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Title: Base of the pyramid as a source of innovation: Experiences of companies in the Kenyan mobile sector

Year: 2012

Version: Post print

Please cite the original version:

Linna, P. 2012. Base of the pyramid as a source of innovation: Experiences of companies in the Kenyan mobile sector. International Journal of Technology Management & Sustainable Development, 11(2), 113-137. DOI: 10.1386/tmsd.11.2.113_1

International Journal of Technology Management & Sustainable Development

Base of the pyramid (BOP) as a source of innovation: Experiences of companies in the Kenyan mobile sector

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Abstract

Mobile innovations have been seen as one of the success stories of 'base of the pyramid' (BOP) business models. Nevertheless, deeper analysis of their commercial scalability has been lacking. This article focuses on the Information and Telecommunications (ICT) and mobile boom in Kenya, which is a major economic driver in the whole country. The article describes how social needs are seen as a basis for innovating technological solutions and what strategies are used to make them commercially viable. The article is based on empirical data on the Kenyan mobile industry where companies are designing socially oriented technological innovations for low-end consumers. This research contributes to the ongoing discussion on successful BOP entrepreneurial models and innovations.

Keywords: base of the pyramid, business models, entrepreneurship, Kenya, innovating, mobile applications, social innovation

Introduction

The poor and other underserved populations at the 'base of the pyramid' (BOP) represent huge economic potential (Hammond and Prahalad 2004; Prahalad 2005); nevertheless, recent studies have begun to challenge the view whether market potential really exists (Karamchandani et al. 2011; Garrette and Karnani 2010; Karnani 2007). Several studies also highlight that serving BOP is not an easy task, and especially designing profitable businesses that are also socially beneficial is a real challenge (Garrette and Karnani 2010). Innovative solutions are not only needed in technology, products or services, but it is also necessary to rethink the whole business model.

The mobile technology in the Information and Telecommunications (ICT) sector has been one of the leading industries that have actively introduced corresponding services for the low-end market. The benefits of ICT have been recognized worldwide, particularly in sub-Saharan Africa where the ICT sector has been among the major drivers of economic growth over the past decade. Hence, it is expected that the ICT sector will be a key driving force of fundamental economic change within the continent (e.g. World Bank 2010b; Hellström 2010; Muturi 2010) and is still expected to offer fast growth rates for companies (McKinsey 2010).

The ICT sector is not only growing in terms of the number of subscribers, but more importantly new kinds of ICT knowledge and business have evolved. For example, the AfriLabs network of tech incubators in various African countries aims to promote technology as a platform for entrepreneurship: local developers are increasingly encouraged to think about accessing global markets, for instance, by using the 'windows of opportunity' offered by multinational telecom companies. In addition, the international donor community, non-governmental organizations (NGOs) and government agencies are increasingly interested in participation in the telecommunication boom and are constantly engaging individuals in developing new mobile phone-based information services for the poor (Lehr 2008). For example, the World Bank held applications for development challenge – a competition to create innovative software applications for solving some of the world's most pressing problems (World Bank 2010a). There is a widespread belief that the potential to scale and replicate development efforts via the mobile phone is enormous, although, to date, most of the initiatives remain in the proof of concept or at the pilot phases.

Most of the previous research on mobile service business models has concentrated on developed markets (e.g. Hedman and Kalling 2003; Leem et al. 2004; Pateli and Giaglis 2004). However, a growing number of scholars target their research at the challenges and opportunities within the ICT sector in emerging countries (Anderson 2006; Crabbe et al. 2009; Donner 2008; Ivatury and Pickens 2006). And there is a growing body of research-based knowledge showing that the patterns of business operations of high-technology firms in developing countries businesses are not the same as those of firms in developed economies (Siqueira and Bruton 2010). To date, there are few studies and little is known

about entrepreneurship in emerging economies (Bruton et al. 2008; Naude 2008; Ray and Ray 2010); besides, most of the research conducted in BOP domain principally focus on multinational companies' (MNCs) perspectives (Hammond and Prahalad 2004; Hammond et al. 2007), and little attention is given to examining the alternative models of market creation and innovation offered by local players from emerging countries (London 2008). Although it is greatly emphasized that entrepreneurs may play a significant role in creating solutions for societal problems (Kandachar et al. 2009; Katzenstein and Chrispin 2011), the literature offers little theoretical or practical guidelines for innovative product development in the BOP context (Viswanathan and Sridharan 2012). This article aims to respond to this challenge by focusing on local players' strategies relating to designing socially beneficial market-based solutions for low-end consumers.

In this study, the focus is on the mobile service sector in Kenya, which is the fastest growing economic activity in the country providing economic opportunities that transcend geographical borders (World Bank 2010a). The ICT boom has created new jobs, knowledge and business opportunities (Donner 2009). Nevertheless, it is worth considering how many of those technical solutions that have been developed are socially oriented and targeted at the low-income mass population. Much of the previous research have concerned the potential of ICTs for development (see e.g. Heeks 2008; Harris 2004; Jensen 2007), rather than analysing the commercial viability of the solutions, making the proposals of business formulation rather suggestive instead of practical for strategy formulation (Ramani et al. 2010). For that reason, this article will explore the following research question: do the local (Kenyan) mobile industry enterprises serve the BOP; and if they do, how are they innovating market-based solutions for social needs?

The remainder of this article is organized in four parts. The first part provides a brief overview of the literature on social innovation. In the second part, the methodological aspects of the article are discussed. Third part presents the main findings. In the final part, the article is concluded with some general remarks and recommendations for further research.

Innovating for social needs

BOP as a source for innovating

Companies constantly try to identify new opportunities for innovation, for example by searching for unsolved problems and recognizing unmet needs. Social needs can be seen as business opportunities for which to develop ideas, serve new markets and solve long-standing business problems (Kanter 1999). During the last decade, the social needs of BOP in emerging countries have been recognized as untapped market opportunities. The four billion people at the base of the economic pyramid who live in relative poverty – forming a large mass of the poor in the world – is viewed as representing a huge untapped economic potential (Prahalad and Hammond 2002). The so-called BOP approach seeks to solve the problems of disadvantaged groups within a society while simultaneously creating new business opportunities and new revenue sources for companies (see e.g. Prahalad 2005; Prahalad and Hammond 2002; Kahane et al. 2005). Societal problems among the low-income group can serve as the basis for innovating potential business solutions (Brugmann and Prahalad 2007), which are at the same time profitable for the companies that engage in the challenge of improving the life of the poor. Innovating for BOP has also been seen as an opportunity to develop 'reverse innovations': products originally created for the poor environment are later successfully upgraded for sale in the developed world (Immelt et al. 2009). In addition, S. Hart and C. Christensen (2002) highlight that disruptive innovations deployed by companies can make a great leap down the pyramid, having an extraordinary potential to generate growth. Relating to this, the BOP is also seen as a testing ground and launch pad for innovations which have little or no potential in developed countries due to prevailing technologies, systems and infrastructure (Hart and Christensen 2002).

The emerging markets, especially those of low-income people, are a fertile ground for innovation (e.g. Chavan and Prabhu 2011). The low-income market has its own special characteristics, which require unique strategies from the companies that attempt to exploit the market opportunities. For example, accessing scattered, low-income consumers requires creating new ways to innovate because companies need to develop a deep understanding of the local sociocultural and business environment and focus on generating innovation from the ground up (Anderson et al. 2010). This might demand,

first, new capabilities from the companies because the existing capabilities of firms targeting the wealthier customers do not transfer easily to the BOP (London and Hart 2004; Anderson et al. 2010), and, second, new management practices and business metrics inside corporations, such as tolerance of uncertainly and longer time expectations in terms of ROI (Halme et al. 2012; Olsen and Boxenbaum 2009). In reality, thus far, there are only a few success stories of companies operating at the BOP and due to the challenges some MNCs have retreated from BOP markets due to an inability to mesh a business model with local norms, values and beliefs (Hanson and Powell 2006). This can leave space for aspiring new entrants to explore the BOP market.

Besides MNCs, local emerging country companies have also begun to recognize the potential value lying at the BOP markets. Despite being native to their country, these local firms often have very little knowledge concerning how to operate efficiently and effectively in the respective country's BOP markets (London 2008). In the present study, the particular interest is in local companies' intentions to create financially sustainable social innovations to satisfy the need of low-income people. The empirical focus is the growing ICT industry that can be seen as a pioneering business sector designing new solutions for the BOP and at the same time creating a viable innovation ecosystem that includes various players. Social innovation, in this article, is broadly defined as the process of developing and applying business-like, innovative approaches to meet social needs. Social innovation is often more than a product or process innovation; it is a concept that must recognize an essential commitment of the people for whom the change seeks to contribute (Dawson and Daniel 2010). Indeed, the innovation is not successful before it is diffused to the market, meaning that successful innovation is primarily a question of social adaption (Cavalli 2007; Kramer et al. 2007), which, arguably, represents the more important element of the innovation process (Pot and Vaas 2008).

Designing market-based innovations for social purposes

Tackling social needs as business opportunities forces many companies to stretch their capabilities to develop successful innovations (Kanter 1999). Several technological companies have noticed the range of possibilities that ICT can offer for development. Hence, technological advancements act as drivers and enablers of many service

innovations (Bouwman et al. 2008). Poverty has an important informational dimension since underprivileged population often lack access to information that is vital to their lives and livelihoods, which further adds to their vulnerability (United Nations Conference on Trade and Development (UNCTAD) 2010). From the innovation perspective, the poverty context means that ICT innovations result from a mix between technical solutions and social understanding (Srinivas and Sutz 2007). For profit-oriented companies, innovating for social changes can be a challenge in economic terms – how and whether it is possible to remain profitable while serving low-income customers (Srinivas and Sutz 2007).

Recent studies on BOP have questioned the whole assumption of whether, in reality, it can offer any real market opportunities (Karamchandani et al. 2011). A. Karnani and colleagues (Karnani 2007; Garrette and Karnani 2010) argue that BOP activities are either profitable but not socially beneficial, or socially virtuous but not profitable. According to Karnani, there are very few examples of profitable businesses that provide socially useful goods in low-income markets and operate on a large scale. D. J. Teece (2010) emphasizes that without well-developed business models the value of the social innovations can fail to be captured, which leads to financial failure.

To create financially viable and socially beneficial business opportunities, it is worth taking a closer look at the conditions that BOP innovations need to fulfil. Social innovations are more complex and ambiguous than conventional business innovations because they need to satisfy a wider range of stakeholders (Lettice and Parekh 2010; Hall and Vredenburg 2003). Lessons learnt from BOP innovations emphasize that products and services need, foremost, to be affordable (e.g. Anderson and Markides 2006; Chandra and Neelankavil 2008; Prahalad 2005; Simanis and Hart 2006; Landrum 2007) because low-income users are faced with cash-flow restrictions and have limited possibilities to save money for big investments. Besides being affordable, solutions should also offer some additional value to the living standards of people faced with poverty cycles (e.g. Martinez and Carbonell 2007; Gollakota et al. 2010). According to Hart and Christensen (2002), disruptive technologies are ideal for the low-end market; products can be sold at lower prices to market segments traditionally viewed to be unattractive, or distributive

innovations can compete against non-consumption by offering products and services to people who would otherwise be left out entirely.

For the innovation process, it is recommended that product development takes customers' affordability and value-added points as the basis for innovating, and then work backwards (Chandra and Neelankavil 2008). Rather than a top-down approach, this can be viewed as developing the innovation from the bottom-up (Viswanathan 2011; Boyer 2003; Waibel 2012), where the local needs are in the central point of the innovation process (e.g. Boyer 2003). BOP practitioners are also turning more towards co-creation methodologies, by innovating solutions to poverty-related problems together with different partners and the users themselves.

The ultimate success of new services is not perhaps determined by the technological possibilities but by their capability to better satisfy customer needs rather than other existing alternatives (Bouwman et al. 2008). Especially in the context of BOP, social innovations are essential for the whole welfare of society. Social innovations can occur at the level of society, broad communities and regions, the nation state, regional areas within countries, local communities, organizations, and within families and groups (Dawson and Daniel 2010). In this regard, mobile- and ICT-based social innovations can reach different levels of societies and be created across different sectors. For instance, J. Donner (2009) distinguishes between the following types of mobile applications: agricultural extension, market information, virtual marketplaces, financial services such as mobile banking, direct livelihoods, mobile health, education services and civil services. ICT solutions can give access to various services that have been unreachable for poor people, and can be understood as 'leapfrog technologies'. Therefore, in a low-end market context, the benefits of mobile services may not only include profits but also less tangible societal benefits such as the empowerment of users, improving access to and use of information, improving coordination among agents and increasing market efficiency (e.g. Aker and Mbiti 2010; UNCTAD 2010; Howard and Mazaheri 2009).

In this study, the focus is to analyse whether socially oriented mobile innovations are financially sustainable for companies. As stated earlier, for organizations this can be a challenging task. First, it is necessary that they are adopted by a large number of people, but as social innovations might require some behavioural change diffusion can occur

slowly (Rogers 2003). Second, the ICT sector itself can set obstacles: customer expectations can be that basic services should be offered free (Teece 2010), which would force companies to create alternative revenue streams.

Methodology

Case selection

The mobile sector was chosen as a case example because it has been the pioneering industry understanding the possibilities at the BOP market and has developed several innovations related to poverty alleviation (Lehr 2008; Castells et al. 2004). The technology has especially benefited Africa, which is the fastest-growing mobile market in the world. The mobile industry in Africa is booming, and not only is it a catalyst for immense growth but there is also scope for far greater development. On the heels of this phenomenon, other industry actors are exploring ways to use mobile technology to cut the cost of serving the BOP by creating mobile applications that can be open access to other services (Kubzansky et al. 2011).

Kenya was chosen as a case study country due to the country's achievement and significant efforts in boosting the mobile industry. In general, East Africa as a region has globally gained attention for its efforts to build technology-based local enterprises and develop world-class mobile innovations, which has made it an innovation hot spot (World Bank 2010a; Perry and Wadhams 2011) in the sub-Saharan region. For example, the success story of M-PESA, a brainchild of Safaricom, Kenya's largest service provider, which allows customers to transfer money using their mobile phones (e.g. Hellström 2010), has received global attention. The M-PESA application is installed on the SIM card and works on all models or mobile telephone handsets once activated by the provider. This service has been the source of innovation of new products connected to the M-PESA platform, particularly mobile banking, making Kenya among the first countries in the world to commercially launch this service. In addition, several foreign companies, like Samsung, Nokia and Google, have recognized the existing knowledge in Kenya and have established their African regional R&D centres there (Ratemo 2011; Nyabiage 2011).

It can be assumed that this kind of diverse industry base is fruitful for creating new innovations and, in general, broadening the knowledge base. This study is based on an exploratory case study research approach, typically involving qualitative analysis (Eisenhardt 1989; Miles and Huberman 1994; Yin 1989). In the research procedure, the main mobile industry players in Kenya are first identified and secondary data relating to the research question are collected. Information and data are sought that bear particularly on commercially successful social innovations developed by local actors, albeit excluding ICT-oriented social innovations that are either implemented by NGOs or foreign telecom giants. Various people were contacted to elicit data as to whether they knew of any commercially successful social-oriented mobile apps. This pre-selection process guided the final selection, and six enterprises were selected and studied deeply. The box below provides a brief overview of each case.

Box 1: Company profile of selected cases.

Kilimo Salama

Kilimo Salama is a partnership between Syngenta Foundation for Sustainable Agriculture, UAP Insurance and telecoms operator Safaricom. The product, micro-insurance for small-scale farmers, was piloted in 2009 and during the following few years it has covered more than 12,000 farmers. Kilimo Salama is a weather-based insurance m-app distributed by farm input suppliers to insure farmers' investments in inputs – such as seeds, fertilizers and chemicals – against weather risks such as drought or heavy rains. It uses solar-powered weather stations to provide farmers with full climate data, and mobile payment technology to collect premiums and distribute payouts. It also provides an advice line for farmers and sends text messages to help farmers improve their techniques.

M-Farm

During 2010 launched a start-up, focusing on developing applications for farming. This company was created as a result of the IPO47 business plan competition organized by HumanIPO and Garage48.org. Their first and original application, M-Farm, won a cash value prize, which allowed the entrepreneurs to develop the business further. The founders of the company have goals to scale up their businesses all over Kenya and also outside the country. The company received seed capital by winning the competition, but

has concentrated from the outset on being financially self-sustainable. The company focuses on developing applications relating to farming, targeting five million farmers in Kenya.

Mobile Planet

Mobile Planet was established in 2001 by three founders. Presently, it has around twenty employees and expects to grow slightly in the near future. Currently, it is at a stage of changing its business model due to changes in the business environment. It used to develop mobile services for different companies, and its revenue model was based on revenue sharing. In the near future, Mobile Planet aims at offering products directly to subscribers, which will force the company to change its revenue model. Recently, the company expanded its businesses outside Kenya to the larger East African market, operating now also in Tanzania, Rwanda and Uganda. The funding of the company came from the founders and the company has been able to generate profits from the outset. Mobile Planet has written at least two applications that address the needs of the BOP: (1) Biashara (a Swahili word for market), this application allows customers to check market prices at different markets and sellers to receive orders. (2) KAZI560, a job information service linking job seekers to employees, in which employers can advertise and job seekers can subscribe to alerts for numerous types of jobs.

Safaricom

Safaricom Limited was formed in 1997 and is currently Kenya's leading mobile telephone operator. The company employs over 1500 people directly and tens of thousands indirectly. Its subscriber base is approximately twelve million.
The company is popularly known for its most famous product M-PESA, which provides access to financial services for the rural poor and general masses in Kenya and beyond.

Ushahidi

Ushahidi (Swahili word for testimony or witness) is a non-profit tech company developing free and open source software for information collection, visualization and interactive mapping. The starting point for the company was the 'Ushahidi', website

which was initially developed to map reports of violence in Kenya after the post-election bloodshed in 2008. In the following year, Ushahidi transformed from an ad hoc group of volunteers to a more focused organization. Thus far, the company's operations have been funded by donor money, but currently there are developing revenue models. The organization started by addressing a social need to map incidents of violence and peace efforts in Kenya. Later, the mapping service has been used for tracking anti-immigrant violence in South Africa, Eastern Congo, monitor elections in India and track incidents after the Haiti earthquake.

Virtual City

Established in 1999 by three partners with an ICT background. It began as a web service company offering e-commerce solutions, and later the founders moved on to supply chain and knowledge management for mobile solutions as the founders noticed there were lack of these kind of services. Currently, Virtual City has around 40 employees. It customer base includes companies, public agencies, non-profit organizations. The funding of the company came from the founders and the company has been able to be profitable from the outset.

Mobile solutions target social constraints in at least two different ways. First, it offers innovative mobile solutions for NGOs to manage their processes more efficiently. Second, the company focuses on solutions for improving agribusiness and agricultural value chains. However, the supply chain management solutions enhance the actions of all actors in the value chain, starting from the raw material producer to the final seller.

These enterprises originated in Kenya, and for them BOP is an important market segment. Each enterprise had designed services for the BOP. For instance, Virtual City sees huge opportunities of creating simple solutions for social change due the increased connectivity through the widespread use of cell phones among the population who lack basic technological infrastructure. Also for Safaricom, the BOP represents a huge market segment, and by using the M-PESA platform Safaricom has launched several products serving the BOP segments – for example, M-KESHO, which allows customers to access

their savings accounts and credits. Safaricom also partners with Kilimo Salama, whose focus has from the beginning been on subsistence farmers.

Mobile Planet has also designed solutions for the BOP, for example the KAZI mobile application allows people to conduct some small tasks using their mobile phones. It seems that for the larger players BOP is an important market segment, but they do not solely concentrate on serving them. What is interesting is that other smaller enterprises, like Ushahidi and M-Farm, have from the beginning been established around the social challenges facing developing countries. Ushahidi aims to act as tool for 'social activism' and improve people's access to information, which is seen as one of the constraints of poverty, while M-Farm's purpose is to empower the rural farmers and improve their livelihoods.

The selected organizations represent a range of start-ups, established and mature organizations, to ensure rich data layers and a broad view of the technological industry and also to generate common approaches in social innovation. One of the companies is at its very early stage of start-up and does not have any permanent employees. Two companies have been in the business for approximately ten years and have had significant growth in their business, albeit one of these is changing from a non-profit into a for-profit company, and the other is large and stock-listed on Kenya's trade exchange bourse.

Data collection

The data for this study were mainly collected through semi-structured interviews, which involved in the process different mobile industry actors in Kenya during November 2010 to January 2011. In total, sixteen interviews were conducted: four expert interviews, two MNC representatives and ten local company representatives or individual entrepreneurs. The interviews lasted between minutes and one and a half hours. The questions asked during the interviews were open and varied slightly depending on whom the interviewee was with. Nevertheless, for all interviewees the following themes of questions were present:

- Background information of the organization
- The process of developing new mobile services

- Thoughts on the future of the mobile industry in Africa
- Social needs as a source of new ideas for mobile services
- Business model development/revenue streams

The information obtained through these interviews provided the researchers with rich, qualitative data that informed about the methods of innovation and the attractiveness of low-income markets. All the interviews were recorded and fully transcribed afterwards. By way of data triangulation, secondary data were used to check the authenticity of the data gained from the expert interviews. Sources of secondary data included, for example, organizations' websites, latest press releases and business publications (Waweru 2011; Ratemo 2011, Mutegi 2011), and attending several public workshops organized by the local Kenyan technological and innovation players. The secondary data were used to solicit additional information from the interviewees and to challenge and triangulate conclusions derived from the interviews. The small nature of the sample size used in this study sets a limit on the generalizability of the findings. However, it should be noted that the study is exploratory in nature and was intended to identify themes for deeper investigation in subsequent studies.

Findings

This findings section is divided into three parts:

1. Alternatives for revenue streams
2. Challenges of serving the BOP
3. Methods of innovating mobile services for social needs

Table 1 presents the main findings, which are thereafter discussed in detail.

Table 1: Summary of the main findings.

Main findings	**Further explanation**

Alternatives for revenue streams	Transaction-based charging model Offering the same application for a broader market segment Portfolio pricing structure The embedded and premium pricing systems Third-party revenue sources: as supplemental customers or funding partner
Challenges of serving the low-end market	Designing financially sustainable business models Business strategies need to be regularly modified due to the constant change of the mobile industry Diffusing the innovation
Methods of innovating socially oriented solutions	Social networking Idea competitions 'Traditional methods' Based on own local information By partnering with other actors

Alternatives for revenue streams

The business opportunities at the BOP have been widely highlighted, but financial profitability has been questioned and this study also verified that challenge. Relating to the mobile sector, the business models are still in their infancy, and hence there are not yet many examples of commercially viable business models (Kubzansky et al. 2011). Furthermore, previous studies on socially oriented mobile apps show that financially sustainable business models rarely exist, for example in the Qiang et al. (2011) study of mob apps for agriculture and rural development only 16 per cent out of 92 apps were sustainable. The present study confirmed these results, because, according to the interviewees, financially sustainable business modelling is seen as the largest challenge in addressing the needs of the BOP. The interviewees particularly addressed the ability to find a sustainable revenue stream. Several interviewees admitted that developing applications for social change are not yet very profitable.

> We don't make lot of money, but we don't make a loss either. What we did with Kilimo Salama was make a specific consensus with the profit expectations because we think that it's an excellent product for the BOP in the longer term. (Safaricom representative)

> [Mobile applications] don't usually have a business model in terms of revenue generation, which is a challenge. You need to have some other revenues in your company, which will allow you to develop applications for social needs. (Nokia representative)

There were several intentions to create ways of making money from social applications. It was possible to identify the following different revenue models that the case companies were utilizing:

Table 2: Revenue models used by the case companies.

Revenue model	**Description**	**Example**
Transaction-based charging model	Clients are charged by the number of transactions they make. To be able to offer services at affordable prices, a market mass should be reached and the company should accept lower margin per use	M-PESA, M-Farm, KAZI560
Offering the same application for broader market segment	The product is not targeted only to BOP, rather the customer base is understood to be wide	M-Farm
Portfolio pricing structure	Portfolio pricing structure is possible for bigger companies that do not rely on a few products. Among several profitable products, it is possible to keep mobile application services that are not profitable, but are otherwise seen to be important for the company	Safaricom, Mobile Planet
The embedded and premium pricing systems	Some service is offered without charge, but demand is generated or customer loyalty strengthened	Kilimo Salama, M-PESA

	towards the main or value-added services, which are chargeable	
Third-party revenue sources	This is a non-chargeable service for the individual end-user. Usually, they offer some basic information to clients	Ushahidi

The traditional business logic of mobile services is to keep the margins low and reach mass market (Steinbock 2005). In the BOP market, this means that the price of the service should be so low that the poor can afford to use them. The most common example of this is that of mobile money and other financial service applications. For example, M-PESA receives its profit from commission that is deducted from users' accounts when an e-float is sent and when it is withdrawn. In addition, the M-PESA agents, over 12,000 across Kenya, receive a commission on a sliding scale for both deposits and withdrawals. To be financially viable, it is necessary to reach the level of economies of scale that M-PESA has successfully achieved. M-PESA has become an open platform, where further services have been developed. These mobile app services are provided free of charge (Safaricom charging the commission of every transaction) and their aim is to generate demand and strengthen customer loyalty to the provider's primary products and services.

Mobile Planet's KAZI560 has also been successful in creating a transaction-based charging model. There is a small fee for job seekers to receive an SMS message about a potential work task. It is a simple subscription model, via SMS, where users can specify the type of job that they are looking for. They will then receive, via SMS, work opportunity offers, which cost seven Kenyan shillings (less than 10 cents) per message. Once they receive an alert, subscribers can instantly ring back to apply for the job.

It seems to be common that a company does not rely on a single revenue stream option. Instead, several different methods are used simultaneously. Moreover, as the case companies admitted, socially oriented applications are not financially successful, at least not yet. Therefore, increased revenues are sought by exploring the broader market

segment or expanding the ‘product portfolio’, which allows a mixture of successful and non-successful applications.

For example, M-Farm’s main target clients are resource-marginalized poor farmers it aims to serve with affordable prices. To achieve this aim, it has created several additional revenue stream options. Besides poor farmers, the company aims to serve other customer segments, such as cooperatives, associations and research institutes. This broadens the revenue stream at an exponential pace. M-Farm is also looking for alternative and supplemental revenue sources to make it financially self-sustainable in the long run. Potential payable services targeted at third-party players are, for example, offering pricing and weather information to farmers, mapping information based on their locations and collecting information and selling it to different parties interested in agribusiness. The company is also looking for new methods for creating additional services that can be purchased by end-users.

For big companies, it is possible to maintain a big product portfolio, which allows inclusion of non-profitable and socially oriented mobile applications among the product range. Other mobile applications, especially entertainment oriented, provide the companies with sufficient revenues, which make it possible to offer non-commercial mobile applications at subsidized prices or even at a loss. For example, Safaricom admits that some of their apps for BOP do not make much profit, but still they allow them to reach the low-income mass market. It might be that these applications are expected to be profitable in the future, while in the meanwhile the company increases its customer loyalty and brand in the new market segment. Virtual City enjoys a steady income from its general business, which allows it to carry out some long-term research and development on new products. The company also highlighted that there is not always a clear distinction between ‘top of the pyramid’ (TOP) and BOP customers; the company designs services for all the players in the value chain: starting from the rural farmer who produces the raw material up to the final market distributor. Hence, Virtual City has adopted an expanded view of BOP customers, engaging also those organizations, such as agriculture cooperatives, that are involved in the BOP market in a broader sense.

> We approach the [the BOP] in a broader sense and it is something that runs through all our products: we are looking at the whole supply chain when designing mobile apps […] we are facilitating the seller and raw material producers and link them with cashless payments. (Virtual City representative)

Mobile Planet offers various mobile services to its customers from entertainment apps to social-oriented services. The entertainment apps are the most profitable.

The impact of mobile technology on development has been widely recognized; hence, several international donor agencies have become interested in creating mobile services to make their own service delivery more efficient, creating their own mobile applications that are not intended to be commercially oriented. This means that to achieve a wider impact and user base, the mobile apps are offered free of charge to end-users. These non-chargeable services make the business environment for commercial companies even more competitive and challenging. It might even be that later it will become difficult to explain to users why they should pay for services. One alternative is to partner with development agencies. A representative from a large telecom company admitted that making profit from social-oriented mobile services is a challenge:

> [For social apps], I think that an individual developer or entrepreneur needs a partner like a UN body partner, who is funding you so you can cover your rent, salaries and you charge the consumers a nominal fee so that they are able to use it. (Nokia representative)

Donor funding is common for applications that are not immediately targeted to be commercially successful. Nevertheless, scaling up after a piloting stage and creating a business model are required for sustainability over the long term. Ushahidi has been funded by donors, but the team is trying to create some additional and supplemental revenue sources, such as adding payable features to the basic service in order to be financially sustainable in the longer run.

> We want to earn our revenue, and we are considering adding more functions, then start to charge clients for using them. (Co-founder of Ushahidi)

Challenges of serving the low-end market

Besides creating financially successful commercial apps, one other challenge is that high-technology firms typically operate in an environment that is under constant change (Siqueira and Bruton 2010), and this is especially so in the context of developing countries, where the ICT landscape is rapidly changing (UNCTAD 2010). Kenya's explosion in technology innovation has caught the eyes of multinational tech giants. For example, Samsung and Google have set up their regional research and development centre in the country to boost their market penetration in the whole African continent. In addition, the deregulation of the telecommunication sector in Kenya has, in several ways, levelled the playing field for other service providers and led to increased competition. When the business environment is so highly competitive, it requires that keeping the business models viable becomes a continuing task (Teece 2010).

Based on the findings of this research, Kenyan technology companies have been remarkably competitive. Virtual City and Mobile Planet offer good examples of how to meet these challenges. Both companies have successfully carried out business for about ten years. One key success factor is their ability to change their business offering frequently. Virtual City changed its focus from e-commerce to mobile solutions and has concentrated on expanding their use of solutions across various industries. Mobile Planet, on the other hand, used to program mobile application for Safaricom, but then commenced targeting end-users for themselves, because the revenue sharing model was no longer profitable. The competitiveness of the Kenyan ICT sector has also received global recognition. For example, in 2010 Virtual City won the Nokia Innovation Challenge Award, beating companies from 54 different countries (Afrinnovator 2010), and during the spring of 2011 M-Farm was selected to be among the top 20 most promising SMEs from emerging countries (InfoDev 2011).

Successful diffusion is a prerequisite, especially for social innovations. Historically, the adoption of new technologies has been slow and incomplete, especially in Africa. Creativity is needed to reach a wide user base. Ushahidi, which is an open platform and it can be downloaded for free, has been successful in reaching users in different geographical areas globally, and the platform is now used in several countries in various continents. But as the co-founder, Hersman, says, 'a tool is only as good as the people who use it'. So raising awareness of the product is essential. The challenge among the social media innovations is how to reach people living in rural and remote areas. For this, partnership with different local actors is essential to spread the word. When Mobile Planet launched KAZI560, it was using various methods to raise awareness. It received support from communities (e.g. village chiefs, NGOs, youth organizations) and some media coverage. Marketing was intensive, and involved deep face-to-face interaction with possible users; the Mobile Planet person described their marketing method as 'activating citizens'.

> We tried to recruit users for the service by visiting schools and colleges, going on to bus stops and just start talking with people. (Co-founder of Mobile Planet)

When Kilimo Salama was being designed, the product distribution was considered from the beginning. It needed to reach small-scale farmers who, however, lacked the supporting infrastructure. The solution was to partner with Safaricom and using Syngenta's stocking network, consisting nearly 8500 agricultural 'stockists', to sell the product. 'Stockists' also train the farmers on the benefits of insurance. Using these local people farmers already know has helped to establish relationship based on trust. In addition, the product has been marketed over the radio and at group training sessions.

Methods of innovating socially oriented solutions

As previously stated, innovating for BOP requires a deep understanding of the needs and preferences of users and the local context. Products need to be socially acceptable and affordable for low-income customers. Gaining knowledge of the local conditions is one of the main challenges particularly for foreign companies operating in developing solutions. Moreover, it is even more complex and time-consuming for them to develop

mobile applications targeted at specific challenges in a particular sector. In view of this, it is not surprising that local entrepreneurs and companies are also striving to innovate solutions for low-income people.

Table 3 represents different practices that were in use in these case companies.

Table 3: Methods of stimulating inputs for social innovations.

Innovating method	**How**
Social networking	Take part in collective innovation communities
Idea competitions	Especially for idea generation
Based on own local information	Own knowledge and experiences as sources of innovation
'Traditional methods'	Research, benchmarking existing solutions, ethnographic observations of users
By partnering with other actors	The idea can be introduced by an external party who is lacking the technological knowledge to develop the product

As reported in this study, various methods are used to develop new mobile solutions. The methods largely depend on the resources of the company. For example, for smaller players, the role of social networks is significant, whereas larger companies can practice more systematic R&D work. Nevertheless, in terms of being a local innovator, holding information relating to local needs (see Luthje et al. 2005) is a significant advantage compared to foreign players.

For instance, M-Farm's business model, with its focus on providing mobile solutions to rural farmers, emerged when the founders followed the media discussion on farmers complaining about the general lack of information available to rural farmers in Kenya – for example, information on market prices and weather forecasts. In addition, the founders were informed by family members working in agriculture about the general problems and needs of Kenyan farmers. Personal family experiences made it easier to

understand the wider societal context and the need. The entrepreneurs had strong ICT knowledge and therefore were able to engineer solutions to prevailing problems. Nevertheless, the existing knowledge of the needs and understanding of the local context were just the beginning of a longer development process. Creating a workable business concept demanded deeper research. The M-Farm ladies studied in depth the issues of agribusiness by taking courses at the university, meeting agricultural vets and most of all consistently spending enormous amounts of time with the local farmers. By 'job-shadowing', the innovators gained a better and truthful image of farmers' everyday activities, and real problems and needs. The innovators emphasized that interviews were not always suitable because farmers cannot always translate their needs, and for this reason it was deemed important to spend time with them in the field.

> Our research has been more user focused, user centered, because something like farming isn't a traditional industry where you more or less know what is going on. You need to be more hands on, go to the farms, you do what they [farmers] do, see how the process goes, what is produced, what goes on until the produce reaches the consumer…. (Co-founder of M-Farm)

For individual developers, personal user experiences and observations from everyday life generate new ideas for solutions.

> Here in Kenya very many women are involved in table banking. So I am trying to build an application for a mobile phone which allows these women to keep a record easily. I have seen my own mother struggling when doing all the math's manually, which is very complicated and took time and if all that could be done easily and could be automated it could be so much easier for her. (Member of AkiraChix)

Ideas for solutions can also arise in an 'ad hoc fashion': Ushahidi was originally created as an ad hoc solution to inform people what was happening during the outbreak of violence following Kenya's general elections in December 2007. It is open source

software for information collection, visualization and interactive mapping. It is based on the idea of crowd-sourcing – people can send, by various methods, their reports on the issue of concern. Later, Ushahidi software was used, for instance, to track anti-immigrant violence in South Africa, and monitor elections in Latin America and India, as well as for crisis response by organizations such as Red Cross.

Positive experiences of the platform have encouraged Ushahidi to design new digital tools for crowd-sourcing, and they are actively exploring new possibilities with regard to where to use these tools. For 2011, the company anticipated a launch of a new venture, Huduma (a Swahili word for services), using crowd-sourcing in Kenya, to monitor the effectiveness of basic services initially including health and education, and later water, governance and infrastructure depending on the feedback received from initial application.

It is worthwhile recognizing that innovating for BOP can also follow very 'traditional' research and development activities. For example, Mobile Planet's innovation process is internal. Once or twice a month, the whole office staff takes one afternoon off and meets to discuss ideas for new apps. In fact, the idea generation is not seen as the most challenging part; rather, execution is the challenge. Safaricom, as a large company, has various methods to generate ideas; they benchmark other markets outside Kenya in order to follow-up what is happening in the industry; they follow customer feedback constantly via their customer service contact centre, and conduct regularly focus group discussions. Virtual City sources many of its ideas for social innovations from its current business offerings. For example, when the company develops tailor-made services for individual clients, it hopes to later commercialize them as a product for the broader customer base.

Whereas idea generation can happen easily based on 'sticky access to local knowledge', collective support is valuable especially when developing ideas into concrete business concepts. Networks, especially, can give start-up companies access to resources that are not otherwise available, such as funding or just giving encouragement and motivation (Lettice and Parekh 2010; Witt 2004). In Kenya, a vibrant ecosystem of ICT players has

developed, which furthers the influence of inspiration and innovations. Several hubs, social networks, exist where small enterprises can share ideas and knowledge and take part in training offered by external actors. M-Farm and Ushahidi (and individual developers) actively use these networking opportunities. For example, the Innovation Hub (iHub) for the technology community in Nairobi has become a co-working and community space among the local 'tech-entrepreneurs' to meet other entrepreneurs, developers or potential investors, and offering various training and workshops by different experts and MNCs. M-Farm, being enterprise for women, has also used the networking possibilities of AkiraChix, a network of ladies interested in technology aiming to encourage ladies in the field of technology. These kinds of networks also offer possibilities to combine resources and further knowledge.

> We are trying to get more ladies into the mobile industry, because they do have ideas but the problem is how they deploy them; ladies need more confidence, they need to be pushed and shown to them that it is not only the males who can do this, we can also do this. (President of AkiraChix)

Donor agencies have begun to establish collaboration with business actors. The aim is both to boost investments and achieve the Millennium Development Goals. These collaborative ventures allow businesses and donor agencies to combine their unique competencies in order to address social needs (UNDP 2010). In the mobile sector, one particular form of cooperation is to facilitate and inspire local enterprise developers to create social innovations, for instance the 'Apps for Development' competition invited software developers across the world to create applications using the World Bank's development data. The benefits of mobile services have been widely recognized and social needs have been taken as an object of innovation. Besides donors and international development agencies, foreign MNCs have recognized the benefits of development challenge contests. For instance, Samsung had various country-specific 'Developers' contest' (Samsung 2010a, 2010b); Nokia held a 'Growth economy venture challenge' (Nokia 2010); and Groupe Spéciale Mobile Association's (GSMA) and Vodafone's 'mWomen base of the pyramid app challenge' (GSMA 2010).

High-tech entrepreneurs are eager to take part in competitions because success offers good publicity and access to external resources. For instance, the creation of M-Farm was a result of IPO48, organized by HumanIPO and Garage48.org during autumn 2010. During the 48 hours that IP048 lasted, eighteen ideas were created and two AkiraChix participants developed the idea of M-Farm. M-Farm won a cash prize with a value of Ksh. 1,000,000 (10,000EUR), which now facilitates young entrepreneurs' business development. Virtual City has also gained benefits from these competitions; they have taken part in the African Enterprise Challenge Fund targeting agribusiness, and Nokia's Innovation Challenge, which they won. This victory gave them a US $1million venture capital investment, but the success in the competition not only provided financing, but also an opportunity to work with Nokia to integrate their application into Nokia's product category, thereby creating the potential for more clients and increasing scalability. Hence, the cooperation with Nokia can open access to global markets.

> They [Nokia] are helping us to market the product and of course they help us to improve it and will take it to their phones and most likely to commercialize it and maybe putting it in their Ovistore. The partnership will also have triple effect because it improves our revenues and in the future we are able to use those skills that we have learnt in this particular exercise with them. (Virtual City representative)

Individual developers are enthusiastic about working with telecom MNCs, especially utilizing their platforms. These platforms promote innovations, encourage uniform application development standards and can offer a large pool of potential customers who are already connected. To activate local developers, companies regularly offer training sessions to developers and even tailor their own training programmes.

For MNCs, these kinds of partnerships are also fruitful. With the help of local entrepreneurs and developers, they can develop applications that are needed by local people. These different cooperation models can easily lead to deeper partnership. Idea

competitions can be one beginning of a partnership, but enterprises can also begin from the whole idea generation with non-profit actors who know the social needs of the poor. For example, M-PESA was originally launched by Vodafone, and the whole development process was initially supported by the UK Department for International Development (DfID) through a matching fund. M-PESA's primary aim was to contribute to the Millennium Development Goals by offering easy access to micro-loans for the unbanked market segment (Hugnes and Lonie 2007; Africa Progress Panel 2011). Due to the success of M-PESA and the broad business network across the country, several actors contact Safaricom directly and propose ideas for product development for the M-PESA mobile money platform. One example of this is the M-KESHO service, which allows M-PESA account holders to register a virtual bank account that enables them to transfer their M-PESA balances into a virtual bank account that would yield returns on savings. M-KESHO was designed in partnership with Equity Bank, a fast-growing micro-finance institution in Kenya.

Kilimo Salama is another example of partnership arrangements from the development idea until actual implementation. The idea for Kilimo Salama originally came from the Swiss-based Syngenta Foundation, which partnered with several actors. The Foundation developed the idea and Syngenta provided access to its product distribution network by local agri-dealers. UAP Insurance provides insurance services and the Kenya Meteorological Department provides weather forecasting equipment. The insurance is sold using Syngenta's stockist network, and the product is distributed and implemented by Safaricom's mobile network as a mobile application. Kilimo Salama is further supported by the Global Index Insurance Facility, a programme managed by International Finance Company to facilitate the expansion of the product globally.

Conclusion

This exploratory study, focusing on local players' innovation activities to serve low-income people, is just a starting point for research aimed at understanding alternative models of innovation – this being a research field that has previously neglected models of innovation (Ray and Ray 2010). The research was based on Kenyan mobile industry

enterprises. Although this industry has its own characteristics, some of the good practices bear the potential of being transferred to other industries. By shedding light on the process of designing a commercially viable business model around social innovation, the findings of this study are expected to contribute to the ongoing discussion on how to support the development of social innovations.

The starting point of this research was to analyse how Kenyan mobile industry enterprises innovate commercially oriented solutions for social needs. The findings of the study are, however, far from conclusive in view of the limitations of the data used. A relatively small sample size was used as a basis to generate data. As yet, though, there are few commercially successful mobile apps that have been developed especially for BOP or purely for social needs. Social needs and the low-income end of the market in general are viewed as having attractive market potential, but the challenge often arises in designing a financially viable business model. The most common business model seems to rely on a mixture of revenue streams. This can be, for example, providing the service for free or at very low cost and then searching for supplemental revenues. It might be accepted that businesses are not profitable in the short term, but the untapped market opportunities are recognized and companies are seen to be willing to invest in building sustainable businesses. Thus, in terms of business model development, the 'trial and error method' appears to be acceptable.

The mobile industry has been the leading industry in developing BOP innovations. From the business model perspective, mobile applications have several options for revenue streams. In other industries, such as energy and water, it might not be so easy to develop alternative revenue streams. Moreover, in these industries the quick piloting of products might also take more time.

It can be concluded from the discussions in this article that for local enterprises generating ideas is not a challenge: personal experiences and practical 'grass-root-level knowledge' are significant sources for BOP innovation. Social networks and 'hubs' are good ways to test own ideas and to get feedback for the actual concept development and business modelling.

Partnerships with telecom MNCs are highly desirable among the local enterprises. These partnerships offer benefits for both parties: for the local enterprises, the much needed

resources to develop their business, technical knowledge, access to additional finance and perhaps opening doors to global markets; and for MNCs, partnerships with local actors offer a smooth way to provide tailor-made solutions for the low-income market.

The BOP literature emphasizes the role of partnerships (Anderson et al. 2011), but in reality little research has been conducted on MNC and local company partnership (or cooperation) models aimed at co-creating innovations. An emerging issue in recent BOP discussions relates to inclusive business ecosystems, which are seen essential besides the business models (Gradl and Jenkins 2011). The whole Kenyan mobile industry sector can also be approached from the (innovation/business) ecosystem point of view; Kenya's drive in terms of technological innovation has gained the interest of various international players both from the private for-profit and non-profit sectors. Multinational tech giants want to take part in both the market opportunities opening up on the whole African continent and the increasing technological talents. This has led to an emergence of a viable ecosystem including a broad range of players representing both non-profit and for-profit sectors varying from local micro-enterprises to global telecom companies. If companies want to conquer the vast market opportunities and create successful (social) innovations, they need to create partnerships and find their place in the ecosystem.

It may be asked whether it would be possible to create a similar kind of ecosystem that attracted various players for other industries – for example, energy. What would then be the partnership arrangements and cooperation method between these various actors? Would there be a 'clustering' effect similar to that which has happened in the East African mobile industry? Local knowledge is increasingly leading to the development of knowledge centres that attract even global attention. In conclusion, it is worth pointing two points relating to future research as a spin-off to what is discussed in this article. First, more longitudinal research is needed to evaluate both the commercial success and social impacts of doing business in the low-income market. Second, the scope for research could be expanded to cover different kinds of partnership arrangements and models of innovation ecosystems.

Acknowledgements

The author kindly acknowledges the following individuals for their cooperation in providing information used in the writing of this article: Linda Kamau, co-founder of Ushahidi, member of AkiraChix; Agatha Gikunda, head of solutions, Middle East and Africa, Nokia; Eric Hersman, co-founder of Ushahidi; Jussi Impiö, director, Nokia Research Center, Nairobi; Ken Banks, owner, Kiwanja.net; Tim Kelly, lead ICT policy specialist, The World Bank; Judith Owigar, president of AkiraChix; Jamilla Abass, co-founder of M-Farm; Rose Goslinga, Syngenta Foundation; Patrick, Safaricom; Lillian, co-founder of M-Farm; Chris Sang, CEOs deputy, Virtual City; Toni Eliaz, Mobile Innovation and Entrepreneurship, The World Bank; Kigen Kandie, co-founder of Mobile Planet; Jonathan Donner, researcher, Microsoft Research India Beki Grinter, Georgia Institute of Technology Gary Marsden, University of Cape Town; Paul Kukudo, CEO, Kenya ICT Board.

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