sri Lanka. (n.d.a). *Statistics.* Retrieved from http://www.trc.gov.lk/information/statistics.html

Telecommunications Regulatory Commission of Sri Lanka. (n.d.b). *Rural payphone subsidy scheme.* Retrieved from http://www.trc.gov.lk/press-room/76-subsidy-scheme-for-payphone-operators.html

The Highland Council. (2008). BT payphone consultation. Retrieved from http://www.highland.gov.uk/yourcouncil/news/newsreleases/2008/April/2008-06-04-18.htm

United Nations Development Program (UNDP). (2011). International Human Development Indicators. Retrieved from http://hdr.undp.org/en/statistics

Vodacom. (2010). *Annual report 2010.* Retrieved from http://vodacom.investoreports.com/

vodacom_ar_2010/performance/sustainability-review/empowerment

Wellenius, B. (2002). Closing the gap in access to rural communication: Chile 1995–2002. *Info, 4*(3), 29–41. doi: 10.1108/14636690210439998.

Wireless Intelligence. (2010). Industry adds 1 billion connections in 18 months; On track to reach 6 billion in H1 2012. Retrieved from http://www.wirelessintelligence.com/analysis/2010/07/global-mobile-connections-surpass-5-billion-milestone/

World Bank (2011). *World development indicators*. Retrieved from http://data.worldbank.org/data-catalog

Zainudeen, A., Samarajiva, R., & Abeysuriya, A. (2006). *Telecom use on a shoestring: Strategic use of telecom services by the financially constrained in South Asia*. WDR Dialogue Theme 3rd Cycle Discussion Paper, WDR0604, Version 2.0. Available at SSRN: http://ssrn.com/abstract=1554747