Section 1. Shaping the economic sphere

Chapter 1

Mobile-based livelihood services in Africa: pilots and early deployments

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Abstract

The paper describes a collection of initiatives delivering support via mobile phones to small enterprises, small farms, and the self-employed. Using a review of 26 examples of such services currently operational in Africa, the analysis identifies five functions of mobile livelihood services: Mediated Agricultural Extension, Market Information, Virtual Marketplaces, Financial Services, and Direct Livelihood Support. It discusses the current reliance of such systems on the SMS channel, and considers their role in supporting vs. transforming existing market structures.

Keywords: SMS, ICT4D, microenterprise, agriculture

Introduction

Researchers have documented the rapid uptake and use of mobile telephones by both farmers and by micro and small enterprises (MSEs) across Africa. Mobiles offer both groups opportunities to deepen interactions with existing customers, replace travel, and participate in broader and more efficient markets (Aker, 2008; Jagun et al., 2008; Molony, 2006; Muto and Yamano, 2008; Overå, 2006; Samuel et al., 2005). Landlines have offered many of the same benefits for decades (Saunders et al., 1994), but in many cases have been unaffordable or simply unavailable to the smallest businesses and farmers.

Recently, a small number of ventures (some by private companies, others by governments, or NGOs) have begun to explore what mobiles can do for farmers and MSEs, beyond voice calling and person-to-person SMS. These mobile-based livelihood services" offer platforms for information sharing, coordination, marketing, and even financial transactions. With a few notable exceptions, livelihood services are not yet runaway successes–indeed many are pilot programs or niche services. However, there is sufficient diversity to provide some indications as to what the next wave of mobile-based livelihood services might look like.

This analysis describes a variety of emerging mobile services targeting any of the smallest and most numerous forms of enterprises in Africa—independent famers and small agricultural producers (Munyua, 2008), operators of micro and small enterprises (Mead and Leidholm, 1998), and the self-employed (International Labor Organization, 2003), including tradespersons and casual laborers. Previous research has tended to address only one sector at a time; there is a broad community of researchers and policymakers concerned with leveraging information and communication technologies (ICTs) for agriculture (Munyua, 2008; Saunders et al., 1994; Shepherd, 1997), and a distinct (and much smaller) community concerned with ICT use by small non-agricultural enterprises (Duncombe and Heeks, 2002). This analysis combines the

groups for three reasons: (1) there are technical commonalities between the sectors, in that a technology deployed for one sector can be used by another, (2) there is a relatively small number of discrete applications available for analysis, and (3) there are theoretical similarities between the designs and intended outcomes which become clearer when a broader pan-sectoral lens is applied. That said, there are more services targeting agriculture than small enterprise, perhaps because the small enterprise community is much more fragmented into manufacturing, services, and sales. The common thread is that the majority of tiny enterprises in Africa have typically not been users of digital technologies. The increasing ubiquity of mobile telephony has changed the affordability and access equation for both agricultural and non-agricultural small enterprises alike.

This brief paper does not present an evaluation of the effectiveness of any particular service, nor does it venture an assessment of the suitability or potential effectiveness of different kinds of services. Instead it provides an overview of the range of services currently available, and, more importantly; it identifies what kinds of changes (to the enterprise or to its environment) the designers of the services intend to bring about. The task of making these intended changes explicit serves as a bridge to considering these services in light of our interdisciplinary understanding of the role of mobile communication (and ICTs) in society and in economic development. In particular, by taking an aggregate view encompassing a couple dozen services we can better consider how these livelihood services both reflect and reinforce the logic of an informational society (Castells, 1996; Castells et al., 2007).

Methods

References to the various services active in Africa were gathered from a combination of primary and secondary sources. From the new media, www.kiwanja.net and www.mobileactive.org offer databases of mobile-specific services, applications, and use cases in development and community activism. Slavova's (2009) weblog, MMD4D,

includes a permanent page with links to numerous "ICT market information projects" From more traditional sources, excellent reviews by development agencies (Gakuru et al., 2009; Munyua, 2008) were helpful. There are also some recent reports in the technical literature describing pilot programs, or outlining current design challenges facing such systems (Kassegne et al., 2008; Veeraraghavan et al., 2009). However, because the mobile livelihood services in Africa are generally quite new, there are few detailed scholarly analyses or independent evaluations available. Notable exceptions include Boadi et al., (2007) on Tradenet/Esoko, and David-Benz, Wade and Egg (2006) on Manobi, and Tickner's (2009) review of mobile use in agricultural marketing systems.[1] Tickner's recent review is particularly germane, as it too stresses the paucity of available evidence and prioritizes further research into the impacts, both positive and negative, of digital market information systems in developing countries. This review was conducted in English, so there is some chance that systems with public documentation only in French (or other languages) were not picked up.

The review focuses specifically on mobile livelihood services. Others have examined mobile based systems as one of (Gakuru, et al., 2009) or the most promising recent addition to (Tickner, 2009) an array of agricultural marketing systems. Indeed, both reviews offer categorizations into subgroups of services. However, neither of these reviews includes nonagricultural livelihood classes, and neither makes linkages back to theories of the informational society. The choice of the word service is also intentional. The review assesses activities which are more complex than simple person-to-person voice calls or text messages; there must be some code, a database, or some structure mediating, storing, or aggregating interactions between users. Some of the mobile payments systems include a small application, or set of menus, which resides on the SIM card (subscriber identity module) provided to the user by the mobile operator. However, at this point none of the systems involve applications which are

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[1] The body of the text mentions a variety of distinct mobile livelihood services. Details and standardized/shortened URLs for each are available in the appendix.

independently downloaded or installed directly to on the operating system of the mobile phone. Instead, almost all are SMS based services that are hosted on a PC or server at a different location from the end users. Finally, the review is limited to conditions in which a mobile handset is in the hands of the end user. It excludes geographic information systems (GIS) and global positioning systems (GPS), photography, PDAs, netbooks, laptops, and tethered mobile use, where the handset is used only as a modem to connect a PC to the internet.

Results

The results section contains a brief description of each of the categories of mobile livelihood service. Both the selection of categories and the assignment of examples to the categories were decided by the author. It starts with three core elements of livelihood applications (agricultural extension, market information, and virtual marketplace) then describes comprehensive platforms that offer all three such services. Later, it describes two related approaches—one from financial services, the other, concerning direct livelihoods, which have not been included in previous reviews of market information systems.

Agricultural extension

Agricultural extension—the practice of gathering, developing, and sharing knowledge about farming and rural livelihoods with rural populations—is a decades-old and common activity (Brunner and Yang, 1949). Over time, there have been layers of archetypal extension activities, starting with an extension worker physically travelling to farms or farming communities to engage in knowledge exchange. Broadcast technologies, particularly rural radio, soon joined the array, allowing for rapid and low cost dissemination (usually in one direction) of knowledge. Finally, participatory methods, with an explicit focus on bi-directionality and knowledge sharing, began to be integrated into updated extension protocols. Not surprisingly, the Internet, as a many-

to-many medium, has shown promise as a way to increase interactivity and the participation in agricultural extension activities (Richardson, 2003).

A few programs take advantage of mobile services for agricultural extension activities in Africa. Taking a broadcast (push) approach, the Collecting and Exchanging of Local Agriculture Content (CELAC) program in Uganda maintains a database of stakeholders and farmers to whom they regularly distribute agricultural tips and knowhow via SMS. Using a "pull" approach, Kenya's National Farmers Information Service (NAFIS) maintains a database of voice responses to commonly asked questions; farmers are invited to call in via their mobile phones to interact via voice menus with the database, presumably at lower cost than speaking directly with an extension worker. Finally, in Uganda, a partnership between Google and the Grameen Technology Center Uganda, has recently launched Farmer's Friend, a set of farming tips and weather updates available via premium SMS. In both the Farmer's Friend and NAFIS model, there is increased customizability, as content can be tailored to and requested by individual users, but the costs of communication are generally borne by the farmer, rather than the information provider.

Those in the Business Development Services (BDS) field serve small enterprises in much the same way agricultural extension workers serve farmers (Gibson, 1997). However, no instances of BDS services delivered via the mobile channel were evident in Africa at the time this review was compiled.

Market information

A second set of services focuses directly on one of the greatest challenges facing commodity producers such as farmers and fishermen—having accurate knowledge of the going price for their goods. In Africa, a variety of governments, NGOs, and private sector companies offer country-specific and regional price information for numerous agricultural goods. Some of these have begun to integrate mobile channels. For

example, the Kenyan Agricultural Commodities Exchange Program (KACE) offers a co-branded service, SMS Sokoni, with one of the major mobile operators, Safaricom.

Also in Kenya (and neighboring Ethiopia and Tanzania), the Livestock Information Network Knowledge System (LINKS) provides information on prices and sales volumes for cattle across various markets, as well as weather information. A project of Texas A&M, funded by USAID, the system operates on multiple platforms: Internet, satellite radio, and SMS. In Uganda, FIT Uganda, a consultancy, offers Infotrade, a website offering a variety of prices and calculators, including distance and transport costs and multi-market comparisons of real-time prices. There is an SMS component, but the functionality is more limited, offering only generic wholesale and retail prices for one commodity and one market at a time.

Of course, individual farmers or fishermen can use the voice call (or even a public payphone) (Eggleston et al., 2002; McKemey et al., 2003) to call a wholesaler or trader themselves. These person-to-person (P2P) calls already offer enormous value in reducing variance in prices farms are able to secure for their goods (Muto and Yamano, 2008), and have played a significant part in converging markets toward the law of one price (Aker, 2008; Jensen, 2007). This is good for producers and consumers. However, a centralized system such as KACE and LINKS, in which an entity gathers accurate price information from multiple markets for multiple products on behalf of multiple producers, can distribute the costs and time associated with information search which might otherwise fall to individual farmers. SMS is an attractive, logical channel to deliver such aggregated data, since farmers can receive (or query) such databases without needing to travel from their farms.

Virtual marketplaces

Specific venues matching buyers and sellers are as old as markets themselves, from bazaars and town squares to hardcopy classified ads to online B2C, B2B and C2C

marketplaces. It is not surprising to see services available in Africa that match buyers and sellers over a mobile channel. In Zambia, the National Farmers' Union uses SMS (and a website) to provide not only aggregated price information, but also information linking quoted prices to individual, identifiable buyers, including contact information and whereabouts. This offering falls short of full transaction support, but is rather online matchmaking for offline transactions. Meanwhile, in Uganda, Google Trader offers an open-ended keyword based platform for the exchange of anything from cars and homes to transport and products.

Other services focus on matching job seekers to employers. Mobile for Good's Kazi560 site in Kenya lets job-seekers place and browse advertisements for jobs via SMS. Further North, Souktel, launched first in the Palestinian territories, has begun offering its SMS based JobMatch service in Somalia.

Comprehensive and/or flexible platforms

A few of the most established actors in the livelihood services space cannot be classified into any of the three "core" categories, because they provide some or all of the constituent services in an integrated offering.

Manobi, from France and Senegal, and Esoko (formally Tradenet) from Ghana are the two most established and well-known comprehensive ventures in the space. Both began with some support from donor agencies. Each now offers a customizable suite of services, including upstream agricultural extension information, price quotes, and virtual marketplaces.

Further, Manobi and Esoko each offer coordination functions, rolling up information such as quality metrics and inventory figures to inform downstream buyers. Both offer extensive websites and robust environments applications; the mobile/SMS services are only one way of accessing the systems. Individual deployments consist of a tailor-made configuration of the core system to the client group, for example, say, the Mango

industry in Mali (iicd, 2008) or the fisheries of Senegal (Manobi projects using their core "Time to Market" software) or bean traders in Ghana and cashew growers in Mozambique (both Esoko commodities). Mark Davies, head of Esoko, has explained, "While running TradeNet, we realised that there was a need for a platform to integrate the whole supply chain, not to just provide prices…We're missing the point if we don't integrate the whole industry" (Magada, 2009).

"Integrating the whole industry" requires significant scale investments. In the same interview, Davies suggests a nationwide rollout of an Esoko system could cost $1m (in addition to investments in servers and hardware, staff must be hired to gather prices, conduct training, troubleshoot, and manage subscriptions). Esoko seeks to enter public-private-partnerships in the markets it serves, and also seeks revenue from individual subscribers, in tiered plans with target clients ranging from individual farmers to middlemen and exporters. Similarly, Kenya's Virtual City, offers coordination functions to larger firms (for example, breweries and livestock buyers) putting handhelds or mobile phones in the hands of buyers and agents who are transacting with small producers. The handsets, the network, and Virtual City's custom functionality enables linkages between informal and formal, between micro and macro enterprises, but is supplied and supported by the larger entities in the transaction.

Two other systems are similarly comprehensive, but have been rolled out as not-for-profit activities. Trade at Hand, managed by the International Trade Center, itself a program of the United Nations and the World Trade Organization, offers a suite of SMS-based tools delivering market prices in Burkina Faso and Mali, and supporting a virtual marketplace piloted in Liberia. Drumnet, in Kenya, works with small-scale agricultural providers and players across the supply chain in order to facilitate high-quality exports. Phase 1 of the Drumnet system was internet-based, with shared access points and community info-mediaries; phase 2 is largely mobile based, and also contains provisioning for microfinance loans to support purchasing agricultural inputs in

advance of product delivery. Like Manobi and Esoko, the Trade-at-Hand and Drumnet systems contain facilities and protocols (a combination of software, business processes, and manpower) to gather and pass aggregated information downstream to buyers. These coordination functions are costly, but may be critical in overcoming the inertia and trust barriers associated with switching from old to new systems, and may provide more value than simply matching buyers and sellers in flat, context-free virtual marketplaces.

Frontline SMS offers a completely different constellation of features and functions. The system is far from comprehensive (like Manobi or Esoko); instead it is lean, free, and highly customizable and flexible. It is a relatively simple protocol designed to connect a PC's database directly to a GSM modem and SMS service, allowing small organizations to manage a two-way SMS-based information service.[2] Frontline SMS specifically targets the NGO community, and has been downloaded and customized by organizations to craft disaster alerts, monitor disease outbreaks, send out prayer alerts, and coordinate field staff. According to the Frontline SMS website, it has been used to distribute agricultural market information systems in Madagascar, Rwanda, Botswana, and Niger; to coordinate and gather information from farmers in Cameroon and Mozambique; and to deliver agricultural extension information in Tanzania and Mauritius. Thus, while any discrete use of the platform might focus on only one or two core livelihood functions, the system has demonstrated a collective comprehensiveness in its range of possible uses.

Financial services

There has been a great deal of attention paid to the arrival of "mobile banking" and "mobile payments" systems in Africa (Duncombe and Boateng, 2009). Offered by banks, mobile operators, or third parties, these systems combine an electronic system

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[2] A similar SMS server was developed and piloted by Microsoft Research India, and is used in agricultural collectives in India and Vietnam (Veeraraghavan et al., 2009).

with an on-the-ground network of agents, partner banks, and/or merchants, and provide users the ability to convert money into stored value, to send money to friends and family (or to businesses), and to "cash out" stored value back into hard currency. For those with bank accounts, mobile banking is a convenience; for hundreds of millions of "unbanked" people in the developing world, it could be more than a convenience. M-PESA, offered by the Kenyan mobile operator Safaricom, has been a breakaway success, signing up over 6 million users in its first 2 years (Mas and Morawczynski, 2009). But other systems are joining the fray. A recent inventory by the social venture credit SMS suggests that that there are at least 23 distinct mobile money transfer services, operating or pending in 22 countries (creditsms.org, 2009). Some, like MTN Mobile Money, and Zain Zap operate across multiple countries; others are country-specific.

For the most part, these m-payments systems have been targeted at individuals and families, rather than specifically at small enterprises or farmers. In Kenya, early promotion and use of M-Pesa centered on "sending money home" (from wage earners in cities to families in rural areas) rather than paying for goods and services, or for savings or credit. But with time, a broader ecosystem has begun to emerge, as Kenyan businesses are beginning to accept payments for goods and services via M-PESA. The patterns of use and impact are still evolving, and urgently require further study in both agricultural and nonagricultural arenas. However, the potential certainly exists for mobile payments systems to be of great value as livelihoods services, and they merit inclusion in a review of such tools.

Direct livelihood support

Finally, a few mobile systems exist which help small entrepreneurs pursue livelihoods directly on the mobile—this is different from using a mobile or mobile service to support a non-phone-based livelihood, such as farming or retail. The most well known example is the Grameen Village Phone program, started in Bangladesh (Bayes, 2001) but now

replicated in Cameroon, Uganda, and Rwanda. The system provides loans to individual entrepreneurs, usually women, to purchasing a handset and airtime. The women then use their handsets like payphones, providing telecommunications services to their villages or neighborhoods. Around the world, less formal "umbrella ladies" (Sey, 2006) and other independent operators resell airtime from shared phones. In the case of a branded village phone, some signage, a battery, and an antenna are generally required. Further, some groups create hardware (South Africa's PsiTek) or software (South Africa's SharedPhone) which are tailored specifically to supporting mobile payphone enterprises. In a sense, both companies offer products which support mobile-based livelihoods.

Txteagle (Eagle, 2009), launched in Kenya, takes a very different approach to facilitating mobile-based livelihoods. It 'crowdsources' large tasks, such as translation or transcription, slicing them into small character bits and distributing these to a workforce entirely by SMS or USSD. In essence, anyone can participate in a translation task, and can get paid on a per-message basis. The system sends the task to multiple users to increase overall accuracy. Users are paid via airtime transfers or, —in a further indication of the growing importance of the mobile-based electronic payments ecosystem in Kenya—via M-PESA.

Discussion

The discussion that follows has two primary sections. First, it evaluates the state of the mobile livelihoods services landscape in Africa as a whole. Second, it considers that landscape in light of the emerging interdisciplinary theory about personal ICTs, development, and society.

The landscape

One finding is that SMS "rules the roost".[3] In some ways, this dominance is both practical and reflective of the current capabilities of the handsets most target users currently own. All of the SMS services are currently accessible via even the most basic of handsets, and by users who have neither postpaid accounts nor data plans. However, this broad accessibility comes with some constraints. In terms of fixed costs to end-users, phones which support only voice and SMS are cheaper than data-enabled phones. However the variable costs of using voice, SMS and data systems are inverted; to transmit a simple message, say, about the cost of potatoes, via a voice call could cost $.20 for a one minute call, or $.10 for a single SMS. The same message if sent via a GPRS data connection, accessed via a WAP page, or from a dedicated application in a handset, could cost a penny or less.

The reliance on SMS may exclude those with lower degrees of literacy (Medhi, Ratan, and Toyama, 2009); voice options, such as the ones employed by CELAC or the National Farmer's Information service, and explored elsewhere (Agarwal et al., 2009), may be helpful for the low-literacy population, but relatively costly and frustrating to those who can navigate text. Further, and regardless of the connectivity they offer, midlevel feature phones have better displays and more customizable interfaces which make them easier to use than basic handsets for complex tasks (though not necessarily for routine tasks like placing and receiving calls).

On the other hand, the text message is a pricy and limited way to move information. When SMS messages can cost ten (US) cents or more, any kind of regular use can strain the pockets of a farmer or microentrepreneur. In some cases, the SMS can be stretched—for example, Nokia's Life Tools and Mobile XL use SMS to transmit data, but present it to feature phone users in a more flexible browser-like application; and

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[3] Another text-based channel, USSD, shares attributes with SMS but is controlled by the operators and is much less expensive. It is available only to services delivered by, or working with, the operators.

multisession SMS messaging can support a variety of complex data queries—but the key to the transmission and processing of broader ranges of information is the GPRS (data) channel. Getting the spot-price for sorghum via SMS might be fine, but consider the difference between buying that sorghum, sight-unseen, from an unknown buyer via an SMS virtual marketplace, and seeing a photo of that actual bag of sorghum, its whereabouts on a map, and a list of previous buyers and their comments. The latter experience is possible only on a feature phone with a data connection, running an application or accessing a WAP page.

As costs come down, more African handsets will be data-ready every year. Builders of mobile livelihood services (or applications) will have to make the calculation, based on their particular data transmission needs, the particular demographics of their users, and the particular pricing regimes of the telecommunications companies in the countries they wish to serve, as to whether a tipping point has been reached and the transition to GPRS can begin. The landscape will continue to evolve quickly, and in five years, it is likely that it will contain a menagerie of approaches, ranging from SMS to WAP to GPRS applications, to full-internet converged experiences via smartphones and netbooks.[4] Indeed, if one looks beyond Africa, more examples of different approaches are evident,[5] from Nokia's Life Tools (a feature phone browser delivering agricultural content via SMS in India; CellBazaar, a virtual marketplace in Bangladesh which offers a WAP/GPRS option alongside its original SMS features (Quadir and Mohaiemen, 2009), or Frogtek in Colombia, which will offer a suite of financial tools to support small retail enterprises via applications running on a smartphone.

Livelihood services, development, and the informational society

The results section described five discrete functions of mobile livelihood applications, plus the comprehensive platforms. Both the Agricultural Extension and Market

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[4] While smartphones, netbooks, laptops and PCs are not currently affordable by many small farmers or microenterprises, they can be shared by collectives, or carried from site to site by extension workers, or subsidized by downstream wholesalers (or upstream suppliers) who seek better integration with transaction partners.
[5] http://www.nokia.co.in/explore-services/nokialifetools; http://cellbazaar.com/web; http://frogtek.org/.

Information systems have their roots in the broadcast/mass communication paradigm. A central actor gathers and processes information on behalf of a community which—it is hoped—will value that information. The pull queries add a degree of targeting and user control, but the content still resides with an institution and is transferred to end-users. By contrast, the Virtual Marketplaces and Financial Services providers have a taller order, convening a location (creating a platform) for two-way person-to-person interactions.

One way to assess the orientation of these functions to the environment as a whole is to translate their functions into intended impacts on that environment, and in particular on the market in which small and informal enterprises operate. Indeed, we take two factors as granted; (1) that there is a market, albeit inefficient, that enterprises wish to address, and (2) that increases in the productivity of enterprises are desirable, both to the operators of the enterprises and to the development community. In reality these factors are not always present, and subsistence, survival, and symbolism may in various ways compete with productivity as the governing logic of many small and informal enterprises (Duncombe and Heeks, 2001). Nevertheless for assessing intended and actual impact of mobile livelihood systems, a useful (but not the only useful (Duncombe, 2007)) approach is to treat their users as enterprises, and to bring to bear tools traditionally used to assess the structural locations and strategic choices of larger enterprises.

An earlier analysis of the research on basic voice-and-SMS mobile use (not services) by small enterprises (Donner and Escobari, 2009) suggested that mobiles can impact small firms in a variety of ways: by altering internal business processes, or by altering the network of market relationships in which users are based (Porter, 1985). These impacts on the network include the injection of additional information about markets, the addition of new buyers and sellers, the bypassing of middlemen, and the origination of new business. To Donner and Escobari, the literature suggested that there was

currently more evidence for mobiles having observable impact in evolutionary ways (adding information and new players) than in revolutionary ways (bypassing middlemen, and starting new enterprises). In other words, the available literature suggests that while mobile use makes many small enterprises more productive, and markets broader and more efficient, it does not suggest that the markets themselves are being transformed.

Figure 1.1. Services Impact on Environment System or Value System

Impact on Environment/Value System

	Improve internal activities	Add Market Information	Add Buyers/ Sellers	Bypass Middlemen	Start Businesses
Mediated Agricultural Extension	X	X			
Market Information Systems		X			
Virtual Marketplaces		X	X	Sometimes	
Financial Services	X		X		
Direct Livelihood Support				X	X

Figure 1.1 arrays the various mobile livelihood functions identified in this review against the categories of impact presented in Donner and Escobari (2009). It is reasonable to expect some impact associated with bringing more information to small and traditionally marginal market players, and some expansion of the scope of markets by allowing more players to interact with each other over distances at lower costs (as occurs when telecom use drives commodity price convergence, holding transport prices equal (Jensen, 2007; Muto and Yamano, 2008)). However, Figure 1.1 illustrates that it is unlikely that agricultural extension, BDS, or price quotes alone can transform the network of relationships linking buyers and sellers, because they do not seek to alter them.

Conversely, to reconfigure a market, to replace existing market relationships with new mediated relationships is likely to be a more challenging task. It is possible that mediated relationships are better suited to some exchanges than others, and may work best only under conditions where other barriers to a generalized and level marketplace

(around transport, finance, trustworthiness) can be overcome. The only available assessment of one such system (Manobi) is largely skeptical (David-Benz et al., 2006) of its ability to overcome these hurdles, so more research is urgently needed, particularly in light of Molony's (2006), work on how mobile-based commerce in Africa operates best with a wrapper of face-to-face trust-building interactions and Geertz's (1978) description of how traders can elect to transact only with a subset of known alters. It is probably too early to ascertain the likelihood that any given market will move to an online (or on-mobile) venue, but it is not too early to conduct the research to determine what factors make some markets (agricultural or non-agricultural) more amenable to mobile-mediation than others. In the meantime, initiatives such as Esoko's experiments with trustworthiness/reputational rankings (Magada, 2009) should be studied and discussed.

The shift to a virtual marketplace does not necessarily require the abandonment of existing marketplaces and market relationships. Indeed, the mobile livelihood services categorized as "comprehensive platforms" are using the transaction spaces in ways which deepen industry value systems and possibly empower middlemen (buyers, wholesalers) rather than completely replacing them. These are not simple, disruptive applications, but rather complex, expensive, multifaceted interventions in which mobiles play only a role. In this sense, these platforms may be generating large benefits in terms of productivity and value creation by further integrating local producers with demanding external/export markets, but are doing so without necessarily breaking out of existing trade relationships. At the broadest of levels, these systems might be better understood as reinforcing and reflecting, rather than transforming, the underlying structures of the global informational society described by Castells (1996).

Conclusion

The two dozen mobile livelihood services profiled in the review are not reflective of a single integrated trend. They are instead a confluence of different technical and organizational models (Donner et al., 2008), reflecting donor priorities, local-NGO innovations, government mandates, and some market opportunities. Although this review has stressed the mobile channel, it is important to recall that in almost every case, the "service" does not run on the handset on its own. Rather, there is a PC, a server, or a whole organizational ecosystem behind whatever the user sees on his or her small mobile screen. More often than not (the "not" being some implementations of Frontline SMS), the systems are deployed and maintained by large institutions in central, influential locations in the continents' formal agricultural and non-agricultural economies. In fact, this increased institutional involvement may be one of the greater current impacts of these livelihood systems. An array of such institutions can draw into closer contact with the smallest farm and nonfarm enterprises—entities which have often been at the margins of the formal economy. That these institutions can help in help more farms and small enterprises become more productive by lowering the cost of searching for information, adding new skills, or advertising to customers, is good for the families which depend on the enterprises for their livelihoods. However, we should be wary of heralding the arrival of a new paradigm of economic organization until we see more evidence of thriving mediated marketplaces replacing, rather than simply accelerating, current market structures.

References

Agarwal, S., Kumar, A., Nanavati, A., Rajput, N. (2009): Content Creation and Dissemination by-and-for Users in Rural Areas. Paper presented at the the third international conference on Information Technologies and Development (ICTD2009), Doha, Qatar.

Aker, J. C. (2008): Does digital divide or provide? The impact of cell phones on grain markets in Niger. BREAD Working Papers, 177(177). Retrieved from http://ipl.econ.duke.edu/bread/papers/working/177.pdf.

Bayes, A. (2001): Infrastructure and rural development: insights from a Grameen Bank village phone initiative in Bangladesh. Agricultural Economics, 25(2-3), 261-272.

Boadi, R. A., Boateng, R., Hinson, R., Opoku, R. A. (2007): Preliminary Insights into M-commerce Adoption in Ghana. Information Development, 23(4), 253-265.

Brunner, E., ang, E. H. P. (1949): Rural America and the extension service: a history and critique of the cooperative agricultural and home economics extension service. New York: Columbia University.

Castells, M. (1996): The rise of the network society (Vol. 1). Malden, MA: Blackwell.

Castells, M., Fernández-Ardèvol, M., Qiu, J. L., Sey, A. (2007): Mobile Communication and Society: A Global Perspective (Information Revolution and Global Politics). Cambridge, MA: MIT Press.

creditsms.org. (2009): MMT Africa Directory Retrieved September 11, 2009, from http://www.creditsms.org/home/index.php?categoryid=19.

David-Benz, H., Wade, I., Egg, J. (2006): Market information and price instability: an insight into vegetable markets in Senegal ISHS Acta Horticulturae 699: I International Symposium on Improving the Performance of Supply Chains in the Transitional Economies (pp. 131-142).

Donner, J., Escobari, M. (2009): A review of the research on mobile use by micro and small enterprises (MSEs). Paper presented at the International Conference on Information and Communications Technologies and Development, (ICTD 2009), Doha.

Donner, J., Verclas, K., Toyama, K. (2008): Reflections on MobileActive08 and the M4D Landscape. In J. S. Pettersson (Ed.), Proceedings of the First International Conference on M4D (pp. 73-83). Karlstad, Sweden: Karlstad University Studies.

Duncombe, R. (2007): Using the Livelihoods Framework to Analyze ICT Applications for Poverty Reduction through Microenterprise. Information Technologies and International Development, 3(3), 81-100. doi: 10.1162/itid.2007.3.3.81.

Duncombe, R., Boateng, R. (2009): Mobile Phones and Financial Services in Developing Countries: A Review of Concepts, Methods, Issues, Evidence and Future Research Directions Development Informatics Working Paper Series. Manchester, UK: Institute for Development Policy and Management, The University of Manchester.

Duncombe, R., Heeks, R. (2001): Enterprise Development and Information and Communications in Developing Countries: Supporting "ICT Flyers" Retrieved 26 November, 2009, from http://www.unbotswana.org.bw/undp/docs/bhdr2002/-

Supporting%20ICT%20flyers.pdf.

Duncombe, R., Heeks, R. (2002): Information, ICTs and small enterprise: Findings from Botswana. In H. Katrak R. Strange (Eds.), Small scale enterprises in developing and transitional economies (pp. 285-304). New York: Palgrave.

Eagle, N. (2009): txteagle: Mobile Crowdsourcing. Paper presented at the 13th International Conference on Human-Computer Interaction (HCII09), San Diego. http://txteagle.com/hcii09.pdf.

Eggleston, K., Jensen, R., Zeckhauser, R. (2002): Information and telecommunication technologies, markets, and economic development. In G. Kirkman, P. Cornelius, J. Sachs K. Schwab (Eds.), The Global Information Technology Report 2001-2002: Readiness for the Networked World (pp. 62-75). New York: Oxford University Press.

Gakuru, M., Winters, K., Stepman, F. (2009): Inventory of Innovative Farmer Advisory Services using ICTs, from http://www.fara-africa.org/media/uploads/File/NSF2/RAILS/Innovative_Farmer_Advisory_Systems.pdf.

Geertz, C. (1978): The bazaar economy: Information and search in peasant marketing. American Economic Review, 68(2), 28-32.

Gibson, A. (1997): Business development services core principles and future challenges. Small enterprise development, 8(3), 4-14.

iicd. (2008): ICTs help to boost Mali's mango exports. iicd. Retrieved from http://www.iicd.org/articles/icts-help-to-boost-malis-mango-exports.

International Labor Organization. (2003): Key Indicators of the Labour Market. Geneva: International Labor Organization.

Jagun, A., Heeks, R., Whalley, J. (2008): The Impact of Mobile Telephony on Developing Country Micro-Enterprise: A Nigerian Case Study. Information Technologies and International Development, 4(4), 47-65.

Jensen, R. (2007): The Digital Provide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector. Quarterly Journal of Economics, 122(3), 879-924.

Kassegne, S. K., Kidane, T., Assefa, A., Denko, M. K. (2008, 6-7 Oct). Mobile Text and Instant Messaging Solutions in Non-Latin Scripts for Commodity Price Information Management in Emerging Markets. Paper presented at the 2nd IFIP International Symposium on Wireless Communications and Information Technology in Developing Countries (WCITD 2008), Pretoria, South Africa.

Magada, D. (2009): Esoko - the new market info system for African farmers. (1 may). Retrieved from http://www.allbusiness.com/media-telecommunications/telecommunications/12342067-1.html.

Mas, I., Morawczynski, O. (2009): Designing Mobile Money Services: Lessons from M-PESA. innovations: Technology, Governance, Globalization, 4(2), 77-92.

McKemey, K., Scott, N., Souter, D., Afullo, T., Kibombo, R., Sakyi-Dawson, O. (2003): Innovative Demand Models for Telecommunications Services: Final Technical Report Retrieved August 17, 2007, from www.telafrica.org.

Mead, D. C., Leidholm, C. (1998): The dynamics of micro and small enterprises in developing countries. World Development, 26(1), 61-74.

Medhi, I., Ratan, A., Toyama, K. (2009): Mobile-Banking Adoption and Usage by Low-Literate, Low-Income Users in the Developing World. Paper presented at the Human Computer Internactional (HCII), San Diego.

Molony, T. S. J. (2006): 'I don't trust the phone; it always lies': Trust and information and communication technologies in Tanzanian micro- and small enterprises. Information Technologies and International Development, 3(4), 67-83.

Munyua, H. (2008): ICTs and small-scale agriculture in Africa: A scoping study. Retrieved 9 Sept 2009, from IDRC http://www.idrc.ca/uploads/user-S/12415296931FInal_Rev_6%5B1%5D.1.5_Scoping_Study__ICTS_and_Agriculture__Final_Report_26.4.08.doc.

Muto, M., Yamano, T. (2008): The impact of mobile phone coverage expansion on market participation: panel data evidence from Uganda (Vol. Working Paper 37). Tokyo: Japan Bank for International Cooperation.

Overå, R. (2006): Networks, distance, and trust: Telecommunications Development and changing trading practices in Ghana. World Development, 34(7), 1301-1315.

Quadir, K., Mohaiemen, N. (2009): CellBazaar: A market in your pocket. Innovations, Special edition for GSMA, 59-71.

Richardson, D. (2003): Agricultural Extension Transforming ICTs? Championing Universal Access Retrieved from http://internships.cta.int/-observatory2003/background/background_paper.pdf.

Samuel, J., Shah, N., Hadingham, W. (2005): Mobile Communications in South Africa, Tanzania, and Egypt: Results from Community and Business Surveys. Africa: the impact of mobile phones Retrieved August 17, 2007, from http://www.vodafone.com-/etc/medialib/attachments/cr_downloads.Par.78351.File.tmp/GPP_SIM_paper_3.pdf.

Saunders, R. J., Warford, J. J., Wellenieus, B. (1994): Telecommunications and economic development (2 ed.). Baltimore, MD: Johns Hopkins University Press.

Sey, A. (2006, 19-23 June): Mobile pay phone systems in Africa: the social shaping of a communication technology. Paper presented at the 56th Annual Conference of the International Communication Association, Dresden, Germany.

Shepherd, A. (1997): Market information services: theory and practice. Rome: Food Agriculture Organization of the UN (FAO).

Slavova, M. (2009): ICT Market Information Projects. MMD4D. Retrieved from http://mmd4d.org/ict4d-marketplace-projects/.

Tickner, V. (2009): Agricultural Marketing Systems and the Development and Spread of Mobile Phone use and other Information Communications Technologies (ICTs) in "Developing" Countries – experiences and directions forward. Brighton, UK: Government and Agricultural Marketing Consultants.

Veeraraghavan, R., Yasodhar, N., Toyama, K. (2009): Warana Unwired: Replacing PCs with Mobile Phones in a Rural Sugarcane Cooperative. Information Technologies and International Development, 5(1), 81-95.

Appendix Mobile-based livelihood services in Africa

A. Core Livelihood Services	Mode	downstream info	price quotes	match buyers/sellers	upstream info	financial services	direct livelihood
Mediated Agricultural Extension							
Collecting and Exchanging of Local Agriculture Content (http://is.gd/2ZPvA)	SMS	X					
Google Farmer's Friend (http://is.gd/2ZPGO)	SMS	X					
National Farmers Information Service (http://is.gd/2ZBPb)	IVR	X					
Market Information Systems							
Foodnet Agricultural Market Information System (http://is.gd/2ZRWJ)	SMS	X	X				
InfoPrix Benin (http://is.gd/2ZRGL)	SMS		X				
Infotrade Uganda (http://is.gd/2ZRQ8)	SMS		X				
Kenya Agricultural Commodities Exchange SMS Sokoni* (http://is.gd/2ZSak)	SMS		X				
Livestock Information Network and Knowledge System (http://is.gd/2ZRMf)	SMS		X				
Malawi Agriculture Commodity Exchange (http://is.gd/2ZRCb)	SMS		X				
Regional Agricultural Trade Intelligence Network (http://is.gd/2ZS33)	SMS		X				
West-African Market Information Network (http://is.gd/2ZRSZ)	SMS		X				
Virtual Marketplaces							
Google Trader (http://is.gd/2ZSl0)	SMS			X			
Mobile for Good Kazi560 (http://is.gd/2ZSeI)	SMS			X			
Souktel JobMatch (http://is.gd/54tpx)	SMS			X			
Zambia National Farmers Union (http://is.gd/2ZSpW)	SMS		X	X			
Flexible or Comprehensive Platforms							
Drumnet (http://is.gd/2ZQ34)	SMS	X	X	X	X	X	
Manobi (http://is.gd/2ZPSt)	SMS+	X	X	X	X		
Trade at Hand (http://is.gd/2ZPNT)	SMS	X	X	X	X		
Tradenet / Esoko (http://is.gd/2ZPXZ)	SMS+	X	X	X	X		
Virtual City (http://is.gd/54tUD)	SMS+	X	X	X	X		
Frontline SMS (http://is.gd/2ZQ5Q)	SMS	X	X		X		

B. Related Livelihood Services

	Mode	downstream info	price quotes	match buyers/sellers	upstream info	financial services	direct livelihood
Financial Services							
M-PESA (http://is.gd/2ZTT3) (and 23+ other mobile money services)	SMS					X	
Direct Livelihood Support							
Grameen Village Phone (http://is.gd/2ZU7J)	N/A						X
Psitek Kazang (http://is.gd/2ZUnD)	N/A						X
Sharedphone (http://is.gd/2ZUiz)	N/A						X
Txteagle (http://is.gd/2ZTWY)	SMS						X