

The Gap between Mobile Application Developers and Poor Consumers: Lessons from Kenya

Tonny Omwansa (tomwansa@uonbi.ac.ke)

Angela Crandall (angelac@ihub.co.ke)

Timothy Waema (waema@uonbi.ac.ke)

Abstract

With a 75% mobile penetration in Kenya, there has been a flurry of efforts to develop mobile applications for the common citizen who now owns a mobile device. However, the uptake of such mobile phone-based applications has been disappointingly low, especially at the so-called base of the pyramid (BoP). This paper examines the development and use of mobile applications at the BoP in Kenya with a view to establishing the challenges of scaling the uptake of these applications. It is based on findings from data obtained from users and developers, as well as key stakeholders. Specifically, the paper analyses data from a study commissioned by infoDev that involved 796 face-to-face interviews with mobile phone owners, 178 financial diaries of phone usage, 12 focus group discussions with mobile phone users and 10 key informant interviews with stakeholders in the Kenyan telecommunications industry. The paper also relies heavily on a national representative survey by Research ICT Africa (RIA) that involved 1,200 households in Kenya. The paper concludes that the scaling of mobile applications use amongst BoP users has three key challenges. One, the development of applications is not informed by thorough research on the problem space and possible solutions. Two, most developers of mobile applications lack the financial and social capital to market their solutions. Consequently, there is limited awareness of these applications amongst BoP users for scaling to take place, leave alone traction. Finally, most applications do not reach the stage for financial sustainability, especially given the low purchasing power of users at the BoP and their sensitivity to cost. The paper ends with recommendations on how the penetration and diffusion of mobile applications can be accelerated.

Key Words: Access, mobile applications, poverty, consumer, Kenya, Base of the Pyramid

Introduction

Close to 80% of the 6 billion mobile phone subscriptions in 2011 were in developing countries (ITU, 2011). In Kenya, by the second quarter of 2013, the Information Communications Technologies (ICT) regulator, the Communication Commission of Kenya (CCK) reported that mobile subscription had reached 30.7 million against a population of 41 million (CCK 2012), representing a 75% penetration. With this high penetration of mobile phones, there has been a significant effort to develop mobile applications that people can use to improve their livelihoods. The uptake of mobile phones in Kenya has triggered a realization that the mobile phone can serve as a good tool for disseminating information among other forms of use. The use of mobile phones to extend financial services to the poor in Kenya and the Philippines is one example of the potential for mobile applications (Omwansa & Sullivan, 2012). Mobile applications are now propagating in the development sectors such as education, agriculture, health, transport, and government, among others. Unfortunately, the uptake of such mobile phone-based applications in Kenya has not been widespread, except notably for M-Pesa (“M” for mobile and “Pesa”, the Swahili word for money) (infoDev, 2012).

Numerous entrepreneurs have developed technology applications to serve various needs, many of them working out of the innovation hubs being established in the capital city of

Nairobi. The general uptake of these applications still appears to be very low, particularly among the poor individuals in society. Success of such innovations depend on various factors, including the right regulatory environment, access to information about the applications, access to the applications, consumer culture and appropriateness of the innovation, among others. Due to a number of barriers, most of the applications that have been developed remain in pilot stage, or are consistently supported by donor funding. A report published by infoDev established that over 80 mobile applications exist in Kenya aiming to solve various societal problems. Most of the base of the pyramid (BoP) mobile phone users, for whom many of these applications were developed, are unaware of them (infoDev, 2012).

The research reported in this paper was guided by the question: What can be learned about the development and usage of mobile applications at the BoP in Kenya? In order to address the research question, we identified the following subsidiary questions:

1. What is the level of uptake of mobile applications among the BoP in Kenya?
2. How well is the BoP mobile phone consumer market segment understood by the mobile applications developer community in Kenya?
3. How relevant and supportive is the regulatory framework in Kenya?

This paper aims to contribute to the literature by exploring the gaps between mobile application developers and the BoP consumers. The paper reviews some of the experiences of start-ups developing mobile applications in Africa, particularly in Kenya. It analyses the challenges faced in scaling these applications and provides some recommendations on how the penetration and diffusion of mobile innovations can be accelerated.

Review of related literature

Potential for mobile phone applications for the poor

The rapid adoption of mobile phones has generated optimism around the world about the potential economic effect in developing countries. In a study about mobile phones and economic development in Africa, Aker and Mbiti (2010) identified ways in which mobile phones can potentially provide economic benefits to consumers in Sub-Saharan Africa. They itemized the ways as follows: first, to improve access to and use of information; second, to improve firms' productive efficiency; third, to create new jobs to address demand for mobile-related services; fourth, to facilitate communication among social networks in response to shocks; and finally, to facilitate the delivery of financial, agricultural, health and educational services (Aker & Mbiti, 2010).

There is an established relationship between increased access to ICTs and improved income and economies (Aker J., 2008; Ilahiane et al., 2012). Further, there are several studies that have demonstrated possible opportunities in using mobile phones to develop rural economies (Baumuller, 2012). For instance, a report by Vodafone Group and Accenture illustrates multiple ways in which solutions on mobile phones focused on food and agriculture would be useful. Specific ways identified include increasing access and affordability to financial services, delivery of relevant information to farmers, improving

data visibility for supply chain efficiency and enhancing the link between stakeholders of the agricultural markets (Vodafone Group & Accenture, 2011). In a separate study by the World Bank, researchers reviewed over 80 mobile applications from Africa, Asia, Latin America and the Caribbean. The study identified four areas in which mobile phones can make a difference in the lives of poor farmers. The areas are better access to market, disease and climate information; better access to extension services; better links to distribution networks; and better access to financial services (Qiang et al., 2011).

In a paper that used Sen's Capability Approach, Ndung'u and Waema (2011) established that mobile phones and Internet had led to both positive and negative development outcomes in low-income households in Kenya. Households' choices were based on their perceptions of the role that the new technologies played in enhancing their quality of life. The paper notes that the social, economic and knowledge status of individuals, coupled with the choices they make, determine the development outcomes derived from use of mobile phones and the Internet (Ndung'u&Waema, 2011).

Scaling of mobile applications

The development and testing of mobile applications have not been the greatest challenges faced by the technology community in Africa. Rather, it is the scaling of the applications, especially in developing countries, that has been noted as the greatest challenge. The study by the World Bank on mobile applications for rural development that reviewed over 80 mobile applications across the world found that only a few were already sustainable (Qiang et al., 2011). One study in Uganda showed that between 2008 and 2009, approximately 23 of 36 mHealth initiatives did not make it past the pilot phase (Lemaire, 2011). There are several challenges when scaling mobile applications. The most obvious is access to the mobile phones, whereby the wealthier and more educated are likely to be the ones with mobile phones (Muto & Yamano, 2009). In some cases, the challenges are not so apparent. The World Bank analyzed over 500 mHealth studies, but could not provide information about the likely uptake, best strategies for engagement, efficacy, or effectiveness of these initiatives (Qiang et al., 2011; Tomlinson et al., 2013). M-Pesa is probably the most celebrated recent innovation in developing countries that has scaled rapidly. In the five years since its inception, the mobile application is accessible to over 15 million people in Kenya. The mobile operator, Safaricom, has provided customers with more than 45,000 M-Pesa agents for cash-in-cash-out services. Over 700 business partners have formed a partnership with M-Pesa, making it a huge financial services grid. Several studies have explored the design, adoption and impact of this application (Omwansa& Sullivan, 2012). Specifically, a number of success factors have been identified, including proper management of the agent network, creating a compelling product offering and sustaining a strong corporate commitment (Cobert et al., 2012; Omwansa& Sullivan, 2012). In managing the agent network, Cobert et al. (2012) propose three key tenets: (1) growing the customer base and the agent network in tandem; (2) understanding the agent economics as well as risks; and (3) enrolling agents who have the right skills and dedication. In a separate study of M-Pesa uptake at the initial stages, Ignacio Mas and AmoloNg'weno summarized the key success factors of M-Pesa as (1) creating a strong brand, resulting in awareness and trust; (2) good channel management through creating a consistent user experience; and (3)

appropriate pricing for the customers and an attractive agent commission structure that incentivized early adoption (Ignacio & Amolo, 2010). In this paper, we wish to provoke relevant stakeholders to consider the extent to which some of these factors have been considered when developing and rolling out new mobile applications.

The challenge for the developers

Unlike the case of M-Pesa, most of the recent mobile applications have been developed by start-ups who might have a number of limitations to facilitate scaling. In a publication focusing on the technology adoption among the poor, Baumuller (2012) argues that obtaining access to technologies requires knowledge of the existence of the technologies. This probably forms the first challenge for scaling innovations by start-ups. If the intended user at the BoP has no information regarding the existence of the new technologies, potential usage is limited. Beyond access to the technologies, the intended consumer must have the ability to assess the suitability, and then obtain and finance the technologies. At the point of usage, the user must have the necessary knowledge for usage and associated risk management (Baumuller, 2012).

Other studies have pointed out that aspects of the business models could be influencing the diffusion of mobile applications. Within the business model, sustainability ranks high. In the study mentioned earlier, Qiang et al. (2011) found that, about 16% of the applications studied had reached a stage of financial sustainability. As part of the business model, demand appeared as a key determinant of the sustainability of the commercial applications. Demand is fairly broad, but within the context of the study, it focused on the willingness of the consumers to pay for the goods and services, which the researchers noted is distinct from ability to pay (Qiang et al., 2011).

A number of recommendations have been provided in the literature to assist start-up companies plan to succeed. For example, a white paper commissioned by the Advanced Development for Africa (ADA) identifies recommendations (See Table 1) for mHealth programs, which could be adapted to other mobile application sub-sectors (Lemaire, 2011).

Table 1: Recommendations for designing mApplications that would succeed

1	Planning for sustainability and scalability right from project conceptualization
2	Performing assessments to identify real needs and demands of target beneficiaries, local priorities and understanding the local landscape
3	Identifying existing similar initiatives and players
4	Avoiding duplication by collaborating with other organizations
5	Securing buy-in from critical stakeholders like government and communities as soon as possible

6	Educating and engaging end-users and target beneficiaries in the development of the applications
7	Collaborating with local implementation partners
8	Aligning the applications capabilities with the local and national priorities
9	Establishing strategic partnerships to support scaling up of the projects
10	Performing monitoring and evaluation using meaningful measurable metrics
11	Maintain flexibility in project implementation to adapt to changing needs and priorities of beneficiary populations and avoid failures

Source: Lemaire (2011)

Development of mobile applications for the poor in Kenya

As noted above, the use of ICT in Kenya has been on the rise in the past decade, and many see the country as a technology and innovation front-runner among developing countries. Specific examples of innovations out of Kenya, launched by government, private sector, development partners and start-ups, make the country worth mentioning. The start-ups alone have launched over 80 mobile applications within a few years (infoDev, 2012). Also notable for the growth of Kenya's technology community has been the emergence of several innovation hubs in Kenya (sometimes called technology labs or incubators) since 2010. Some of the most notable technology hubs are iHub, m:Lab East Africa, iLab Africa, Nailab, Startup Garage Nairobi and C4DLab. The strong belief that mobile phones will shape the future of technology in the country has attracted academics, venture capitalists, researchers, entrepreneurs and policy makers alike, wanting to participate in different ways. The hubs strive to ensure technology start-ups grow into stable businesses. While there is not yet substantive evidence that this objective has been achieved, the number of mobile applications launched shows significant levels of activity in these hubs.

Emerging models for BoP in developing markets

Since the publication of the book '*Fortune at the Bottom of the Pyramid*' in 2004 by C. K. Prahalad, there has been a growing attention on designing business models that enable entrepreneurs to generate income while serving the poor. There is also a growing body of literature on how to design and develop innovative business models for the poor consumers (Karamchandani et al., 2009; Ismail & Masinge, 2011; GSMA, 2012).

Getting the business model right to design products for a particular BoP group can be very challenging. A study conducted by Monitor evaluating over 270 examples of market-based business solutions found many business models lacked the ability to sustain themselves. Since the consumers at the BoP are characterized by low purchasing power with small and

irregular income, to serve this segment, businesses must address affordability and cost, while factoring in the customer's cash flow (Karamchandani et al., 2009).

Methodology

The findings described in this paper are largely based on a study commissioned by the infoDev, with the support of UKaid and the Ministry for Foreign Affairs of the Government of Finland. The data for the study was collected by iHub Research and Research Solutions Africa (RSA) through qualitative and quantitative approaches. The data collection methods can be summarized as follows:

- 796 face-to-face interviews with BoP mobile phone owners in 6 districts across Kenya, covering the urban and rural populations of each district. In addition to the questionnaire, 178 participants completed a diary to record in great detail four days of their phone use. These diaries were supported by the actual phone logs.
- 12 Focus Group Discussions among phone users in the BoP target group to better understand the choices made.
- 10 Key Informant Interviews with stakeholders in the Kenyan telecom industry from leading managers of service providers to representatives of regulatory bodies.
- A range of interviews with entrepreneurs, especially with those who aim to serve the BoP market with mobile phone based add-on services and applications.
- Extensive desk research and literature review.

The regions and respondents were selected to maximize the diversity of the insights, rather than to proportionally reflect Kenya's population. The multitude of approaches allowed for a nuanced and detailed picture of the BoP mobile phone sector. For this study, a \$2.50 USD/day income line was used and adjusted for purchasing power parity (PPP) in choosing BoP respondents. In addition to using an income line to categorize the BoP, a Living Standards Measure (LSM) was also used to categorize and screen respondents. LSM refers to a household's consumption habits as measured by the ability to purchase and consume a variety of goods and services.

The paper also relies heavily on a national representative data set for Kenya, collected by Research ICT Africa (RIA), using a random sampling methodology. The Kenya survey was conducted in September 2011, with the sample consisting of 1,200 households and 500 Small-Medium Enterprises (SMEs). For the households, the fourth National Sample Survey and Evaluation Program (NASSEP IV) sampling frame of the Kenya National Bureau of Statistics (KNBS), which has 1,800 clusters spread all over the country, was used.

Findings and Discussion

Understanding the BoP mobile consumer market segment

Noting the high uptake of mobile phones, Kenyan mobile application developers are trying to tackle many of the challenges faced by the economically underprivileged by using technology-based solutions. There has been a consequent recent proliferation in East Africa of mobile phone and web-based innovations. Such innovations aim to address many of the issues raised by those at the BoP.

Entrepreneurs of such innovations in East Africa have tended to be ambitious young adults (between 18 to 35 years old) looking to utilize the wide uptake of mobile phones across the region to catalyze economic change. These entrepreneurs are forming teams and establishing technology start-ups, searching for repeatable and scalable business models. Start-ups aim to validate their business models until they can move into execution mode. Many of these start-ups have attempted to better understand their users, but appear to not yet fully understand their market. For example, many of the developers building for BoP are either creating products for mobile device platforms that are not yet widely used at the BoP (such as Android) or are facing the challenges associated with building for more basic platforms like Short Message Service (SMS) and Unstructured Supplementary Service Data (USSD).

Based on interviews with start-ups, it was noted that most of the entrepreneurs developing applications for the BoP are not yet focusing heavily on marketing their products. With limited time and initial resources, often the start-ups choose to focus on the development of the product and securing funding. Some start-ups dismiss marketing because they equate marketing to the use of general media outlets, such as TV and newspaper, which can often be very costly. While understandable, this decision results in very low awareness amongst BoP users, who largely get their information through word of mouth, TV, radio, and newspapers. Low awareness translates to low usage, since a new user cannot use a product that they know nothing about.

For similar reasons, many start-ups also do not conduct research to better understand their BoP consumer. Often, these young technologists build a product based on a perception they have, rather than based on a real BoP individual that they know and with whom they empathize. It is still rare to find tech start-ups that regularly spend time in the field to understand and continually test their products with their consumers.

Ignacio and Amolo highlighted that M-PESA's success was achieved by creating a strong brand, developing awareness and trust, managing the channel well through a consistent user experience and developing an appropriate pricing model. Thus far, these factors have not yet been fully embedded in the new mobile applications that are being developed and launched. It is important to realize that achieving these factors can be especially challenging for mobile applications start-up teams, many of whom are youth without financial or social capital to leverage. This is in sharp contrast to Safaricom, Kenya's biggest mobile network operator that developed the first implementation of M-Pesa, who already had an established network of airtime reselling agents, and the social and financial capital to establish and scale M-Pesa.

Technological capabilities of BoP in Kenya

According to representative data collected by Research ICT Africa in 2012, 60.5% of the BoP population in Kenya owned a mobile phone. This indicates that the mobile device can indeed be a key channel for service and information delivery to the poor. Of these BoP mobile owners, 20.5% stated that their mobile phone was capable of browsing the Internet, implying they are using either smart or feature phones. The majority of mobile phone owners at the BoP, therefore, are still using basic phones that can only largely access SMS, USSD, and calling services. Alarm clock, calculator, and flashlight functions are also common on basic phones.

These mobile phone users at the BoP remain very sensitive to cost due to often low and irregular income. When asked what prevents them from making more phone calls, over 70% stated that the cost of calls was prohibitive. If calls were cheaper, 44% indicated they would make more calls. When deciding how much to spend on airtime for their mobile phones, 45.7% decided when the need arose (and not beforehand) while 40.7% stated that whenever they had money, they bought airtime. These two most popular strategies for deciding how much to spend also illustrate the level of uncertainty around income at the BoP.

Cost also plays an important role in attracting mobile users to certain networks. Apart from Safaricom, the key determinant for choosing to subscribe to a particular Mobile Network Operator (MNO) is how cheap the services are. 73% of respondents subscribed to either Yu or Airtel networks noted 'cheap services' as the main reason. However, this preference for cheap services did not hold true for Safaricom subscribers, where the majority of people stated that they subscribed because their friends were already subscribed to the network. This might help to also explain why 30% of the interviewed respondents had subscribed to more than one network provider (so they could take advantage of the variety of services offered by the various MNOs). Safaricom can also boast of strong and consistent national network coverage, and M-Pesa, Safaricom's mobile phone-based money transfer service, which many (68%) respondents stated as the reason they use Safaricom. Safaricom's M-Pesa has made it easier for the BoP to use financial services and receive support from others outside of their immediate geographical proximity. It is worth noting that at the moment, all of the Kenyan network service providers have mobile money transfer services. Yu operates Yu cash, Airtel has Zap, while Orange has Orange money. Despite the several products, most users still prefer M-PESA due to its widespread agent network and established trust for the brand. One focus group respondent explained, "Safaricom has an advantage of the M-PESA service, so one can't afford to move [to another operator] and even if you do so eventually you will come back even for the M-Pesa service."

With cost being a particularly important factor in mobile phone usage by the BoP, users do what they must in order to continue to use their cherished devices. One in five of those at the BoP have sacrificed in order to purchase mobile airtime. Many of these people sacrifice food, transportation fare, or clothing in order to save money towards airtime or towards the purchase of a mobile phone. This sacrificing behavior has also been noted elsewhere in the literature (Diga, 2007; Labonne & Chase, 2008; Banerjee & Duflo, 2007). From this behavior, one might extend the argument that if an application is deemed to be critical by BoP users,

they will forego other necessities to access and use it. This implies the need for developers to identify killer applications through research.

Despite the limits of a basic phone, Kenyans at the BoP not only use their phones for calling and SMS, they also use their phones for a plethora of activities including running of their business, job inquiries, sending and receiving money, and listening to music. 18.4% of BoP mobile phone owners use Facebook, Twitter, or other social networking sites, countering a notion that social media is only for the middle and upper class in Kenya. The myriad of uses reveals the deep integration of the mobile device into the lives of the BoP and the potential for greater uptake of applications if new applications properly address the desires of the BoP consumer.

Level of uptake of mobile applications by BoP

Based on our primary data, the level of uptake of mobile applications among the poor in Kenya is still very low. The data shows that most BoP mobile phone users mainly use the basic phone's features, Internet, and M-Pesa. They are unaware of any of the other applications and services available to them through their mobile phones.

As detailed in Table 2 below, all respondents knew about calling services. Almost all survey respondents (98%) were also aware of the M-Pesa service due to extensive TV advertising, very visible billboards, and the popular word-of-mouth. Most (92%) also knew of airtime borrowing services. Only 1% of respondents knew of Internet data bundles/services, which is quite surprising considering that over 16% stated that they use Internet browsing on their mobile. This suggests that either the majority of Internet users utilize the pay-as-you-go mobile Internet (instead of data bundles) and free Internet offers, or that they do not fully understand what Internet browsing consists of.

Table 2. Awareness of mobile phones services and applications provided by MNOs

	Count	Percent
Calling	795	100
Mobile money transfer	781	98
SMS	778	98
Credit (airtime) borrowing	735	92
Tracking lost phones	124	16
Commodity prices	41	5
Internet data bundles	11	1
Bonga points (a loyalty	2	0.3

program by Safaricom)		
Skiza tunes (a music download feature)	1	0.1
Total Respondents	796	100

Source: iHub Research/RSA

Awareness is necessary for usage as revealed in Table 3. The greatest number of respondents reported using calling, SMS, M-Pesa, and borrowing of airtime, which were also the services they were most aware of. Almost all respondents call daily while approximately half of the respondents use SMS daily. The majority of respondents who use M-Pesa do so at least monthly. Finally, those who use airtime borrowing tend to do so on a weekly basis. The majority of surveyed respondents stated that they use these services anytime of the day and no obvious trend was noted in terms of time of day of use.

Table 3. Use of mobile phone applications and services

Service/Application	Yes	No	Total Count
Calling	100%	0%	795
SMS	85.3%	14.7%	767
Mobile Money Transfer	84.4%	15.6%	768
Credit (Airtime) Borrowing	72.6%	27.4%	712
Tracking lost phones	12.1%	87.9%	116
Commodity prices	18.9%	81.1%	37

Source: iHub Research/RSA

The study also noted that “flashing/beeping” or the use of missed calls as studied by Donner (2007) and Zainudeen et al. (2007), is still a common practice amongst the BoP in Kenya; 91.9% of BoP mobile owners use missed calls or ‘Please Call Me’ functions. Respondents said that once they find missed calls or “beeps” from certain people, they already know what these people want, so their follow-up conversations can be as short as 15 seconds, thus saving them money.

As stated earlier, a number of mobile applications are being developed in Kenya, many of them potentially useful for the BoP and some of them particularly targeting the BoP. It is however evident that other than M-Pesa (and all other mobile money transfer services), there is low awareness of other mobile phone based services and applications, and woefully low usage of applications and services. This lack of uptake could be attributed to several reasons including little brand recognition due to low marketing effort by start-ups, resulting

in low awareness and trust; inconsistent user experience due to changing products and ongoing development of start-ups' business model; and difficulties in assessing the appropriate pricing for customers due to little or no on-the-ground research with users.

There are mobile applications developed outside Kenya, which have the potential to save on costs and give consumers at BoP better services. Such applications include Viber, which enables users to make free calls, send free SMS to other Viber users across the world and WhatsAppMessenger, which is a cross-platform mobile messaging application that allows users to exchange messages without having to pay for SMS. Other applications include Facebook Zero for mobile phones and WeChat, which enables subscribers to chat in a Live Chat session. All these applications would guarantee a cheaper way to stay in touch or at least communicate amongst individuals of common interest. The usage of these applications was found to be limited within the BoP in Kenya. The diffusion of these applications was not within the scope of the study, which focused more on applications developed by local startups. In addition, most mobile phone users at the BoP still have basic or feature phones and therefore, cannot and do not yet access applications such as WhatsApp which require a smartphone. This contrasts with mobile phone usage at the BoP in South Africa where there is greater usage of smartphone technology and where cost-saving applications like Whatsapp have higher take-up compared to the Kenyan BoP (Calandro et al., 2012, p. 23).

There is clear evidence that Internet access is going mobile. For example Calandro, E. et al. (2012) found that within the general Kenyan population, 25% use Facebook on their mobile phone, 20% use their mobile phones for sending and receiving emails, and 25% use their mobile phones to browse the Internet. These figures are impressive from a national representative perspective. While focusing only on the BoP this study did not find substantial usage of mobile applications that rely on Internet at the BoP. This could be partly because of the type of mobile phones that most BoP users have, lack of awareness of the applications accessible to them, or a perception that these applications could be expensive to acquire or use.

This study identified 89 applications developed mostly by Kenyan start-ups in various categories, including water, energy, entertainment, news, transport, financial services, agriculture, and healthcare among others. These applications are tailored to the country's unique challenges and demands (infoDev, 2012). As shown in Table 4, most applications focus on healthcare, water or education.

Table 4: Crown-sourced list of mobile phone applications in Kenya

Category	Number of applications
Accounting	2
Education	11
Documents	1
Sports	1
Government	4
Natural Disasters	1
Service Delivery	2
Health	32
Agriculture	6

Employment	2
Financial	7
Water	13
Transport	4
Maps	1
Entertainment	1
News	1

As mentioned earlier, most at the BoP still have basic or feature phones. Therefore, to develop a mobile phone solution for such a market, building applications and services that can be used with these basic and features phones is still necessary. This essentially means, building on a SMS, USSD, calling or SIM-based platform. There are unique challenges associated with USSD and SMS platforms, such as the fact that many of the SMS and USSD-based products require users to know the associated short-codes. Even if a user wants to use the service, if they cannot remember the right code, they will not be able to access the service. This problem will only be exacerbated as more applications are developed, each with its own unique short-code. This problem is an intrinsic characteristic of a SMS/USSD application and may prove to be one of its greatest limitations for scaling.

Regulatory framework in Kenya

The use of mobile money in Kenya has demonstrated the potential of technology to transform people’s lives. The regulator approved the famous M-Pesa partly because data collected showed evidence of demand for the service. Since then, over 80 start-up mobile applications have been developed in the country. These applications have the potential to solve critical problems in sectors like education, governance, agriculture and health and such like sectors. Nonetheless, as the data has revealed, since many of these start-ups lack the financial and human resources to fuel their businesses, most have not yet been able to scale.

The CCK currently does not have any specific clauses that give attention to the BoP, since the industry has no market segmentation criteria to cluster various users with specific needs. Instead, the plans mainly revolve around the regulatory role of the CCK in the Kenyan ICT sector and cater for the needs of the entire consumer community. Encouragingly, the current overriding concern for the CCK is around the affordability of ICT in Kenya. The government has zero-rated all the ICT equipment imported into the country, and CCK has been following a plan to lower the mobile termination rates (MTR), which has been at the center of a controversy between the mobile operators, CCK and the Government. If greater mobile phone-based solutions are to reach the BoP, support for the developers of such solutions also need to be enhanced.

In order to allow for the effective scaling of mobile phone-based services among the BoP, agencies and stakeholders should appreciate the existence of local Kenyan talent necessary for content development and technical systems. Greater utilization of existing products and services in the local ICT ecosystem by MNOs, Government, private companies, and other stakeholders, will help initiate stimulus in the local market and support the small but promising, local mobile application initiatives. Supporting these start-up initiatives will boost

access and usage among the BoP, thus determining the performance and probable impact of these mobile application systems on the BoP.

The Kenya Communications (Amendment) Act, 2009, provides for the establishment of a Universal Service Fund (USF), administered and managed by the regulator. The purpose of this fund is to support widespread access to ICT services, promote capacity building and innovations in ICT services in the country, especially in commercially unviable areas. Although this fund has not yet been set up, it can be argued that it could be useful in supporting the development and scaling of mobile application innovations targeting the poor, who tend to be most underserved by existing ICT infrastructure. This may require changes in the current Kenya Information and Communications (Universal Access and Service) Regulations.

Conclusions and Recommendations

This paper reveals that while mobile phones have become deeply integrated into the lives of the poor, the scaling of new mobile applications faces three key challenges. First, most of the recent mobile applications have been developed by start-ups with limited social and financial capital to market their applications. Consequently, there is limited awareness of these applications amongst BoP users for scaling to take place. Indeed beyond money transfer services, most BoP users are unaware of other mobile phone-based services and applications. Further, start-up entrepreneurs do not fully understand the market. Many do not conduct research to better understand their BoP consumer before developing their products. For example, though a majority of BoP users are still using basic phones that can only access SMS, USSD, and calling, developers continue to create products for mobile device platforms that are not yet widely used by the BoP (such as Android). Finally, a great number of mobile innovations do not reach the stage for financial sustainability, especially given the low purchasing power of users at the BoP and their sensitivity to cost.

In order to improve the scaling of mobile applications, we recommend the use of an innovation framework that puts the user at the centre of product design and development, as argued in AMMREC 2012 Report (Waema, et al. 2012). This process normally starts with field research among target users, proceeding to concept design and prototyping, and ending with field trials. Adopting such an approach could address the research challenge cited earlier and ensure a good fit between the final product and market need. Such an approach will require close collaboration between developers and research institutions.

We further recommend that new mobile applications be nurtured through incubation to increase the chances of wider application adoption. As part of the incubation process, there should be an iterative engagement with users that includes constant product refinement based on user feedback, piloting and testing of the product. This in turn results in parallel product and customer development, which partly addresses the challenge of user awareness of new innovations. Incubation typically requires collaboration with an innovation hub, whether is either a research institution or a stand-alone facility.

Mobile applications developed with the above user-centric approach stand a higher chance of being readily accepted, even when their access and use competes with basic necessities, from an affordability perspective. Finally, we recommend that funding of mobile application

innovations be given higher prominence across all sectors of national development. As part of this effort, perhaps universal access funds can be considered to fund the development and scaling of mobile applications that have potential of uplifting the poor, especially those in areas least served by ICTs.

References

- Aker, J. (2008). Working Paper Number 154 October 2008 Does Digital Divide or Provide? The Impact of Cell Phones on Grain Markets in Niger. http://www.cgdev.org/files/894410_file_Aker_CGD_Cell_Phone_WP.pdf.
- Aker, J. C., & Mbithi, I. M. (2010). Mobile Phones and Economic Development in Africa. *Journal of Economic Perspectives*, 24(3), 207-32.
- Ana Marr, (1999). The Poor and their Money: What have we learned? ODI Poverty briefing, March 1999
- Baumuller, H. (2012). Facilitating agricultural technology adoption among the poor: The role of service delivery through mobile phones. Centre for Development Research, University of Bonn.
- Banerjee & Duflo (2007). What is middle class about the middle classes around the world? <http://economics.mit.edu/files/2081>, accessed March 2013.
- CCK, 2012. Quarterly Sector Statistics Report: Second Quarter of the Financial Year 2012. Nairobi, Kenya
- Calandro, E., Stork, C. & Gillwald, A. (2012) Internet Going Mobile: Internet access and usage in eleven African countries. CPRAfrica 2012/CPRsouth 7, 5-7 September, Port Louis, Mauritius
- Cobert, B., Helms, B., & Parker, D. (2012). Mobile Money: Getting to scale in emerging markets. McKinsey and Company.
- Deaton & Subramanian (1996). The Demand for Food and Calories. http://www.vincenzodimaro.it/teaching/crescita/Subramanian_Deaton_1996.pdf, accessed March 2013.
- Diga (2007). Mobile Cell Phones and Poverty Reduction: Technology Spending Patterns and Poverty Level Change among Households in Uganda. http://www.w3.org/2008/02/MS4D_WS/papers/position_paper-diga-2008pdf.pdf, accessed March 2013.
- Donner, J. (2007). The rules of beeping: Exchanging messages via intentional “missed calls” on mobile phones. *Journal of Computer-Mediated Communications*, 13(1), article 1. <http://jcmc.indiana.edu/vol13/issue1/donner.html>
- GSMA (2012). Striving and Surviving: Exploring the Lives of Women at the Base of the Pyramid.
- Ignacio, M., & Amolo, N. (2010). Three keys to M-PESA’s success: Branding, channel management and pricing. *Journal of Payments Strategy and Systems*. Vol. 4 No. 4, December 2010.

Ilahiane, H., Lafferty, H., & Sherry, J. W. (2012). The Problematics of the ' Bottom of the Pyramid ' Approach to International Development : The Case of Micro-Entrepreneurs ' Use of Mobile Phones in Morocco. *USC Annenberg School for Communication & Journalism* 8 (1): 13–26.

InfoDev (2012). Mobile usage at the base of the pyramid in Kenya.

Ismail, T., & Masinge, K. (2011). *Mobile Banking: Innovation for the Poor*.

ITU (2011). ICT Facts and Figures. <http://www.itu.int/ITU-D/ict/facts/2011/material/ICTFactsFigures2011.pdf>. Accessed March 2013.

Karamchandani, A., Kubzansky, M., & Frandano, P. (2009). Emerging markets, Emerging models: Market based solutions to the challenges of global poverty.

Labonne & Chase (2008). Do Community-Driven Development Projects Enhance Social Capital? Evidence from the Philippines. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1233054, accessed March 2013.

Lemaire, J. (2011). Scaling up mobile health: Elements necessary for the successful scale up of mHealth in developing countries. *Geneva: Advanced Development for Africa*.

Muto, M., & Yamano, T. (2009). The impact of mobile phone coverage expansion on market participation: Panel data evidence from Uganda. *World Development*, 37(12), pp 1887-1896.

Ndung'u, M.N. & Waema, T.M. (2011). Development Outcomes of Internet and Mobile Phones Use in Kenya: The Households' Perspectives, *Info*, 13(3), 110 – 124.

Omwansa, T. K., & Sullivan, N. P. (2012). *Money, Real Quick: Kenya's disruptive mobile money innovation*. London: Guardian Books/Ballonview Press.

Qiang, C. Z., Kuek, S., Dymond, A., & Esselaar, s. (2011). *Mobile applications for agriculture and rural development*, ICT Sector Unit. Washington, D.C.: World Bank.

Tomlinson, M., Rotheram-Borus, M., Swartz, L., & Tsai, A. (2013). Scaling Up mHealth: Where Is the Evidence? *PLoS Med* 10(2): e1001382. doi:10.1371/journal.pmed.1001382.

Vodafone Group & Accenture. (2011). *Mobile Communications to transform smallholding farmers' livelihoods in Emerging markets*. London: Vodafone Group & Accenture.

Waema, T, P Wagacha, W Ng'ang'a, and T Omwansa. *Incubating Mobile Financial Services in Kenya*. Nairobi: University of Nairobi, 2012.

Zainudeen, A., Sivapragasam, N., De Silva, H., Iqbal, T., & Ratnadiwakara, D. (2007). Teleuse at the Bottom of the Pyramid: Findings from a Five-Country Study. LIRNEasia. <http://lirneasia.net/wp-content/uploads/2008/07/tbop-gk3.pdf>, accessed April 2013.