Can the Innovative Use of Mobile Phones Support More Effective Land Administration Services?

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Key words: Mobile Government; Mobile Phone based Services; Land Administration; Location Based Services.

SUMMARY

Mobile phones have made a bigger difference to the lives of more people, more quickly, than any previous communications technology. They have spread the fastest and proved the easiest and cheapest to adopt. It is estimated that around 3.6 billion people currently have mobile phones and 6 billion will have them in 2013. With the developed markets now saturated, a significant portion of this growth will be in developing countries; in the year to March 2009, an additional 128 million signed up in India, 89 million in China and 96 million across Africa (The Economist, 2009).

Apart from the increase in number of users, there is a big shift from holding a phone to your ear to holding it in your hand. In addition to education and entertainment, a whole new generation of information services are being provided to users in developing countries: providing agricultural information services for prices, weather and farming tips; gathering health information in the field to help manage drug stocks; and verifying the authenticity of drugs. The mobile service that is delivering the most obvious economic benefits is money transfer, better known as 'mobile banking'. This has grown out of using pre-paid calling credit as informal currency and is well placed to bring financial services within reach of billions of 'unbanked' people across the developing world. An increase of 10 percentage points in mobile phone adoption in a developing country leads to a corresponding increase in GDP per person of 0.8 percentage points (The Economist 2009).

Could this revolution in the developing world also help to bring land administration services within reach of billions of people currently without security of tender? This paper explores the opportunities provided by increasingly ubiquitous mobile phones to support the delivery of and participation in land administration services. Mobile phones will increasingly integrate GNSS positioning, digital cameras and video capabilities and provide citizens with the opportunity to get directly involved in the land registration and cadastral process. But even today's simpler phones offer opportunities to provide secure payment of land administration fees and to support feedback mechanisms to monitor corruption. The mobile phone offers land professionals the opportunity to rethink how land administration services are designed and delivered.

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1. INTRODUCTION

Land Administration Systems (LAS) provide the infrastructure for implementing land policies and land management strategies in support of sustainable development. This infrastructure includes the institutional arrangements, a legal framework, processes, standards, land information, management and dissemination systems, and technologies required to support allocation, land markets, valuation, control of uses, and development of interests in land. LAS are dynamic and evolve to reflect the people-to-land relationships, to adopt new technologies and to manage a wider and richer set of land information (Enemark et al, 2010).

Land management underpins the distribution and management of a key asset of any society namely its land. For western democracies, with their highly geared economies, land management is a key activity of both government and the private sector. Land management, and especially the central land administration component, aim to deliver efficient land markets and effective management of the use of land in support of economic, social, and environmental sustainability (Enemark et al, 2005). The land management paradigm, as illustrated in Figure 1, allows everyone to understand the role of the land administration functions (land tenure, land value, land use, and land development) and how land administration institutions relate to the historical circumstances of a country and its policy decisions. The LAS is the fundamental infrastructure that underpins and integrates the land tenure, land value, land use and land development functions of land administration to support an efficient land market that fully demonstrates sustainable development.

To support an inclusive approach, a 'well governed' LAS is an infrastructure that is managed in such a way that the products and services are of the appropriate quality level, affordable, easy to use, support short transaction times and are fully transparent. It is crucial to understand that LAS can never be an end in themselves; their nature is to serve society, whatever that society currently looks like. For many countries this is definitely a break with the past, because elements of LAS, such as land registration and cadastral boundary surveying, are considered historically as an instrument of the colonial or otherwise ruling powers to securing their own land rights. 'Sustainable' land administration systems are therefore systems that serve society well, by providing effective sets of products and services that are fully inclusive to meeting demand now and in the future. This includes the poor who are currently excluded from participating in many countries.

It is estimated that LAS are only fully operational and work reasonably well in about 30 and mainly western countries (Enemark et al, 2010) Thus, the fundamental support of LAS in achieving the Millennium Development Goals is of serious concern. The lack of effective LAS conspires to limit access to services by large sections of society, especially the most vulnerable.
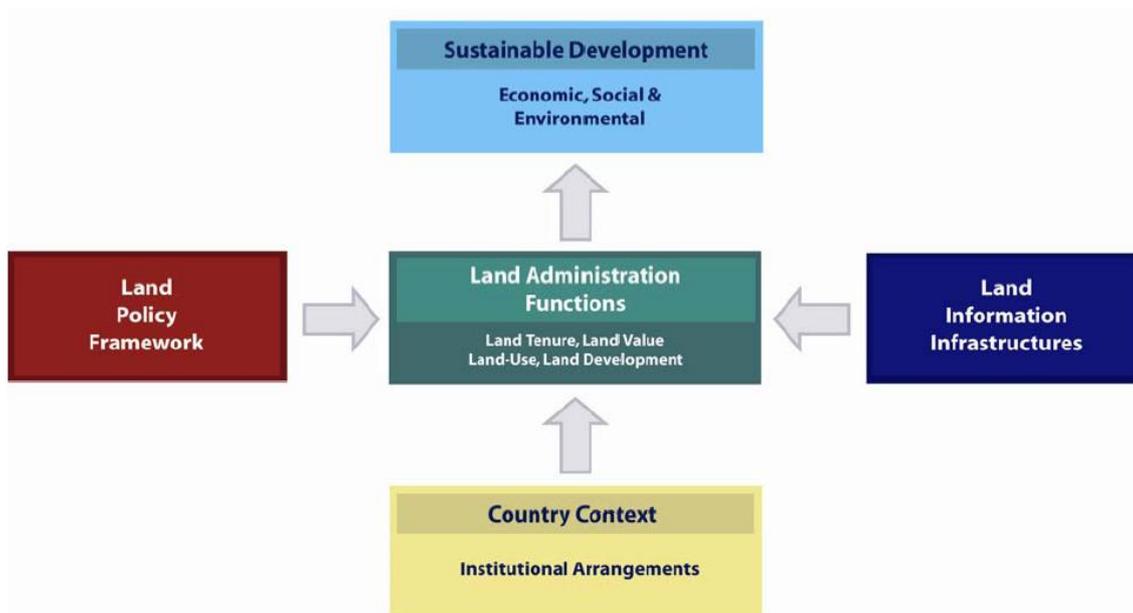
Figure 1: The land management paradigm (Enemark et al., 2005)

Mobile phones are providing a whole new generation of information services to users in developing countries: providing agricultural information services for prices; weather and farming tips; gathering health information in the field to help manage drug stocks; and mobile banking. This paper explores the opportunities provided by increasingly ubiquitous mobile phones to support the delivery of and participation in land administration services. Mobile phones will increasingly integrate GNSS positioning, digital cameras and video capabilities and provide citizens with the opportunity to get directly involved in the land registration and cadastral processes. But even today's simpler phones offer opportunities to provide secure payment of land administration fees and to support feedback mechanisms to monitor corruption. This paper challenges land professionals to rethink how land administration services are designed and delivered based on the opportunities provided by mobile phones.

2. LIMITATIONS OF CURRENT LAND ADMINISTRATION SYSTEMS

Although LAS are clearly understood to be essential in providing the infrastructure for implementing land policies and land management strategies in support of sustainable development, their current adoption and effective implementation are limited to mostly western countries. Factors limiting their effective implementation include:

- overly complex procedures leading to high service delivery costs and end user charges;
- lack of a supporting land policy framework ensure that the LAS do not deliver against the main drivers of land tenure, land markets and socially desirable land use;

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- a primary focus on delivering individual titles with insufficient support for social and customary tenure systems;
- lack of transparency leads to corruption;
- insufficient technical and business capacity to delivery and sustain services;
- a predominance of centralised administration limits accessibility and does not deliver services sensitive to local needs;
- communication channels to customers are either office or Internet based leading to geographic discrimination or exclusion through the 'digital divide';
- cadastral surveys using professional surveyors are mandatory leading to higher fee rates;
- a mortgage requires a bank account and credit rating, which is difficult for the poor and those remote from financial services to obtain.

The consequence of these current LAS characteristics is that many sections of society have no access to LAS services and are excluded. There is a pressing need to simplify LAS procedures, empower citizens in the delivery of LAS services and open new channels for their participation. The mobile phone offers the opportunity for a radical new set of LAS services to be applied to reach the world's poor.

3. THE INCREASINGLY PERVASIVE MOBILE PHONE

Mobile phones have made a bigger difference to the lives of more people, more quickly, than any previous communications technology. They have spread the fastest and proved the easiest and cheapest to adopt. It is estimated that around 3.6 billion people currently have mobile phones and 6 billion will have them in 2013. With the developed markets now saturated, a significant portion of this growth will be in developing countries. This has been possible through the innovative, dynamic tariff model and the outsourced and infrastructure sharing network model devised originally by the Indians; sometimes known as the 'Indian Model'. This has led to lower costs in establishing and operating mobile networks and serving customers, leading to lower and more affordable mobile phone ownership. Mobile phone basic models can now be purchased for as low as US$20 (US$250 in 1997) and despite the average revenue per user being as low as US$6.50 in India, for example, the operators still have operating margins of around 40%; comparable with leading Western operators. This 'Indian Model' is supporting the rapid expansion of mobile phone use across the developing world bringing it within reach of even larger numbers of the world's poor; in the year to March 2009, an additional 128 million signed up in India, 89 million in China and 96 million across Africa, where the teledensity is 40% (The Economist, 2009).

The use of mobile phones is not restricted to urban areas. The concept of the 'village phone' model (Grameen Foundation, 2010), initially developed in Bangladesh, has been very successful in the initial delivery of mobile phone services to rural communities across the developing world. In rural areas, where isolation and poor infrastructure services are often the norm, telecommunications can play an extremely important role in enhancing social and economic development. The Village Phone initiative has made tremendous social and economic impact in the rural areas of Bangladesh, creating a 'substantial consumer surplus' for

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the users. It has also created an income-earning opportunity for the Village Phone operators, mostly poor women who have used microfinance to buy a mobile handset, antenna and a large battery. In Afghanistan, for example, telephone ladies take an average of eight months to pay off the microloan required to buy their equipment and then earn US$50-100 a month (The Economist, 2009). However, with prices continuing to fall, most users in the developing world now have their own handsets.

Apart from the increase in the number of users, there is a big shift from holding a phone to your ear to holding it in your hand. In addition to education and entertainment, a whole new generation of information services are being provided to users in developing countries: providing agricultural information services for prices, weather and farming tips; gathering health information in the field to help manage drug stocks; and verifying the authenticity of drugs. The mobile service that is delivering the most obvious economic benefits is money transfer, better known as 'mobile banking'. This has grown out of using pre-paid calling credit as informal currency and is well placed to bring financial services within reach of billions of 'unbanked' people across the developing world. An increase of 10 percentage points in mobile-phone adoption in a developing country leads to an increase in GDP per person of 0.8 percentage points (The Economist 2009). The former luxury item has become a tool of global development

The emergence of smart phones has combined an array of technologies onto the mobile phone platform to significantly increase its functionality and its applicability in a wide range of new applications; applications for Apple's iPhone, for example, have now surpassed the 130,000 mark (148Apps.biz, 2010). Mobile phones are not just a communication device, but are also a passive sensor that silently collects, exchanges and processes information all day long. As well as recording sounds, mobile phones are increasingly recording images and locations. Mobile phones are progressively being spatially enabled through integration with GNSS technology, cell phone triangulation or wifi positioning. Over the next five years Multi-constellation GNSS will provide around 100 satellites available for global positioning. These new GNSS signals and constellations will provide better accuracy and reliability, leading to centimetre(s) positioning in a mobile environment. Indoor positioning will still require augmentation with other sensor systems and will result in sub-metre accuracy. Therefore, high accuracy ubiquitous positioning will become an expectation. Over this period, cheap sensors will also be added to mobile phones to detect aspects of the environment, e.g. air and noise pollution (CAMMOBS, 2010).

As well as this inbuilt functionality, mobile phones are being connected to the phone networks at ever higher bandwidths. This has opened up real-time access to the Internet and to information services.

The mobile phone is generating a move to distributed citizen / participatory sensing and supporting Mobile(M)-government as an extension or supplement to e-government and providing information and services through mobile devices, i.e. mobile phones, laptops and is mobile and wireless (Trimi and Sheng, 2008). For developing countries with no infrastructures of wired Internet technology, this is the only low cost infrastructure option

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available and opens up new channels for communication with citizens. M-government has the following advantages (Enemark & McLaren, 2008):

- It avoids the digital divide since the use of mobile phones is becoming ubiquitous [70% of the USA population and 93% of the EU own one (Wikipedia, 2007)] and is evenly distributed across society;
- Use of mobile phones is fastest growing in developing countries (in 2007, 90% of phone subscriptions in Africa were mobile phones);
- Services are available anywhere, anytime;
- Mobile phones are increasingly being spatially enabled;
- Supports 2-way communication, including real-time alerts to citizens, e.g. terror and severe weather alerts;
- Can be used for e-payments for services. This can reduce the potential of corruption; and
- Mobile phones are single user devices, allowing services to be personalised, e.g. license renewal reminders.

M-government opens up additional channels for citizen participation and has a significant potential to increase the constituent participation.

4.   MOBILE PHONE SUPPORT OF LAND ADMINISTRATION SERVICES

This increase in functionality of the mobile phone and its migration to lower cost devices, its increasing pervasiveness across developing countries and its connection to Internet and information services is opening up significant opportunities for its use in delivering more effective and accessible land administration services. This section identifies a number of areas where the mobile phone could be effectively used. These proposals should not be seen in isolation, but should be considered in the context of radical redesign of how Land Administration services are delivered. This greater accessibility would lead to a much higher degree of citizen participation in the process, especially the poor.

4.1 Accessing Customer Information Service

A whole new generation of innovative information services are being provided to users of mobile phones in developing countries. Agricultural information services are providing commodity prices, weather forecasts and farming tips and health information services are gathering health information from the field to help manage drug stocks and verifying the authenticity of drugs (The Economist, 2009). These information services are two way, allowing questions from the field to be answered. A similar set of land information services for users could provide explanations of procedures, electronic forms for completion and best practice for land registration and cadastre, for example. This remote guidance and support will be required when there is more significant citizen participation in land administration services.

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4.2 Recording Ownership Rights

The mobile phone will allow citizens to directly record the boundaries of their properties. This can be achieved in several ways:

- a textual description of the boundaries recorded on the phone;
- a verbal description recorded on the phone;
- a video and commentary recorded on the phone – this could include contributions from neighbours as a form of verification (mobile phone numbers of neighbours could be provided);
- the positions of the boundary points identified and recorded on imagery using products such as Google Maps, for example; and
- the co-ordinates of the boundary points recorded using the GNSS capability of the phone.

The results of this crowdsourced or self-service information could then be submitted electronically to the land registration and cadastral authority for registration. Although there are limitations in the quality and authenticity of the ownership rights information provided, it could form the starting point in the continuum of rights being proposed by UN-HABITAT (UN-HABITAT, 2008). This recognises that rights to land and resources can have many different forms and levels. Just as 'land tenure' has the notion of a statutory land right, other forms of land rights, such as anti-eviction 'right', group tenure etc., refer to the recognition of somebody's land possession within the social community and can be called 'social tenure'.

To increase the authenticity and quality of the registration application, the concept of the 'Village Phone' (Garmeen Foundation, 2010) could be adopted to allocate and train one member of a community to record or check ownership rights prior to their submission. This is the ultimate form of decentralisation.

The land registration and cadastral authority could apply a variety of quality checks on the submitted information, including random checks in the field, comparisons with other applications submitted in the same proximity, checks on ownership of the mobile phone, phone the client and their neighbours on their mobile phones to ask for clarification, etc.

Computer scientists at the University of Washington (Open Data Kit, 2010) have used Android, the open-source mobile operating system championed by Google, to develop an Open Data Kit to turn a mobile phone into a versatile data-collection device. It is being used by organisations around the world that need inexpensive ways to gather information in areas with little infrastructure. For example, members of the Surui tribe in Brazil have tested the Open Data Kit as a tool to raise awareness of illegal logging on their lands. The tribe also plans to use the tool to take an inventory of its forests so it can participate in global carbon markets

The power of crowdsourcing is gathering popularity and momentum in a variety of applications and a report commissioned by the UN (United Nations Foundation, 2009) has

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advocated its increased use. An example cited is a web-based reporting tool called Ushahidi, "testimony" in Swahili, (Marwaha, 2008) that allows Africans caught up in political unrest to report incidents of killing, violence and displacement. It is an open source tool (see www.ushahidi.com) to crowdsource information in times of crisis and its goal is to create a simple way of aggregating information from the public for use in crisis response. It taps in to mapping 'backends' like Google Maps, Virtual Earth or OpenStreetMap and has been used in Kenya after the violence following the 2007 elections and more recently in the Democratic Republic of Congo. The approach involves people providing information through the web, email or text messages (either directly sending text messages or posting information for those who don't have access). There is also a process whereby NGOs confirm events and provide a credibility score. As Lyn Lusi, founder and programme manager of an NGO called HEAL Africa, puts it, "It is also very important that this information should be verified because this is also an information war." Crowdsourcing could become a very important tool in the Land Administration sector.

4.3 Obtaining Title

The submission of an application for registration usually involves the payment of a fee. This is normally paid as cash over the counter or a financial transaction through a bank or post office. However, in the context of mobile phones, the payment could be made by the client through 'mobile banking' on the mobile phone. This has grown out of using pre-paid calling credit as informal currency and is well placed to bring financial services within reach of billions of 'unbanked' people across the developing world.

Mobile phones are currently being used to manage identification information, e.g. boarding passes can be transmitted to passengers' mobile phones as bar codes. In Finland chip ID cards for government employees are being adopted throughout Finnish central government (epractice, 2010). The photo ID cards contain a qualified certificate enabling identification to log into information networks, authentication of network users and their usage rights, encryption of email and other documents and provision of a binding and undisputable electronic signature, as specified in Finnish legislation. These Government Employee Certificates can also be used for access control systems, teleworking, passage control and physical identification. A Citizen Certificate can be incorporated into a chip ID card issued by the Police, a bank card or the SIM card of a mobile phone. It is therefore feasible that encrypted forms of land title could be incorporated into clients' mobile phones and used as proof of ownership.

4.4 Accessing Land Information

Effective Land Administration Systems are supported by Land Information Systems (LIS). These LIS are usually initially developed to support the internal operations of the land registration and cadastral authority. However, the next development stage is to make them outward facing and accessible by customers either by Extranet or Internet. This has normally been achieved through e-government services, requiring customers to have access to Internet through landline (dial-up or broadband) phone services. However with mobile phones directly

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supporting Internet access, these information services can now be accessed by mobile phones. This new channel creates much more accessibility for the citizen, bringing land administration services to a wider range of society many of whom are currently excluded.

4.5 Paying Mortgage Instalments

Securing a mortgage normally requires the property owner to have a bank account to support the mortgage payments transactions. However, the mobile phone offers opportunities to provide secure payment of land administration fees with the increasing use of 'Mobile Banking,' simplifying the procedures and again potentially opening up the means of wider property ownership.

The mobile phone can also play an important role in reducing corruption associated with financial transactions in the land sector. For example, in Jhang district of Pakistan (The Economist, 2009) all clerks were asked to submit a list of their daily transactions, giving the amount paid and the mobile numbers of the buyers and sellers. Supervisors then called buyers and sellers at random to find out whether that had been asked to pay any extra bribes or commissions. Following charges being brought against one clerk who had asked for a bribe, there was a marked improvement in the service. This two way interaction with clients opens up the opportunities for essential feedback and quality checks.

4.6 Marketing Real Estate

The 'smart' mobile phone is now delivering innovative Location Based Services for mobile real estate marketing. Using your mobile phone in the field, you can walk up to the front of a house for sale, aim your smart phone's camera at it, and within seconds view and capture all the information about the real estate listing (see Figure 2). You can then check out more pictures of the property, watch a video walkthrough of the property, browse information about the property, e.g. selling price, email the information to yourself (or someone else) and even contact the listing agent. This is achieved using an Augmented Reality browser such as Layar (www.layar.eu). The mobile phone opens up a window into the virtual real world where you can directly point at features and obtain the associated information.

4.7 Participating in Development Control / Planning

If citizens are not directly engaged in their local land use control activities then the political decision making will not be truly legitimate. Citizens who cannot influence changes to their local environment will tend to reject the official land use control procedures and turn their backs on ensuring a sustainable local environment. This lack of participation and transparency can also potentially lead to an increase in corruption and illegal development. (Enemark & McLaren, 2008)

Therefore, it is essential that citizens / communities have a genuine opportunity to have a say (a dynamic process of dialogue) on a development plan or proposal which affects them and that officials and politicians listen to what they say and reach a decision in an open and

transparent way, taking account of all views expressed. If the process ensures transparency and inclusivity then even difficult decisions may be easier to be accepted by all parties involved (McLaren, 2007).

Figure 2: Example of Augmented Reality in Real Estate Marketing
[Source: http://venturebeat.com/]

Within the context of land use control services, mobile phones have the potential to increase citizen participation in local land use control activities. The following examples describe how this could be achieved in the context of reducing and preventing informal urban development:

- Citizens register for mobile phone alerts on specific types and / or locations of new development proposals submitted to the planning authorities;
- Mobile phone alerts provide citizens with details and location maps of new development proposals within the citizen's specified area of interest. This will let citizens understand what developments are part of the formal development process;
- Citizens can text objections to development proposals to the planning authorities with associated authentication;
- Citizens text the location (postal address or GNSS derived co-ordinates) of a development to the planning authorities to query it legitimacy. The planning authorities check the current development proposals and alert the citizen. This process can be anonymous and will support a much more citizen based monitoring process.

5. CONCLUSIONS

The first text message was sent in December 1992 and today the number of text messages sent and received daily exceeds the total population of the planet. Mobile phones have made a bigger difference to the lives of more people, more quickly, than any previous communications technology. They have spread the fastest and proved the easiest and cheapest to adopt. It is estimated that around 3.6 billion people currently have mobile phones and 6 billion will have them in 2013. Their increasing and innovative use in the developing world is

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fast turning them into a global development tool that is changing people's lives and improving GDP across nations.

Over the next 2 - 5 years the current functionality provided by the new generation of smart phones will migrate down to cheaper handsets and the bandwidths of the phone networks will continue to improve in developing countries. This will create an environment in which the sophisticated mobile phone applications found in developed countries today will be available in developing countries. However, even with today's basic mobile phones, very innovative and effective applications are already being realised in developing countries and are making a very significant impact on people's lives.

This paper has proposed a number of opportunities for the use of mobile phones to support mobile (M)-government services to deliver land administration services. Not only would this make the land administration services more efficient, but more importantly, it would make them much more accessible to many parts of society that are currently excluded. The challenge for Land Professionals is not just to replicate elements of their current services using mobile phones, but to radically rethink land administration services using this new, innovative citizen centric paradigm that will help to achieve the Millennium Development Goals more quickly and sustainably.

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BIOGRAPHICAL NOTES

Robin McLaren is currently director of Know Edge Ltd a UK based, independent consulting company formed in 1986 specialising in spatial information management. Robin has been at the forefront of the GIS revolution and is recognised as a world expert in Land Information Management and NSDIs. He has worked extensively world-wide to build NSDIs and to strengthen land tenure to support economic reforms. Robin has supported the UK government in formulating the recently published UK Location Strategy and is currently a member of the UK Location Council managing the implementation of the EU INSPIRE Directive and the UK Location Strategy.

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