Where did all the Payphones go?
Intermediaries, Innovation and Insecurity in the Mobile Phone Industry

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Abstract

The delivery of payphone services by micro-entrepreneurs using mobile phones has been celebrated widely as one of the more successful and innovative deployments of ICTs for development (ICT4D). This trend has however been impacted by the rapidly changing nature of the mobile phone industry, and rising levels of personal mobile phone ownership. This paper describes some mobile payphone systems in Africa and discusses how technological innovations deliver industry shocks to which micro-entrepreneurial payphone operators are particularly vulnerable. The potential for continuous creative destruction has important implications for ICT4D strategies that perceive mobile phones as a direct income-generating resource for the poor.

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Introduction

Researchers have identified a link between telecommunications and economic growth in advanced economies (e.g., Colecchia & Schreyer, 2001; Roller & Waverman, 2001). Hoping to replicate this outcome, most African countries have implemented telecommunications expansion policies and projects to improve connectivity and access to information. Some successes have been achieved but, throughout the continent, limited access to telecommunications persists, especially in rural and poor communities. This has necessitated the adoption of new models of ownership and access, in particular a shift from the objective of universal service to that of universal access[1]. The drive for universal access has promoted experimentation with systems of shared access such as telecenters and cybercafes as alternative methods of expanding access to telecommunications in most developing countries.

The developmental impact of such systems, based on wired telephony and Internet access, remains unclear, although it appears to have been relatively limited partly due to access, content, infrastructure and sustainability problems (Benjamin 2001; Etta & Parvyn-Wamahiu, 2003, Latchem & Walker, 2001; Mayanja, 2001; Parkinson, 2004; Roman & Colle, 2002). Access to improved services has been uneven, and methods are still being sought to bring marginalized communities into the telecommunications network. Wireless telecommunication systems, being cheaper to set up and maintain are being hailed as the "missing link" (Kelly, Minges & Gray, 2002) to improved telecommunications access on the continent. Policy reforms have made possible the growth of a vibrant wireless telephone industry in most African countries. However, much like the wired system, wireless telephone operators do not have strong motivation to provide service in poor areas due to lack of a critical mass of potential subscribers, and the cost of access remains high for majority of the continent's population. Thus, despite the immense growth of mobile phone subscriptions in Africa, ideas about shared ownership and public access are also emerging around this typically individually-owned new medium. This paper discusses mobile payphones,[2] the major form of shared access associated with mobile telephony in Africa.

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[1] Universal service generally pertains to providing service to individual households, while universal access pertains to providing access to services with some geographic or population parameters. Some commentators critique the concept of universal access, arguing for example that it "can be interpreted as a watered-down version of universal service because it demands a far lower level of investment overall" (Siochrú, 1996, electronic resource).

[2] This service is known by different names (e.g., Village Phones in Bangladesh, community phones or phone shops in South Africa). For purposes of simplicity it will be referred to as the mobile payphone system in this paper. In addition, while some mobile payphones are designed to look and operate just like the traditional fixed line unmanned payphone booths the focus of this analysis is on the systems that are manned by one or more persons.

The delivery of payphone services by micro-entrepreneurs[3] using mobile phones has been celebrated widely as one of the more successful and innovative deployments of ICTs for development (ICT4D). Starting with the Grameen Village Phone project, mobile payphones have indeed made income generation and access to telephony a reality for poor people in several developing countries (e.g., Day, 2005; *Frontlines*, 2004; LaFraniere, 2005; Moni & Ansar, 2004). Beyond anecdotes, however, little is documented about the workings of these systems in Africa and how they fit into the general landscape of mobile telephony supply and demand.[4] This paper describes mobile payphone systems in Uganda, South Africa and Ghana, and discusses how technological innovations emerging from advanced countries deliver industry shocks to which micro-entrepreneurial payphone operators are particularly vulnerable. These three countries were selected because there is some organized information available on mobile payphone systems in these countries, and the primary methods of deployment are quite different. South Africa is the most advanced economically, with the highest GDP per capita and widest penetration of fixed and mobile phone lines (Table 1). Ghana and Uganda are significantly poorer and more deficient in coverage of telecom services.

Table 1: Some Economic and Telecommunications Indicators

National Indicators	Bangladesh	South Africa	Ghana	Uganda
% of population below US$1/day	36	10.7	44.8	84.9
Urban population %	27	57	46	12
GDP per capita US$ (2003)	385	3551	354	242
Fixed line penetration % (2004)	0.61	10.4	1.47	0.27
Mobile phone penetration % (2004)	2.03	43.13	7.93	4.36

Sources: UN Statistics Division database http://unstats.un.org/unsd/demographic/products/socind/inc-eco.htm, 2005 World Development Indicators http://devdata.worldbank.org/wdipdfs/table2_5.pdf, HNP Stats http://devdata.worldbank.org/hnpstats/cg.asp, ITU statistics http://www.itu.int.

[3] Defined as people self-employed in small-scale business, usually involving less than five people (International Year of Microcredit 2005, 2005).

[4] The most detailed existing research is of the Grameen VP program in Bangladesh (e.g., Bayes, von Braun, & Akther, 1999; Keogh & Wood, 2005; Knight, Zainudeen & Kahn, 2006; Richardson, Ramirez & Haq, 2000). There are also some isolated analyses such as studies of informal payphone operators in Bangladesh (Akther, Onishi, & Kidokoro, 2006) and in Cote d'Ivoire (Kamga, 2006); and the Vodacom community phone system in South Africa (Reck & Wood, 2003).

The discussion is based on secondary data (academic and journalistic reports) in the case of South Africa[5], and a combination of secondary data and fieldwork (interviews and observation) in the cases of Ghana[6] and Uganda[7]. The following discussion presents a brief overview of the features and benefits of the Grameen Village Phone model and the different versions in Uganda, South Africa and Ghana. This is followed by discussion of the ongoing decline in the use of mobile payphones and some of the major contributors to and implications of this trend.

Four Mobile Payphone Models

Although the Grameen VP system has become the quintessential mobile payphone model, it is by no means the only possible approach. Facilitated by the flexibility of mobile phone technology (e.g., ease of connection, prepaid options, portability) mobile payphones have emerged in modified form in several African countries, and across the developing world. To illustrate the variety of formations arising from different local environments, this section provides an overview of four mobile payphone business models. Alongside similarities to Grameen's VP program, mobile payphone systems in African countries have some unique characteristics related to prevailing local conditions, as well as the original goals and purposes of the systems. For example, because the Grameen program in Uganda is based on a development concept, the extension of micro-credit to payphone operators is an important component that is not apparent in the other two countries. On the other hand, the goal of meeting universal service obligations in unprofitable markets has led to the collaborative effort between mobile phone network providers and entrepreneurs in South Africa. Finally, in Ghana, a combination of entrepreneurial spirit and user frustration with the poor quality of the telecommunication network has created a system of largely independent operators with limited involvement of network providers.

The Grameen Village Phone Model

In their Village Phone Replication handbook, Keogh & Wood define the Village Phone (VP) as "a methodology that creates a profitable partnership and channel to market to bring telecommunications services to the rural areas of a developing nation. It offers a framework to extend telecommunication

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[5] Details of the community payphone system in South Africa are derived from Benjamin (2002), Hamilton (2003), Reck & Wood (2003), Skuse & Cousins (2005), and the Vodacom South Africa website.

[6] Details of mobile payphone systems in Ghana are derived mainly from personal observation and interviews during fieldwork in 2005, 2006 and 2007. This work was carried out with the aid of a grant from the International Development Research Centre, Ottawa, Canada. Information on the Centre is available on the web at www.idrc.ca. Additional sources are Ajao (2005), Cudjoe (2005), Day (2005), and Mobile Africa (May 2005, July 2005).

[7] Details of the system in Uganda are derived from the following sources: Celtel Uganda (2006); Dot-ORG (2004), Frontline (2004), Grameen Foundation USA (no date), Keogh & Wood (2005); Knight-John, Zainudeen, & Kahn (2006); MTN (2005), Tanburn & Kamuhanda (2005), Ulfelder (2002) and personal communication with personnel of the Grameen Foundation. The author is grateful to ** for enabling access to information on the villagePhone system in Uganda.

service to the rural poor in countries where an investment has already been made in mobile phone infrastructure" (2005, p.2). There are four main parties to the system: the microfinance institution, the telecom service provider, the VP company, and the VP operator. These parties operate within a framework of interactions that include the VP users, mobile phone wholesalers, providers of other equipment, and the national government (Keogh & Wood, 2005).

In summary, the system works as follows: the micro finance institution (i.e., Grameen Bank) provides a loan to a qualifying bank member who uses it to buy the VP kit (including mobile phone, external antenna, signage and other marketing materials, and a car battery for recharging phones) from the VP Company (i.e., Grameen Telecom), and set up as a VP operator. The VP Company also negotiates wholesale airtime rates from the telecom service provider on whose network the payphone service is provided (i.e., Grameen Phone). The system runs on a postpaid basis, with the Grameen Bank providing an accounting and billing system (Grameen Telecom prepares bills at the end of the month, which are passed on to operators by Grameen Bank, which also collects the payments). Although Lawson and Meyenn (2000) concluded that the VP program was expanding into rural areas rather slowly, more recent reports indicate that as at August 2005 there were over 165,000 VP operators covering almost 50% of Bangladesh's villages (Knight-John, Zainudeen, & Khan, 2006).

VillagePhones: Uganda

Following the success of the VP program in Bangladesh, the Grameen Technology Center sought to replicate this model in other countries. Uganda was the first country in which this replication was implemented, beginning in 2003. The MTN villagePhone program consists of a partnership between the Grameen Technology Center; Uganda's second national telecom service provider, MTN Uganda; and several local microfinance institutions. In most respects MTN's villagePhone is similar to the VP system in Bangladesh. The microfinance institutions lend funds to their members and loan recipients use the funds to buy a starter kit (costing about $230) that includes a mobile phone, SIM card, prepaid airtime card, business cards in the local language, and an advertising sign for the enterprise with phone rates. Operators are also given loans for the purchase of solar panels and DC batteries where electricity is not available. Power problems may also be solved by the use of car batteries to recharge the phones. MTN Uganda gives operators the prepaid minutes at a discounted rate. In its first year the program attracted over 1300 operators, providing service in more than 18 of Uganda's 56 districts. About 100 new businesses are added every month and usage levels exceed initial projections by 25%. Deployments have also exceeded expectations. By the end of December 2005, 1326 village phones had been deployed covering all but four districts (although concentration appears to be much heavier in the southern part of

the country as displayed in maps by Keogh and Wood, 2005), and Grameen Foundation (no date) reports that there were 10,000 village phones in December 2007.

A second village phone system is run by Celtel Uganda, one of Uganda's three mobile phone companies, which currently has no universal service obligation. Celtel Uganda's "community phone" program, offered in collaboration with a micro finance company (FINCA), is not associated with Grameen, but is clearly modeled on the same premise. Local operators lease a mobile phone kit from Celtel and retail airtime to callers. They pay a monthly leasing fee to FINCA and airtime charges to Celtel. This program is also reportedly extremely successful with revenues growing at nearly twice (10% monthly on average) the rate of growth in revenue from mobile phone subscriptions.

Community Phones: South Africa

In South Africa, Vodacom uses the mobile payphone model as a strategy to meet its universal service license obligation, which requires it to deploy 22,000 lines in disadvantaged parts of the country.[8] Vodacom runs a "phone shop" franchise whereby individuals buy the necessary equipment from Vodacom for about $3,450, with an additional investment by Vodacom of about $3,950. Vodacom's contribution goes into the provision of a (Vodacom-branded) modified shipping container in which at least five cellular phones can be set up. Setup costs for rural franchises may be lower as they are usually single phone outfits. Franchisees provide their service in pre-approved locations determined by Vodacom in conjunction with the Independent Communications Authority of South Africa (based on population density, nearness to some high profile location, distance from other phone shops, and accessibility of power source). The service is provided at government-mandated prices that are less than one-third the cost of regular mobile phone calls (this initially required a subsidy from Vodacom, but a recent price increase has removed the need for the subsidy). Prepaid minutes (obtained at a discount from Vodacom) are credited directly to the phones rather than through purchase of a phone card.

The telephone sets are designed for the context of the phone shops (e.g., they resemble traditional landline phones) and Vodacom has entered into arrangements with a national supplier of phones to develop phones that are attuned to the changing needs of phone shops (e.g., programming of call time, display of time remaining, fax and data capability). The containers housing the phone shops have also been modified over time to provide greater security and/or comfort for users, employees and owners, as well as to withstand environmental wear and tear (however, this adds to the cost of the unit). Some

[8] Vodacom also attempted an alternative approach to extending access to underserved communities by providing "transportables" (mobile phone handsets) to faculty and administrators at educational institutions in disadvantaged areas. These phones were intended to be made accessible to any students who wished to use them, simply by approaching the person placed in charge of the handset. However, this approach was discontinued following the observation that students were not being given the required access.

operators use the modified containers; others use their own alternative accommodations. The program provides business training but is otherwise not involved in the day-to-day running of the enterprise.

Vodacom Community Services began this program in 1994 and has since enrolled about 1,800 franchisees in over 4000 previously underserved locations, with over 4,400 phone shops and 25,000 mobile phone lines. The number of people applying to run franchises exceeds what the program is currently able to support indicating that the high set-up costs are not a barrier to business entrepreneurs. Not surprisingly, MTN (a major competitor in mobile telephony, with a community service obligation of 7500 lines) has subsequently begun to provide a competing service in MTN-branded containers.

"Space-to-Space" Payphones: Ghana

The precursor to the mobile payphone trend in Ghana was introduced in 2004 by Spacefon[9] in response to interconnection problems with the incumbent Ghana Telecom network.[10] To overcome this problem, Spacefon provided telecenters with GSM desktop telephone sets fitted with a Spacefon SIM card to enable telecenter users to bypass Ghana Telecom when they wanted to make calls to Spacefon subscribers. The micro-entrepreneurial model emerged when these phones found their way into the hands of some individuals who began to offer this service outside the telecenter system (e.g., in convenience stores, hair salons and other small business setups). All of these operated on the Spacefon network, hence their popular designation as "Space-to-Space." Spacefon was reportedly not averse to this development since it effectively delivered an increase in network traffic. Thus, a new industry in telephone service provision was created. Most of these entrepreneurs commenced business during the latter half of 2004 and there are reportedly over 25,000 such operators around the country.[11]

There is no direct relationship between Space-to-Space operators and Spacefon. These operators simply use their own funds to purchase the telephone handset from shops that sell telephone equipment. However, according to one operator interviewed in Accra, the phone sets are currently designed in such a way that only Spacefon SIM cards (and therefore only Spacefon prepaid cards) can be used with them.[12] In 2005, the initial outlay for the enterprise was approximately ¢7million (about US$800[13]), comprising the cost of the telephone set plus 1000 units of airtime. Once the free units are depleted, operators top up

[9] Now known as MTN Ghana.
[10] These problems have been attributed to deliberate attempts by Ghana Telecom to inhibit the performance of Spacefon, which had become the premier mobile phone provider in the country.
[11] There is no formal record of the number of operators.
[12] Although since the phones are not manufactured by Spacefon, technically, it should be possible to replace the SIM card with that of any other cell phone company, thus enabling access to in-network calls for subscribers on all networks.
[13] Dollar equivalents are based on the May 2006 exchange rate for the cedi (¢), Ghana's currency: $1 = ¢9355.

with 3000-unit prepaid cards, which cost ¢900,000 (about US$100). Some minor expense may be incurred for a table, chairs, sunshade and stationery.

Early in 2005, Spacefon introduced two versions of a mobile payphone service dubbed "i-Tel 'Pop'." The first is a manned service station where users can make wireless phone calls from wall-mounted payphones. The first such station was built on the University of Ghana campus in the capital city. The second is a mobile service provided by bicycle riders. The main difference between this and the already-existing Space-to-Space service is that it is institutionally organized. However, entrepreneurs have the option to run the bicycle service as an employee of Spacefon or independently. Ghana Telecom, has also introduced a similar mobile payphone product, ONE4ALL.

Benefits of Mobile Payphones in Developing Countries

The literature on mobile payphone systems (particularly the Grameen VP) generally concludes that users are enjoying important benefits such as improved welfare, and increased consumer surplus due to lower communication costs[14] (e.g., Bayes, von Braun, & Akhter, 1999; Gillwald, Esselaar, Burton & Stavrou, 2005; Moni & Ansar, 2004; Richardson, Ramirez, & Haq, 2000; Skuse & Cousins, 2005). Reasons for use include communicating with family, business transactions, checking the prices of agricultural goods, and calling into radio phone-in programs. The payphone sites have, in some cases, also become social as well as commercial centers, taking advantage of the flow of human traffic. Mobile payphones ('private kiosks') are the most prevalent form of rural and urban public telephone access in several African countries (Table 2).

Table 2: Access to and Use of Payphones (approximate % of respondents)

	Public Payphones		Telecentre		Private kiosk	
COUNTRY	Major towns	Rural	Major towns	Rural	Major towns	Rural
Ghana (access to public payphone)	54.5	9.6	30.6	10.7	77.8	44.8
South Africa (use payphone)	24.0	17.0	14.6	18.0	35.0	43.5
Uganda (use in past 3 months)	60.0	25.0	5.0	3.0	65.0	20.0

Source: Gillwald, A. (2005), Towards an African e-Index: Household and individual ICT access and usage across 10 African countries. The LINK Centre, Wits University School for Public and Development Management.

[14] Rural residents may still have to walk up to one hour to reach a public access point.

Payphone service providers are able to generate fairly large streams of income. For example, in South Africa, phone shop operators in good locations can sell over 100 hours of airtime per month, are usually able to repay their loans within six months, and make up to $1,190 net revenue. Mobile payphones also provide significant *additional* income (up to 40% of household income in Bangladesh) since most operators are involved in other economic activities. Evaluations of the VP system in Bangladesh and Uganda indicate that operators are better able to cater for their families, and additionally gain social and economic empowerment, especially in gender terms. They also expand employment generation – for example, most operators in South Africa employ additional staff to run the phone shops, and in Ghana, a significant proportion of mobile payphone operators appear to be employees rather than owners of the payphone.

The picture then should look bright for mobile payphones and their operators in Africa. However this is not the case. Reports are beginning to emerge that this industry has peaked and in now in decline.[15] Even participants in the flagship Grameen Village Phone program in Bangladesh are experiencing a significant drop in patronage and revenue (Shaffer, 2007). This is a direct result of changes in the industry such as the falling cost of handsets and lower denominations of airtime, contributing to rising levels of personal mobile phone subscription. As individual ownership rises, the use of shared access can be expected to fall; and this is already an observable trend. The novelty and popularity of the mobile payphone business masked important characteristics of mobile telephony – particularly the goals and aspirations of individuals with regards to mobile phone ownership, the rapidly changing nature of the mobile phone industry, and the fragile nature of micro enterprises in the developing world. The Ghanaian case is discussed in the next section to illustrate these dynamics.

Declining Payphone Use in Ghana

> *I think it started off very, very, very profitable. Now the profit, the business is dying, and it's dying rather fast… and the reason it's dying so fast is the increase of mobile handsets…. Those days when handsets were more expensive and not many people could afford, then the community phone was, was the best alternative. But now a lot of people have their own handsets, and the price difference between calling from your handset and that is not much…. What has even made it worse is the credit transfer … the lowest denomination is 5000, with 5000 you can buy credit. In those days when the minimum credit you can buy from Areeba, I think was 75,000 cedis, you know, so not many people could afford 75,000. So even though you might have this [personal handset], you will be forced to be using this [payphone], because you can't afford. But now 5000, you have your privacy, you have your convenience, you know…. It hasn't got a very bright future.*

[15] See, for example, posts by Bar (2007) and Sey (2007) on the Abaporu blog.

Because ultimately, what is going to happen is individuals are going to have their own handsets and when that happens, the value of the community handset, which is One4All would just fade, would, would vanish." (Manager of Onetouch, mobile phone network provider, on the current state of the mobile payphone business in Ghana)[16]

Over a period of about three years (2003 – 2006), mobile payphones in Ghana experienced a very profitable run but are now faced with declining revenue (e.g., Figure 1). As the above quote illustrates, this is largely attributable to the improved ability of consumers to acquire and use their own mobile phones.

Figure 1: Weekly Payphones Sales

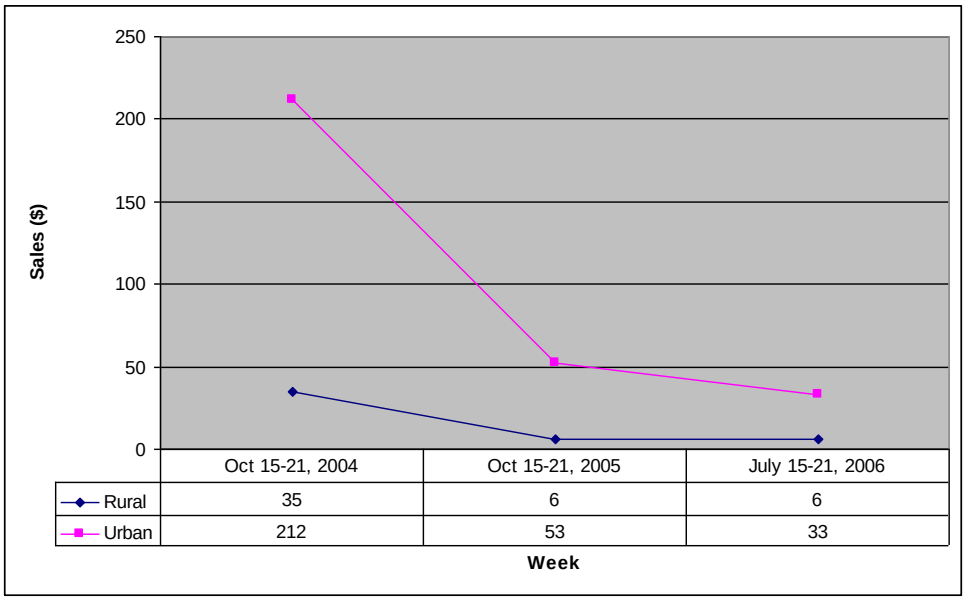


Figure is based on a sample of sales records for one rural and one urban mobile payphone operator. The October 2004 figure for the rural site is derived from the operation of a communication center using a fixed line. The communication center was replaced with the mobile payphone in 2005.

Industry activity in developing countries today is a far cry from earlier times when high-income consumers were the sole target of marketing efforts by mobile phone network and equipment companies. This re-orientation can be seen in the new language of the industry seeking to tap the "fortune at the bottom of the pyramid" (Pralahad, 2006), that is, to skim and aggregate the purchasing power of low-income consumers (see, for example, GSMA, 2006; Prahalad, & Hammond, 2002; Paul, 2004; Proceedings of the International Conference on Information and Communications Technologies and

[16] Personal communication.

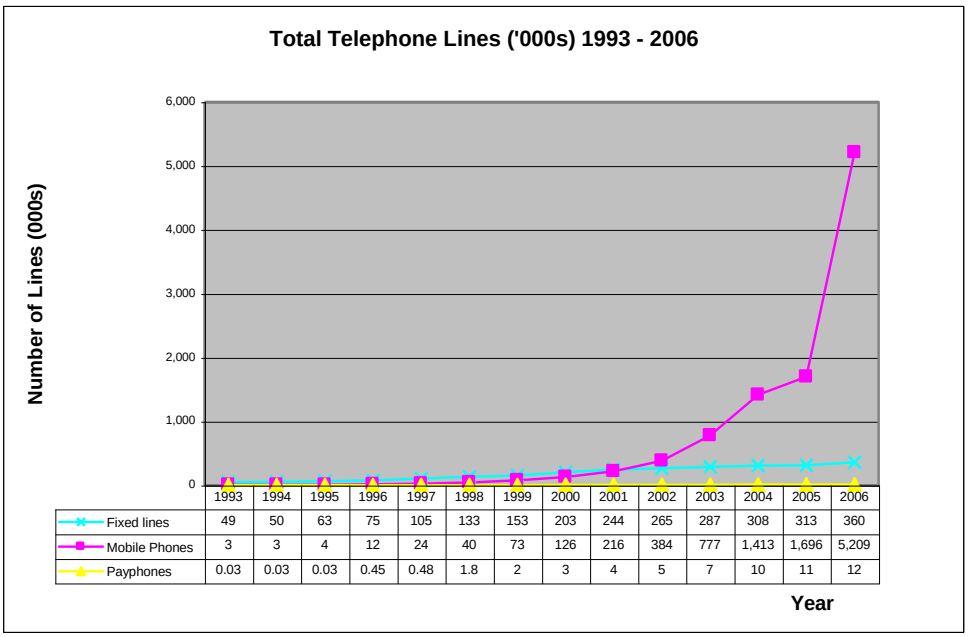
Development, 2006). Strategies that have been particularly successful in enabling the industry meet this objective include the development of low-cost handsets (such as the recent initiative by the GSM Association to develop $20 handsets), and services to deliver affordable airtime (such as micro electronic airtime transfers). These have made it possible for low-income and low-volume mobile phone users to become individual subscribers.

Although there are a variety of other reasons for the downturn in mobile payphone use[17], the deathblow was dealt by the introduction of a new method of delivering airtime – electronic transfers. Prepaid subscribers now have three options for buying airtime – regular scratch cards, vouchers, and electronic transfers (generally known as unit or credit transfers). Scratch cards were the only option available until around 2005 when paper vouchers were introduced. Vouchers are paper versions of scratch cards (but available in smaller denominations) which are printed out at the point of sale by the airtime vendor. The credit transfer system, introduced into Ghana around February 2005, is basically an electronic transfer of airtime from one phone to another. It enables subscribers to buy the smallest amounts of airtime yet (three to five minutes of talk time depending on the network). All networks now enable direct subscriber-to-subscriber airtime transfers but currently the dominant delivery method is via intermediaries – wholesalers and retailers – who have to purchase a special SIM card for the commercial operation (ranging from ¢200,000 to ¢12million, whereas regular SIM cards can cost as low as ¢20,000).

The impact of electronic airtime transfers on the mobile phone market has been significant. The ability to buy just a few minutes of airtime at a time was a boon for mobile phone users, and their acceptance of this new method of topping up was felt immediately by payphone operators. In essence, the need to use payphones in between saving up to buy scratch cards or vouchers had been eliminated. Despite serious technical problems with the credit transfer system, patronage was high. Indeed, in 2005 there was a striking rise in mobile phone subscriptions (Figure 2), which can be attributed to the availability of electronic transfers.[18] It seems logical that more people were willing to invest in a mobile phone subscription, and possibly even a mobile phone handset, because the cost of maintaining a mobile phone account had gone down with the availability of minute airtime top-ups. The initial high cost of the electronic transfer SIM card[19] has been a barrier preventing numerous payphone operators from switching to or adding credit transfers to their payphone operations.

[17] For example, the huge influx of operators all trying to cash in on this new business opportunity has led to a saturation of the market and contributed to the decline of the business for individual operators.
[18] There were certainly other contributory factors such as falling tariffs; however the electronic transfers were a major influence.
[19] This was especially high for the largest mobile phone network.

Figure 2: Total Telephone Lines



	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Fixed lines	49	50	63	75	105	133	153	203	244	265	287	308	313	360
Mobile Phones	3	3	4	12	24	40	73	126	216	384	777	1,413	1,696	5,209
Payphones	0.03	0.03	0.03	0.45	0.48	1.8	2	3	4	5	7	10	11	12

Data source: National Communications Authority, http://www.nca.org.gh

Although electronic transfers technically enable the transfer of amounts both larger and smaller than scratch cards and vouchers, in practice they address the needs of those seeking smaller amounts. This was however, not the reason network providers introduced electronic transfers – rather, they were motivated by a desire to reduce the cost of printing prepaid cards and vouchers. For example, one manager stated,

> Along the line we realized, one, the cost of production is growing, but … prices are dropping, so needed to find a way of reducing our cost of operation. Then the technology came up where you could transfer credit electronically, over the air, without a card. So that's how this whole … product came into being. We wanted to reduce our cost and so now with that … there's nothing like printing of cards, importation, flight… all the shipment cost and related things, all of them, it's gone. Because it's good for us and I think it's good for the consumers as well.

Thus, network providers are not merely responding to consumers' need for low-priced top-ups, but are probably more interested in cutting production costs; it just happens to be a win-win situation for both parties. On the other hand, for payphone operators, the net result is a loss of livelihood. As network service providers tune in to the behaviors of subscribers and non-subscribers, they have taken actions to improve their services, in the process making payphones redundant. Thus the payphone brand of intermediary appears to have only temporary relevance in the industry, serving as a transitory provider along the path from universal access to universal service.

Ironically, mobile payphone operators have been instrumental in their own demise. By sharing their access to mobile telephony, breaking down airtime units, and moving service to areas where they are needed, these intermediaries have played a critical role in exposing the purchasing power and needs of consumers at the bottom of the pyramid, information that networks and equipment providers are using to design new products and services that make personal mobile phone ownership more viable for people with limited income. The mobile payphone system in all its variants was an innovative development, which is now being supplanted by new innovations.

The Global Dimension

Although trends in mobile telephone industries in developing countries are often approached as locally-grown solutions, there is actually a strong global dimension. This derives from the significant level of foreign ownership of mobile phone network providers (Table 3), and the unavoidable sourcing of most technological hardware and software from other, usually more technologically advanced, countries.

Table 3: Mobile Phone Network Providers (Ghana)

	Tigo	Kasapa	Areeba	Onetouch	Westel
Major shareholder	Millicom International Cellular S. A. (100%)	Hutchison Telecommunications International Ltd. (80%)	MTN Group (98%)	Government of Ghana (100%)*	Government of Ghana (100%)*
Start year	1992	1994	1996	2000	n/a
Technology	GSM 900	CDMA 2000 1X	GSM 900	GSM 900	GSM
Subscriptions (2006)	1,546,721	200,104	2,585,467	877,106	0
Market share	28%	5%	54%	13%	n/a

** Both companies are in the process of seeking strategic investors.*

Foreign investment was crucial to the privatization of the fixed line operator and the general liberalization of telecommunications in Ghana. For example, over 85% of the funding for Ghana's second telecommunications development project came from foreign sources, with the largest amounts coming from Japan (Frempong & Henten, 2004.). Ghana also depended heavily and almost exclusively on the interest of foreign telecommunications operators for the privatization process to go forward. This high involvement of foreign investors continues to this day, and has contributed to the flow of particular innovations, technologies and service strategies into the country.

In fact, from the perspective of network providers in Ghana, replication and/or slight adaptation, rather than innovation, are the norm. For example, the managing director of the Kasapa network stated that, "*Ghana's mostly, like, adapting things that have been done elsewhere.*" And a tiGo network manager explained,

> Most of the new services that we introduce are more of, like, things in vogue, erm, we look at what other operators are doing in the advanced countries and then try and replicate it here, and a bit customized to fit the local market."

TiGo's current marketing strategy (based on the goals of affordability, accessibility and availability) was essentially 'transported' from its Latin American operations, where this strategy had proven successful (Beuls, 2006). In fact, a company document describes the strategy as "copy & paste from Latin America" (tiGo, 2006, p.11). This is not to say the strategy is not innovative, just that the notion of innovation should be considered in context.

Notwithstanding the adaptation of imported mobile phone technologies to the local environment, the influence of external sources cannot be ignored, nor questions about the type or extent of involvement of importing countries in the shaping of the technology at different levels. In a study of telecom companies in Ghana, Marcelle (2003) found that as in many developing countries, Ghanaian telecommunications firms are not leaders in technological innovation, but need to use high-end technological products in delivering their services. In their relationships with technology suppliers, firms exercise a "constrained agency" in that they are heavily dependent on a few foreign sources for their technology, but have some limited power because global technology suppliers also need to be responsive to the needs of their customers (Marcelle, 2003, p.243).

As a result of their relationships with foreign technology suppliers and multinational telecommunications conglomerates, network providers in Ghana have a steady flow of ideas that have been tried and tested in other countries. For example, the Space-to-Space phenomenon in Ghana became possible because Spacefon decided to solve a problem by importing GSM desktop phones, which were already being used in a similar fashion elsewhere in the world.[20] And foreign partners were the source of the electronic airtime transfer system that is edging out the payphone business. This is an important consideration for how the mobile phone industry is organized in developing countries and for the usage patterns that emerge from its deployment. It also means that the fate of other industry players such as payphone operators is linked not only to their local conditions, but to the emergence and flow of new technological products and services from the global scene.

The Role of Payphone Intermediaries in the Mobile Phone Industry

ICTs are often touted as facilitating the elimination of middlemen, thus enabling traders to obtain better prices for their produce. Conversely, within the telecommunications industry itself, intermediaries have become important mediators between network providers and consumers, particularly in the area of airtime distribution. The emergence of mobile payphones is one of the more striking instances of this

[20] Personal communication with former Spacefon employee.

mediation, because of the high involvement of poor people both as service providers and as users. Indeed, despite their bad press, intermediaries are not non-essential links in the supply chain; they can play critical roles in improving market efficiency.[21] As industry intermediaries, mobile payphone operators distribute network access beyond the physical capabilities and/or willingness of network providers, and aggregate demand from low-income, low-volume users such that service provision becomes a viable proposition. In this way, they contribute to the furtherance of national universal access goals.

Furthermore, in some African countries it has been observed that payphone users, especially the poor, prefer to use manned payphone stations and are prepared to pay extra for this purpose (McKemey et al, 2003; Parkinson, 2005; Tanburn & Kamuhanda, 2005). A major reason for this is that such users do not feel confident in their ability to use the technology on their own and like to have an attendant on hand to help. Users are also concerned about other issues such as safety and privacy, cost of phone cards and out-of-service booths where inserted cash cannot be retrieved. Payphone intermediaries in this respect provide some level of security and confidence for consumers to use telephone services.

Yet, by their very nature as intermediaries, and in an industry that is not only rife with innovations, but also where corporate service providers are actively seeking ways to reach low-income consumers, payphone operators hold an unstable position in the mobile phone landscape. Both network providers and consumers prefer individual over shared access to mobile phones. Currently the two major barriers to individual ownership of mobile telephones are access to network infrastructure and the affordability of mobile phone handsets and airtime. As these barriers are lowered, the need for access[22] through intermediaries also goes down. Meanwhile, network providers are trying to take advantage of the willingness of individual entrepreneurs to go into payphone service provision, while at the same time doing what they can to increase individual subscriptions. Clearly it is the individuals buying the payphone starter packages from network providers who stand to loose the most from venturing into the declining industry, whereas network providers have no strong financial stake in the mobile payphone business.

It is ironic that one of the most touted benefits of ICTs in the economy of developing countries is that they eliminate the need for intermediaries or middlemen. Unfortunately, mobile payphone operators are also intermediaries of sorts, and therefore subject to the same fate. Micro-entrepreneurs in developing countries have a tenacious capacity to find new business avenues for their energies, but will always be subject to the vagaries of the new economy. Thus, although the ICT industry can create high value for large and small intermediaries who identify value-adding niches to serve, the question is whether this type of participation in the telecommunications industry has long-term potential for *micro*-entrepreneurs as a

[21] Intermediaries only gain undue power when there are too few of them; whereas competition gives end-users more options and forces intermediaries to offer more reasonable prices (Eggleston, Jensen & Zeckhauser, 2002).
[22] Other types of intermediary activity are still possible, such as selling prepaid airtime through physical or electronic media.

sustainable livelihood option, where sustainability refers to the ability of poor people to engage in livelihoods that are fairly secure.[23]

Of the multiple dimensions of poverty, discussions of the digital divide usually highlight the aspects of digital poverty (lack of access to ICTs *per se*) and income poverty (lack of access to adequate resources). Reducing digital poverty can alleviate income poverty directly or indirectly. The move of the telecommunications industry towards more affordable telephony helps to reduce digital poverty. Mobile payphones contribute to this affordability enhancing process. With regards to income poverty, however, the influence of mobile telephony is more indirect than direct in the long term. From the supply side, (production and provision of products and services) mobile telephony generates income directly for participants, including mobile payphone operators. Long-term and substantial income can accrue to the big players – network providers and their employees, large and medium scale dealers, for example – although even they are prone to failure. On the other hand, smaller players such as micro-entrepreneurial payphone operators are extra vulnerable in the long-term because of their relative inability to adapt to industry shocks such as technological change.

Conclusion

Mobile payphone operators have contributed to the development of the mobile phone industry in at least three ways – extending practical access to telephony, providing employment for several individuals, and revealing latent demand for miniscule amounts of airtime. Advancements made in mobile telephony and the evolution of the industry in developing countries have made it clear that the key to serving the low-income ICT consumer is to develop targeted yet flexible service delivery models and strategies. Thus, over time, new forms of delivery have become available that enable lower-cost and more convenient access to telephones for people with limited income. Mobile payphone operators are feeling the pinch, as their patrons turn to these emerging delivery options such as micro electronic airtime transfers. While mobile payphones continue to provide a source of income for some operators in developing countries, for several others, the golden age of mobile payphones is coming to an end.
On the one hand, changes in the industry have resulted in opportunities for intermediaries to play more and more important roles in the airtime distribution chain. On the other hand, changes in the industry also have the potential to destroy the very structures that they help create.

[23] See Chambers & Conway, 1992; DFID, 1999 for discussions of the concept of sustainable livelihoods.

References

Ajao, D. (2005). *The "Space to Space" phenomenon in Ghana*. Accessed July 26, 2005 at http://www.mobileafrica.net/news-africa.php?id=484.

Akther, M. S., Onishi, T., & Kidokoro, T. (2006). *ICT for Poverty Alleviation: A study on Bangladesh*. In the International Conference on Information and Communications Technologies and Development, Conference Proceedings, 2006, pp. 203 – 206. May 25-26, 2006, Berkeley, CA,

Bar, F. (2007). *Creative destruction: izi killed the public phones*. Accessed May 11, 2008 at http://abaporu.wordpress.com/2007/06/15/creative-destruction-izi-killed-the-public-phones/.

Bayes, A., von Braun, J., & Akhter, R. (1999). *Village Pay Phones and Poverty Reduction: Insights from a Grameen Bank Initiative in Bangladesh*. Center for Development Research Discussion Papers on Development Policy. University of Bonn. Accessed December 21, 2004 at www.telecommons.com/villagephone/Bayes99.pdf.

Benjamin, P. (2001). *Telecentres in South Africa*. Accessed January 15 2005 at http://www.telecentres.am/references/info/jdc-benjamin.doc.

Benjamin, P. (2002). Reviewing universal access in South Africa. *The South African Journal of Information and Communication*, *2*(1) [Electronic resource]. Available at http://link.wits.ac.za/journal/j0201-pb.htm.

Beuls, M. (2006). *Millicom International Cellular*. [Presentation] Accessed March 3, 2007 at http://www.millicom.com

Celtel Uganda. (2006). *Community phones*. Retrieved March 16, 2006 from http://www.ug.celtel.com/en/get-connected/community-phones/index.html.

Chambers, R., & Conway, G. R. (1992). *Sustainable rural livelihoods: Practical concepts for the 21st century*. (No. DP 296): Institute of Development Studies.

Colecchia, A., & Schreyer, P. (2001). *ICT investment and growth in the 19902. Is the United States a unique case? A comparative study of nine OECD countries*. Organization for Economic Co-operation and Development. Available at http://www.olis.oecd.org/olis/2001doc.nsf/LinkTo/DSTI-DOC(2001)7.

Cudjoe, F. (2005). *Spacefon: Shrewd Business Vs. Ignorant Consumer Society*. Accessed April 19, 2006 at http://www.ghanaweb.com/GhanaHomePage/features/artikel.php?ID=74474

Day, P. (2005). Talk is profitable in Ghana. *BBC News*, 23 April. Accessed April 25, 2005 at http://newswww.bbc.net.uk/2/hi/programmes/from_our_own_correspondent/4473073.stm.

DFID. (1999, February 13, 2007). *Sustainable livelihoods guidance sheets*. Retrieved February 13, 2007, from http://www.dfid.gov.uk/.

Dot-ORG. (2004). Village cellular phones in Uganda for rural income generation and more.

DOTCOMments, 7. Accessed June 10, 2005 at http://www.dot-com-alliance.org/newsletter/article.php?article_id=36.

Eggleston, K., Jensen, R., & Zeckhauser, R. (2002). Information and telecommunication technologies, markets, and economic development. In G. Kirkman, P. Cornelius, J. Sachs & K. Schwab (Eds.), *The global information technology report 2001-2002: Readiness for the networked world* (pp. 62-74). New York: Oxford University Press.

Etta, F. E., & Parvyn-Wamahiu, S. (2003). *Information and communication technologies for development in Africa. Volume 2: The experience with community telecentres*. IDRC, Ottawa, Ontario and CODESRIA, Dakar.

Frempong, G. & Henten, A. (2004). *Telecom developments and investments in Ghana*. WDR Dialogue Theme 2003 Discussion Paper WDR 0305. Accessed February 27, 2008 at http://www.regulateonline.org/2003/pdf/wdr0305.pdf

Frontlines. (2004). Microloans are helping Uganda villagers get mobile phone service. Accessed June 12, 2005 at http://www.usaid.gov/press/frontlines/fl_sept04/pillars.html.

Gillwald, A., Esselaar, S., Burton, P., & Stavrou, A. (2005). South Africa. In A. Gillwald (Ed.), *Towards an African e-index: Household and individual ICT access and usage across 10 African countries* (pp.130-152). Research ICT Africa, the Link Centre, Wits University School of Public and Development Management. Accessed February 20, 2005 at http://www.researchICTafrica.net.

Grameen Foundation (n.d). *Village Phone Uganda*. Accessed May 13, 2008 at http://www.grameenfoundation.org/where_we_work/sub_saharan_africa/uganda/village_phone_uganda/

GSMA (2006). *Bridging the Digital Divide. An Interim Report by the GSMA Development Fund on its Shared Access to Mobile Data Projects in Emerging Markets*. Accessed March 15, 2007 at http://www.gsmworld.com/digitaldivide/index.shtml.

Hamilton, R. (2003). *Community phones connect SA townships*. Accessed July 26, 2005 at http://news.bbc.co.uk/go/pr/fr/-/1/hi/technology/3246732.stm.

International Conference on Information and Communications Technologies and Development (2006). *Conference Proceedings*. May 25-26, 2006, Berkeley, CA,

Kelly, T., Minges, M., & Gray, V. (2002). *World Development Report 2002: Reinventing telecoms*. Available at www.itu.int/ITU-D/ict/publications/wtdr_02/material/WTDR02-Sum_E.pdf.

Keogh, D., & Wood, T. (2005). *Village phone replication manual: Creating sustainable access to affordable telecommunications for the rural poor*. New York: The United Nations ICT Task Force.

Knight-John, M., Zainudeen, A., & Khan, A-S. (2006). *An investigation of the replicability of a*

microfiinance approach to extending telecommunications access to marginal customers. Version 3.1. WDR Dialogue Theme 3rd cycle, Discussion Paper WDR0506. Accessed February 27, 2006 at http://www.regulateonline.org/index.php?option=content&task=view&id=591&Itemid=31&relaItemid=631.

LaFraniere, S. (2005). Cellphones catapult rural Africa to 21st century. *The New York Times*, August 25, p. A.1.

Latchem, C., & Walker, D. (Eds.), (2001). *Telecentres: Case studies and key issues.* Vancouver: The Commonwealth of Learning.

Lawson, C., & Meyenn, N. (2000). *Bringing Cellular Phone Service to Rural Areas: Grameen Telecom and village pay phones in Bangladesh*. Viewpoint Note No. 25. Accessed April 7, 2006 at www.worldbank.org/html/fpd/notes/.

Marcelle, G.M. (2003). Reconsidering technology transfer. *International Journal of Technology, Transfer and Commercialisation*, 2(3), 227-248.

Mayanja, M. (2001). *The African community telecentres: In search of sustainability*. Accessed January 15, 2006 at http://www.developmentgateway.org/download/165918/In_search_of_sust-telecenters_DG.doc.

McKemey, K., Scott, N., Souter, D., Afullo, T., Kibombo, R., & Sakyi-Dawson, O. (2003). *Innovative Demand Models for Telecommunications Services (R8069). Final Technical Report*. Accessed February 22, 2005 at http://www.telafrica.org/

Mobile Africa (May 19, 2005). *ONEtouch introduces ONE4ALL*. Accessed July 26, 2005 at http://www.mobileafrica.net/news-africa.php?id=272.

MobileAfrica. (July 3, 2005). *GSM desktop phones*. Accessed July 26, 2005 at http://www.mobileafrica.net/articles-africa.php?id=17.

Moni, M. H., & Ansar, U. M. (2004). Cellular phones for women's empowerment in rural Bangladesh. *Asian Journal of Women's Studies, 10*(1), 70.

MTN (2005). *MTN villagePhone*. Available at http://www.mtn.co.ug/payphone/villagephone.htm.

Parkinson, S. (2004). The road to telecenter success remains mysterious. *Balancing Act News Update*, 193, February 9. Retrieved April 17, 2006 from http://www.balancingact-africa.com/news/back/balancing-act_193.html.

Parkinson, S. (2005). *Telecentres, access and development: Experience and lessons from Uganda and South Africa*. ITDG Publishing/Fountain/IDRC. Available at http://www.idrc.ca/en/ev-87255-201-1-DO_TOPIC.html.

Paul, J. (2004). *Technology, globalization and the poor summary of the global knowledge for*

development virtual conference. A Digital Dividend Report by the World Resources Institute. Accessed March 1, 2008 at www.digitaldividend.org/pdf/gkd_vc.pdf.

Prahalad, C. K. (2006). *The Fortune at the Bottom of the Pyramid*. Wharton School Publishing.

Prahalad, C.K., & Hammond, A. (2002). *What works: Serving the poor, Profitably. A Private Sector Strategy for Global Digital Opportunity*. Accessed March 10, 2008 at http://www.digitaldividend.org/pdf/serving_profitably.pdf

Reck, J., & Wood, B. (2003). *What works: Vodacom's community services phone shops*. Seattle: World Resources Institute.

Richardson, D., Ramirez, R., & Haq M. (2000*). Grameen Telecom's Village Phone Programme in Rural Bangladesh: a Multi-Media Case Study Final Report*. Accessed December 21, 2004 at http://www.devmedia.org/documents/finalreport%2Epdf.

Roller, L-H., & Waverman, L. (2001). Telecommunications infrastructure and economic development: A simultaneous approach. *The American Economic Review, 91*(4), 909.

Roman, R., & Colle, R. D. (2002). *Themes and issues in telecentre sustainability*. IDPM Working Paper No. 10.

Sey, A. (2007). *"Right now the business has spoil."* Accessed May 11, 2008 at http://abaporu.wordpress.com/2007/06/21/%e2%80%9cright-now-the-business-has-spoil%e2%80%9d/.

Shaffer, R. (2007). *Unplanned obsolescence*. Accessed May 11, 2008 at http://www.fastcompany.com/magazine/118/unplanned-obsolescence.html.

Skuse, A. & Cousins, T. (2005). *Managing distance: The social dynamics of rural telecommunications access and use in the Eastern Cape, South Africa*. Information Society Research Group Working Paper No. 1. Available at http://www.isrg.info.

Siochrú, S. Ó. (1996). *Telecommunications and universal service: International Experience in the Context of South African Policy Reform*. Ottawa: IDRC.

Tanburn, J. & Kamuhanda, R. (2005). *Making service markets work for the poor: The experience of Uganda*. DFID. Retrieved April 17, 2006 from http://www.bdsknowledge.org/dyn/bds/docs/240/MSMW4P_Report.pdf.

TiGo. (2006). *Ghana 2006: Market overview*. Accessed December 3, 2006 at http://www.millicom.com.

Ulfelder, J. (2002). Upwardly mobile. *World Link, 15*(2), 48-51.

Vodacom South Africa. (2006). *Community services*. Retrieved June 23, 2005 from http://www.vodacom.co.za/about/community_franchise.jsp.