

Capitalizing on the Digital Dividend to Secure Land Rights in Kenya

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I. Introduction

Kenya still largely operates an antiquated manual land information system despite the evolution of technology that could facilitate the updating of land information and easy retrieval of such information.¹ We should however point out that there are spirited attempts to digitize land records. The manual system is fraught with many challenges including human errors and availing opportunities for corruption due to missing files, incomplete land information, difficulties in accessing land records thus complicating land transactions, cases of multiple titling thus exacerbating land disputes, and generally making land rights insecure. The manual land information system also suffers from unreliability and inaccessibility, which are critical both for increased investment in the sector, securing land rights and minimizing or avoiding land disputes. In light of these challenges, and in recognition of the increasing technology uptake in Kenya, this paper argues for the need for greater automation of land information to deal with the problems associated with the concerned has embarked on an ambitious process of digitizing land records in a bid to enhance both data reliability the security of tenure, we urge for the increased use of technology by diversifying the range of technologies used to include the mapping of land particularly in remote areas.

Kenya can capitalize on newer technologies in use in the country and the spectrum that was set free following the digital migration in 2015 (digital dividend) to roll out this technology. As an example, this paper suggests the employment of Unmanned Aerial Vehicles (UAVs such as drones) technology in mapping land rights holding and land use to eliminate the inaccuracies associated with the current processes. The data obtained through the use of geographic information system enabled UAVs will facilitate the delineation of boundaries among land holdings, and thus address insecurity of land tenure.

The paper is divided into five parts. Part I is the introduction, which lays out the problem generally and makes the main argument of the paper and how the paper is structured. Part II is the background and sets the tone for the argument by assessing the subsisting land information

¹ GC Mulaku, 'Land Information Management in Kenya: An Integrated Approach' Department of Surveying, University of Nairobi, 2.

<http://wgbis.ces.iisc.ernet.in/energy/HC270799/LM/SUSLUP/Thema5/612/612.pdf> accessed 08 January 2017.

system in Kenya and the implications thereof on security of land rights. In this context, the paper examines the various unsuccessful attempts to fully digitize land records and the problems presented by the manual land information system, particularly the absence of clarity on land ownership. In this part, we also assess the status of Information Communication Technology (ICT) Development in Kenya with a view to demonstrating the prevalence and deployment of technology in other sectors of the economy. This part also considers the possibility of deploying technology in the land sector to enable digitization of land records, for mapping and surveying among other uses. Part III examines the legal and policy framework that governs and can facilitate the use of ICT in the land sector. Part IV is a comparative analysis where we assess the deployment of drone technology in Tanzania, Philippines and Rwanda for various uses. Part V concludes and suggests the way forward.

II. Background

A. Land Information and Security of Land Rights in Kenya

Kenya has continued to rely on a manual land information system that is both highly unreliable and inaccessible, for over a century now.² The antiquated manual land information system is traceable to 1902 when the then Recorder of Titles under the colonial regime, used to keep titles under the Registration of Titles Act (RTA) title system.³ These paper records are prone to wear and tear, getting lost or being stolen or hidden, and even deliberate misplacement. The manual land recording system has also been associated with double allocation of titles, missing files and erroneous (sometimes fraudulent) transfer of titles.⁴ In addition, the frustration encountered by people seeking to transact land rights acts as a disincentive from engaging and investing in the sector.⁵ A simple search may take up to over a week due to bureaucracy, missing files and cartels

² Lynne N Nyongesa, 'GIS-Based National Land Information Management System (NLIMS) Cadastral and Land Administration Perspectives, FIG Working Week 2012, 2. https://www.fig.net/resources/proceedings/fig_proceedings/fig2012/papers/ts07b/TS07B_uthas_nyongesa_6218.pdf accessed 07 January 2017.

³ Kenya National Assembly Official Record (Hansard) 28 February 2012, 19-20 https://books.google.co.ke/books?id=NP0Q4A_GwhcC&pg=PT18&lpg=PT18&dq>manual+land+information+system+in+Kenya&source=bl&ots=BL2sGZ2ORw&sig=6VU38VUxJi4Xmu0YHliZIEVkBm4&hl=en&sa=X&redir_esc=y#v=onepage&q>manual%20land%20information%20system%20in%20Kenya&f=false, accessed 07 January 2017. Also see, Gordon Okumu Wayumba, 'An Evaluation of the Cadastral System in Kenya and a Strategy for its Modernization' (PhD Thesis, University of Nairobi, 2013) xvii.

⁴ Business Daily, 'Digitisation of land records must succeed at all costs' (Business Daily, February 12, 2015). <http://www.businessdailyafrica.com/Opinion-and-Analysis/Digitisation-of-land-records-must-succeed-at-all-costs/539548-2622044-xohl6ez/index.html> accessed 07 January 2017.

⁵ Harold Ayodo, 'Manual land records a nightmare' (Standard Digital, February 21, 2014). <https://www.standardmedia.co.ke/lifestyle/article/2000105163/manual-land-records-a-nightmare> accessed 07 January 2017.

and brokers who seek to benefit from the system.⁶ Indeed, according to the *Doing Business in Kenya Report 2016*, the lack of digitized land records particularly outside Nairobi has contributed to Kenya being ranked lower than it would, were there a proper digitized land information system across the country.⁷

The tenacity of manual land records in land registries around the country is amazing considering the efforts that have been made to digitize land records over the years.⁸ The failure to digitize land records or secure a digitized land information system may be attributed to the existence of cartels and brokers within the land sector who see digitization as a threat; the absence of adequate human and financial resources;⁹ lack of political will and leadership; torn, missing and incomplete land records; and lack of adequate capacity and change management issues.¹⁰ Following the post-election violence that rocked the country in 2007 due to a disputed presidential election and the identification of land disputes as a contributing factor to the violence,¹¹ land reforms emerged as an agenda that was of great concern necessitating immediate action. This led to the finalization of the National Land Policy in 2009 which recognized the need for, and called for digitization of land records to avert fraud.¹² This was not the first time

⁶ Ibid.

⁷ See, The World Bank, 'Doing Business in Kenya 2016', 8 <http://www.doingbusiness.org/~media/WBG/DoingBusiness/Documents/Subnational-Reports/DB16-Sub-Kenya.PDF> accessed 07 January 2017.

⁸ See for instance, Muriithi Mutiga, 'Digitisation of land records to attack rot at head office' (Daily Nation, November 14, 2009); James Mbaka, 'Lands ministry to digitise records, says Charity Ngilu' (Standard Digital, September 3, 2013); James Wanzala, 'Experts: Digitising land records requires Sh10b' (Standard Digital, October 31, 2015); James Wanzala, 'Nairobi County to digitise lands registry by February' (Standard Digital, December 8, 2016).

⁹ See, Lizahmy Ntonjira, 'Challenges of Developing Land Information Management Systems (LIMS) for County Governments in Kenya' 11th ESRI Eastern Africa user Conference, 2-4 November 2016. <http://www.esri.co.ke/user-conference/wp-content/uploads/2016/11/LESRIChallenges-of-Developing-Land-Information-Management-Systems-.pdf> accessed 08 January 2017.

¹⁰ Cesare N Mbaria, 'Kenya's Experience Towards the Establishment of Land Information Management System: Automation of Kenya's Land Records' Ministry of Lands, 2009.

¹¹ See, Patricia Kameri-Mbote & Kithure Kindiki, 'Trouble in Eden: How and Why Unresolved Land Issues Landed 'Peaceful Kenya' in Trouble in 2008' (2008) 31 Forum for Development Studies 167-193. <http://www.ielrc.org/content/a0805.pdf> accessed 22 January 2017.

¹² The National Land Policy, Sessional Paper No. 3 of 2009, para 163 at page 38.

that computerization and digitization of land records had been suggested,¹³ but its inclusion in the Policy signaled a more serious consideration and it is now a statutory obligation.¹⁴

The absence of clear data or reliable land information affects investment in the land sector because it delays and discourages transactions by unnecessarily increasing the cost of loans where land is used as collateral, and by negatively affecting the security of tenure. Where paper records that are tattered and missing are the main documents evidencing title, and where large swathes of land are not mapped or surveyed, then hardly can it be said that security of tenure is guaranteed. According to the Land Governance Assessment Framework (LGAF) Report prepared between 2014-2015 and assessing the status of land governance in Kenya, the manual land recording system is inefficient, time consuming and militates against timeous decision making.¹⁵

Another problem that is associated with the manual land information recording system is the issue of multiple titles over the same piece of land.¹⁶ This can occur on account of human error but can also be as a consequence of fraud. According to a Commission set up to investigate illegal and irregular allocations of land in Kenya, the issue of multiple titles over land is a big problem and the uncertainty it brings ‘has the potential of disrupting the land market and jeopardizing the general development of the country’.¹⁷ There is therefore no doubt that an automated land information system would greatly reduce incidences of fraud and multiple titles over the same piece of land.

The upshot of the foregoing is that land governance in Kenya remains problematic and the manual land information system has contributed to this. This affects people’s livelihoods as well as economic uses of land that are predicated on efficient land markets. Indeed meaningful social and economic development are difficult to attain in the absence of secure land rights, which in turn are dependent on reliable and easily accessible land information.¹⁸ Recent contestations over

¹³ For instance, see, Government of the Republic of Kenya, ‘First Medium Term Plan (2008-2012) Vision 2030’ (2008) 34, 35. https://www.sida.se/contentassets/855677b831b74ea0b226ce2db4eb93a3/kenya_medium_term_plan_2008-2012.pdf accessed 12 February 2017.

¹⁴ See sections 9 and 10 of the Land Registration Act, No. 3 of 2012.

¹⁵ See, Patricia Kameri-Mbote, ‘Kenya Land Governance Assessment Framework Report’ (27 June 2016) 56. (On file with author).

¹⁶ Ato Kwamena Onoma, ‘Endogenous Contributions to Institutional Change’ in Ato Kwamena Onoma eds., *The Politics of Property Rights Institutions in Africa* (Cambridge: Cambridge University Press, 2009) 191.

¹⁷ Republic of Kenya, ‘Report of the Commission of Inquiry into the Illegal/Irregular Allocations of Land’ (2004) 189.

¹⁸ See, T Besley & M Ghatak, ‘Property rights and economic development’ in D. Rodrik & M. Rosenzweig, eds., *Handbook of Development Economics*, 1st ed. (Elsevier, 2009 a) 4525–4595. The authors argue that there is a correlation between secure property rights and economic development.

ownership of prime pieces of land in Nairobi are apt illustrations of the problematic nature of land governance in Kenya and the difficulties that arise in determining the ownership of land in the absence of reliable information. A scandal relating to alleged grabbing of a 144 acre piece of land in the prime Karen estate in the South of Nairobi is a case in point.¹⁹ Different persons claimed that they owned the land and some had sold the land to third party purchasers for value.²⁰ Politicians and other leaders were allegedly linked to the scam and though investigations have been ongoing to determine the real owners of the land, there is no information forthcoming to this day.²¹ An automated and secured land records system would have obviated such an eventuality. Similar disputes have arisen over the ownership of land in the prime Westlands²² and Parklands areas of the city of Nairobi regarding renewal of leases.²³ Instances abound where cartels allegedly collude with officials from the Lands ministry and put up notices requesting for application for renewal of leases, in default of which they dispossess owners of the pieces of land.²⁴ Lessees whose leases are expiring and who would have the first right of reversion are edged off and evicted violently.²⁵

Contestations over ownership of land allegedly belonging to the United States International University (USIU) pitting a former President of the Republic of Kenya and two investors also sheds light on the lack of clarity as to who owns what land, in various parts of the country.²⁶

¹⁹ Daniel Tsuma Nyassy, 'Probe Karen land scam, Ngilu tells ethics team' (Daily Nation, October 17, 2014) <http://www.nation.co.ke/news/Probe-Karen-land-scam-Charity-Ngilu-tells-ethics-team/1056-2490346-2rmlm1/index.html> accessed 08 January 2017.

²⁰ Ibid.

²¹ Ibid.

²² Vincent Achuka, 'Dispute over Nairobi property creates confusion over who is responsible for alleged vandalism' (Daily Nation, December 24, 2016).

²³ Lillian Mutavi, 'High Court restrains NLC from resolving Nairobi land dispute' (Daily Nation, December 22, 2016) <http://www.nation.co.ke/counties/nairobi/high-court-restrains-nlc-from-resolving-nairobi-land-dispute/1954174-3495614-10veeg3/> accessed 08 January 2017.

²⁴ Ibid.

²⁵ Cyrus Ombati, 'Elderly couple violently evicted from house in Westlands, Nairobi over lease dispute' (The Standard, December 5, 2016) <https://www.standardmedia.co.ke/article/2000225756/elderly-couple-violently-evicted-from-house-in-westlands-nairobi-over-lease-dispute> accessed 12 February 2017.

²⁶ Vincent Agoya, 'Moi in court over disputed prime Nairobi land sale' (Daily Nation, October 6, 2016) <http://www.nation.co.ke/business/Moi-in-court-over-disputed-prime-Nairobi-land-sale/996-3406908-ejrps7z/> accessed 08 January 2017. Also see, Brian Wasuna, 'Equity Bank's Mwangi joins USIU's land battle with Moi' (Business Daily, August 31, 2016) <http://www.businessdailyafrica.com/Equity-Banks-Mwangi-joins-USIUs-land-battle-with-Moi/539546-3363936-3aiu74/> accessed 08 January 2017.

Other lands that are targeted by cartels are public lands hosting institutions. This was the case in the Lang'ata area in Nairobi where land belonging to a public primary school was the issue.²⁷

The importance of reliable land information and data cannot be overemphasized in the quest to address disputes over ownership and the possibilities of fraud which compromise land tenure security. While automated land information systems and the use of modern technology are not a panacea to all problems plaguing the land sector, we are of the view that the two are a great improvement to the while being well aware of and taking safeguards against technological vulnerabilities.²⁸

B. Kenya's ICT Development Status

Kenya has taken advantage of the technological boom that has been witnessed the world over in various spheres and sectors of the economy. The ubiquity of technological advancement in Kenya is illustrated by the proliferation of the Internet, mobile telephony, digital gadgets and the development of various applications that depend on technology.²⁹ This gives an indication of the technological advancement that has been experienced in the country. In this section, we assess the status of Kenya's ICT sector development. Our aim is to make the case for the deployment, application and extrapolation of these technological advances to the land sector to improve the land information system – data capture, storage and dissemination.

Kenya has been dubbed as a Silicon Savannah in the African continent, in reference to the Silicon Valley in the state of California in the United States, which boasts of many top technological innovations and companies.³⁰ The title was earned by virtue of the many

²⁷ Kamau Muthoni, 'Disputed land belongs to Langata Road Primary School, declares Mohamed Swazuri' (Standard Digital, January 14, 2015).

²⁸ For instance, the Integrated Financial Management System (IFMIS), which is a technological platform for management of public funds, was manipulated in the National Youth Scandal resulting into loss of hundreds millions of taxpayers' money. See, Fred Mukinda & Otiato Guguyu, 'Hand over NYS files after probe, detectives told' (Daily Nation, June 24, 2015) <http://www.nation.co.ke/news/Tobiko-joins-probe-on-NYS-hacking-scandal/1056-2764226-14thmt/index.html> accessed 21 January 2017. Further, the IFMIS system recently led to delays of payments of salaries to civil servants and has been said to be marred with loopholes, and control weaknesses that make it possible for it to be manipulated and abused. See, Edwin Okoth, 'State audit finds serious loopholes in Ifmis system' (Daily Nation, January 8, 2017) <http://www.nation.co.ke/news/State-audit-finds-serious-loopholes-in-Ifmis-system/1056-3509548-uu8xr1z/> accessed 21 January 2017.

²⁹ See e.g David Smith, 'Internet use on mobile phones in Africa predicted to increase 20-fold' (The Guardian, June 4, 2014) <https://www.theguardian.com/world/2014/jun/05/internet-use-mobile-phones-africa-predicted-increase-20-fold> accessed 12 February 2017; Joe Ogutu, 'How ICT drives Kenya's economic growth' (Standard Digital, May 18, 2015). <https://www.standardmedia.co.ke/article/2000162611/how-ict-drives-kenya-s-economic-growth> accessed 15 January 2017.

³⁰ See, David Pilling, 'Kenyans start to roam Silicon Savannah' (Financial Times, April 27, 2016). <https://www.ft.com/content/1cda231c-0bdb-11e6-9456-444ab5211a2f> accessed 15 January 2017.

applications that have developed for diverse uses in various spheres and sectors of the economy. Some of these initiatives and applications include the birth of M-Pesa (a mobile money transfer service), which was birthed in 2003 by Vodafone and subsequently launched in 2007 by mobile telecommunication company, Safaricom.³¹ As a consequence of this mobile money transfer application, many services have become much easier and faster and M-Pesa agencies and outlets have opened up in many places, facilitating the launch of other start-ups. A vast majority of persons who had no access to banking services prior to the launch of M-Pesa got them, with the platform presenting heavy competition to traditional commercial banks.³² In excess of 20 million dollars is transacted through M-pesa each day in Kenya.³³

In addition to this development in the financial sector, Nairobi has major and active technology incubators namely: mLab and iLab Africa.³⁴ iHub, a technological hub, was also launched in Nairobi in 2010.³⁵ iHub acts as an open space whereby innovators showcase their innovations and in turn get seed capital or other financial backup from investors to implement their ideas.³⁶ The government of Kenya also markets the country, and particularly the capital city Nairobi as a technological hub.³⁷ As a result, various companies and non-governmental organisations have set up shop in the city including IBM and Google, and this has contributed to the growth of the economy through increasing government revenue and providing employment opportunities.

Statistics reveal that compared to many African countries, Kenya is quite technologically advanced.³⁸ She boasts of over 31 million internet users, and over 5.5 million Facebook users who rely on access to internet.³⁹ Over 30% of her Gross Domestic Product (GDP) is processed through the M-Pesa platform and with the majority of her population being below 24 years, this

³¹ Adam Peake, 'Kenya's ICT Sector, Mobile Money and the Transformation to a Middle-Income Country' March 2013 Intelplace, 104.

³² Gordon Institute of Business Sciences – Digital Disruption: Changing The Rules of Business for a Hyper – Connected World Report.

³³ Dayo Olopade, *The Bright Continent* (New York: Houghton Mifflin Harcourt, 2014) 92.

³⁴ Bitange Ndemo, 'iHub is evolving to help more start-ups grow and compete' (Daily Nation, April 11, 2016) <http://www.nation.co.ke/oped/blogs/dot9/ndemo/2274486-3154012-ojj8bkz/index.html> accessed 15 January 2017.

³⁵ Ibid.

³⁶ Ibid.

³⁷ Ibid.

³⁸ Joe Ogutu, 'How ICT drives Kenya's economic growth' (Standard Digital, May 18, 2015). <https://www.standardmedia.co.ke/article/2000162611/how-ict-drives-kenya-s-economic-growth> accessed 15 January 2017.

³⁹ Internet World Stats, Africa 2016 Population and Internet Users Statistics for 2016. <http://www.internetworldstats.com/stats1.htm> accessed 12 February 2017.

signifies that there is a huge market for technological innovations and services.⁴⁰ Other innovations that speak to Kenya's technological development include: Ushahidi which is a geo-mapping software that was developed to locate areas of violence during the 2007/2008 post-election violence.⁴¹ This software has been used to create over 60, 000 maps in 159 countries to relay information on human rights abuses, to map humanitarian crises like the earthquake in Haiti⁴² and issues of environmental concern.⁴³ The technological hub, iHub, is credited with over 152 start-up companies and over 15, 000 members, creating an avenue for connections and networking among technology enthusiasts.⁴⁴ In addition, in 2009 Kenya completed a 4, 500 km undersea optic fibre cable⁴⁵ under the East Africa Marine Systems (TEAM) and the Ministry of ICT with a view to increasing accessibility of broadband, which is a key infrastructure for technological developments.⁴⁶ Kenya also set up a fully-fledged ICT Authority complete with a board to facilitate the development of technology in the country.⁴⁷ Kenya's technological revolution has been facilitated by the liberalisation of the ICT sector in 2000 by government, which translated into a proliferation of Internet,⁴⁸ mobile phones⁴⁹ and mobile money.⁵⁰

⁴⁰ Dipolelo Moime, 'Kenya, Africa's Silicon Valley, Epicentre of Innovation' April 25, 2016 <https://vc4a.com/blog/2016/04/25/kenya-africas-silicon-valley-epicentre-of-innovation/> accessed 15 January 2017.

⁴¹ See, <https://www.ushahidi.com/> accessed 12 February 2017.

⁴² Pilling (n 31) above.

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ 'Seacom Goes Live,' Cisco Press Release, July 23, 2009. http://newsroom.cisco.com/dlls/2009/prod_072209.html accessed 15 January 2017.

⁴⁶ Mthuli Ncube & Peter Ondiege, 'Silicon Kenya: Harnessing ICT Innovations for Economic Development' African Development Bank, 13

https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Silicon_Kenya-Harnessing_ICT_Innovations_for_Economic_Development.pdf accessed 15 January 2017.

⁴⁷ Ibid.

⁴⁸ See, Adam Peake, 'Kenya's ICT Sector, Mobile Money and the Transformation to a Middle-Income Country' March 2013 Intelplace, 102 http://www.glocom.ac.jp/chijo_lib/118/101-113_B_adam.pdf accessed 15 January 2017.

⁴⁹ It is estimated that three out of every four Kenyans own a mobile phone. See, Julia Manske, 'Innovations out of Africa: The emergence, challenges and potential of the Kenyan Tech Ecosystem,' Vodafone Institute for Society and Communications, 2014.

http://www.vodafone-institut.de/uploads/media/1404_VFI_Report_Innovations_out_of_Africa.pdf accessed 15 January 2017. However, we note that these statistics may be inaccurate and thus not reflective of the actual situation on the ground since some people own more than one mobile phone.

⁵⁰ World Bank, 'Kenya Economic Update, 3rd Edition, The Implications of Kenya's ICT Revolution', December 2010.

In the delivery of public services, the government has established HUDUMA Centres, which essentially are a one stop shop for citizens seeking to obtain government services such as issuance of title deeds, registration of companies, issuance of identity cards, assessment and payment of stamp duty, registration and claims under the National Health Insurance Fund (NHIF) and issuance of police abstract forms, among others.⁵¹ HUDUMA centres were conceptualised with a view to eliminating the red tape normally associated with government and to reduce opportunities for corruption.⁵² It is currently being employed by both the national government and the county government and has helped to improve service delivery and contribute to faster completion of transactions. HUDUMA centres operate effectively by harnessing, leveraging and integrating technology so as to reduce the time and bureaucracy in the delivery of public service.⁵³ They are a further illustration of the level of technological development that Kenya has since attained and embraced.

Besides this, electromagnetic spectrum, which is essentially the pathways in the airwaves,⁵⁴ is critical in developing the infrastructure for the rolling out of technology and thus technological development is dependent on the availability and proper utilisation thereof. Spectrum has many uses which include but are not limited to air traffic control, security or for military purposes, marine transport, broadcasting purposes, and mobile telephony among other uses.⁵⁵ All the players in these sectors compete among themselves for a larger share of spectrum, which is normally allocated by the Competition Authority of Kenya to enable them roll out their programmes.⁵⁶ So critical and valuable is spectrum that it has formed the subject of debates in recent years on how best to manage it so as to ensure the maximum value, efficiency and also take into account equity imperatives, seeing that it is a natural resource that is of great importance in this technological age.⁵⁷

⁵¹ Dennis Mutuku, 'How Huduma is transforming public service' (Standard Digital, July 14, 2015) <https://www.standardmedia.co.ke/article/2000169141/how-huduma-is-transforming-public-service> accessed 15 January 2017.

⁵² Sarah Wanjiru Ng'aru & Moses Kimani Wafula, 'Factors Influencing the Choice of Huduma Centres' Services: A Case Study of Mombasa Huduma Centre' (2015) 5 (6) International Journal of Scientific and Research Publications, 2250.

⁵³ BBC News, 'Kenya launches Huduma e-centre to cut bureaucracy' (BBC, November 7, 2013) <http://www.bbc.com/news/world-africa-24855993> accessed 15 January 2017.

⁵⁴ See, <http://www.geo.mtu.edu/rs/back/spectrum/> accessed 12 February 2017.

⁵⁵ Patricia Kameri-Mbote, Faith Odhiambo, Muriuki Muriungi & Olive Nyawira, 'Spectrum Management and Regulation in Kenya: Engendering Inclusive Access to Technology and Information' (2016) Report Prepared for FORD Foundation, 25. <http://www.ielrc.org/content/a1604.pdf> accessed 15 January 2017.

⁵⁶ Ibid.

⁵⁷ For a comprehensive assessment of the equity imperatives of management of spectrum within the Kenyan context, see Patricia Kameri-Mbote, Faith Odhiambo, Muriuki Muriungi & Olive Nyawira, 'Spectrum Management and

It is indeed the usage of spectrum that prompted the laying down of the fibre optic cables and informed the digital migration exercise in an effort to release unused spectrum and optimize on the usage of available frequencies. The unused spectrum that was released following the digital migration of televisions, which is part of the digital dividend, is what we propose should be utilised to provide infrastructure to extend the use of technology in mapping land.

We argue that the technological development and landscape in Kenya outlined above, presents an opportunity for the country to leverage on the digital dividend of spectrum to enhance the availability of reliable land data. Such an endeavour will not be novel as the country has already deployed the use of spectrum in the security sector. In this context, Kenya allocated a particular bandwidth of radio frequency spectrum to telecommunication company, Safaricom Limited, to install cameras for security purposes.⁵⁸ The security surveillance system was meant to link all security agencies, enable the police to monitor and detect the commission of crime and facilitate them to direct operations.⁵⁹ It involved the setting up of ultra-high definition, tamperproof closed circuit television (CCTV) cameras across major cities that would then be connected to a national command and control room, to enable the relaying of information in real time.⁶⁰ This initiative was coupled with the connection of police stations with Fourth Generation (4G) Internet access,⁶¹ which enables reliable and speedy communication due to its high speed and ability for video streaming.⁶² 4G internet requires a larger bandwidth of spectrum as opposed to (Second Generation) 2G or (Third Generation) 3G Internet. Consequently, Safaricom has had to apply for and be allocated a larger share of spectrum (the 800Hz frequency bandwidth) to enable it roll out 4G internet across the country.⁶³

Regulation in Kenya: Engendering Inclusive Access to Technology and Information' (2016) Report Prepared for FORD Foundation. <http://www.ielrc.org/content/a1604.pdf> accessed 15 January 2017.

⁵⁸ Beatrice Obwocha, 'Government, Safaricom sign deal for Sh15 billion security surveillance system' (Daily Nation, November 25, 2014) <http://www.nation.co.ke/news/Safaricom-start-Sh15b-security-surveillance-project/1056-2534308-6nt7p5z/index.html> accessed 12 February 2017.

⁵⁹ Okuttah Mark, 'Safaricom's security system live in Nairobi, Mombasa' (Daily Nation, May 24, 2015). <http://www.businessdailyafrica.com/Corporate-News/Safaricom-security-system-goes-live-/-/539550/2727886/-/ppi5rkz/-/index.html> accessed 15 January 2017.

⁶⁰ Ibid.

⁶¹ Association for Progressive Communications (APC), 'Global Information Society Watch 2014: Communications Surveillance in the Digital Age' 156

https://panoptikon.org/sites/default/files/gisw2014_communications_surveillance.pdf accessed 15 January 2017.

⁶² Frankline Sunday, 'Safaricom banks on new spectrum to deepen its 4G services' (Standard Digital, September 4, 2015) <https://www.standardmedia.co.ke/business/article/2000175215/safaricom-banks-on-new-spectrum-to-deepen-its-4g-services> accessed 15 January 2017.

⁶³ Okuttah Mark, 'Airtel demands a share of Safaricom Internet frequency' (Business Daily September 2, 2015) <http://www.businessdailyafrica.com/Corporate-News/Airtel-demands-a-share-of-Safaricom-Internet-frequency/539550-2856152-h0e73cz/index.html> accessed 15 January 2017.

Unmanned Aerial Vehicles (UAVs) such as drones are aircraft that are unmanned and remotely controlled or which may fly on space through a software-embedded flight path with the help of the Global Positioning System (GPS) technology.⁶⁴ In order to enable this technology, there is need for allocation of spectrum to the particular users. . We propose that the Ministry responsible for Land could apply for spectrum to deploy GPS enabled Unmanned Aerial Vehicles (UAVs) such as drones to collect and collate land data. Besides security, drones have been previously employed in Kenya for recreational activities like photography.⁶⁵ However, owing to the security challenges presented by their use and the possible infringement on privacy, the government banned their use until the Kenya Civil Aviation Authority promulgated regulations to guide their usage.⁶⁶

Persons keen on making use of the drone technology or UAVs for various purposes have had to seek the approval of the Ministry of Defence because of the security risk they may pose,⁶⁷ and further seek the approval of the Kenya Civil Aviation Authority (KCAA) which is the statutory agency charged with the licensing and approval of prospective drone users.⁶⁸ Even upon the approval of the two bodies, there are particular rules that guide persons who choose to fly the drones. They include: not flying the drones near airports or within the operations of aircrafts; respecting the privacy of other persons while on flight; not flying the drones over people or crowds;⁶⁹ flying the drones only during the day and in good weather conditions; and avoiding flying near or over military installations or power plants.⁷⁰

The Kenya Civil Aviation Authority (KCAA) has since issued rules to guide the licensing, approval and flying of drones in Kenya, though they are being debated and reviewed and thus yet

⁶⁴ Ken Bonyo, 'Everything you need to know about drones in Kenya' June 4, 2015. <http://www.kenbonyo.com/everything-you-need-to-know-about-drones-in-kenya/> accessed 15 January 2017.

⁶⁵ Ibid.

⁶⁶ Emily Johnson, 'Kenya basically bans all drone use — despite potential benefits they may yield' PRI December 15, 2015 <http://www.pri.org/stories/2015-12-15/kenya-basically-bans-all-drone-use-despite-potential-benefits-they-may-yield> accessed 15 January 2017.

⁶⁷ Gerald Andae, 'Defence ministry to regulate use of drones on safety fears' (Business Daily, January 19, 2015) <http://www.businessdailyafrica.com/Defence-regulate-use-of-drones-on-safety-fears/-/539546/2594950/-/12fdgt9/-/index.html> accessed 15 January 2017.

⁶⁸ UAV Systems International, 'Kenya Drone Laws' (February 1, 2016) <https://uavsystemsinternational.com/drone-laws-by-country/kenya-drone-laws/> accessed 15 January 2017.

⁶⁹ See for instance Tanzania banned flying of drones over national parks for security reasons, Adam Ihucha, 'Tanzania now bans private drones from overflying its national parks, cites security' (The East African, November 15, 2014) <http://www.theeastafrican.co.ke/news/No-private-drones-overflying-Tanzania-national-parks/2558-2523774-y3x4jvz/index.html> accessed 15 January 2017.

⁷⁰ Ibid.

to be promulgated.⁷¹ The drafting of the regulations was prompted by various license seekers, estimated at around 1,000, who have already sought approval to use drones for various purposes.⁷² In particular, the Ol Pejeta Conservancy had sought permission to use drones to fight poaching.⁷³ In the draft regulations, the KCAA has categorised the use of drones into: those for recreation and sports; for private use excluding sports and recreation; and for commercial activities.⁷⁴ The agency also classifies drones in accordance with their weight and use in the rules, which also impose criminal liability for breach - a fine of a maximum Ksh. 500,000 or a jail term not exceeding three months.⁷⁵

The regulatory vacuum in the UAVs' usage landscape has without doubt hindered further acquisition and usage of the technology for various beneficial purposes. Some countries like Nigeria and South Africa have stringent rules to guide the usage of UAVs.⁷⁶ While security and privacy concerns are an issue with respect to the use of UAVs, we argue that we should not use these as a barrier towards adopting the technology while discounting the benefits presented by its use. As such, it is critical that the National Security Advisory Committee expedites the process of approving the regulations so as to pave way for drone technology in Kenya.

C. ICT Usage in Land Sector

ICT is already being employed in the land sector in Kenya in the areas of digitisation of land records, mapping and survey and the Kenya National Spatial Data Infrastructure. It is the extrapolation of newer technologies to the area of mapping land rights using UAVs that we propose in this paper, in a bid to further secure land tenure and enhance investment in the sector.

The Ministry of Lands and Physical Planning in Kenya has embarked on various processes to improve on and build an updated, easily accessible and reliable National Land Information Management System (NLIMS).. These processes include: the digitisation of land paper records

⁷¹ Allan Olingo, 'Kenya Now Drafts Regulations, Joins Rwanda to Allow Drones in Its Airspace' (The East African, April 17, 2016) <http://allafrica.com/stories/201604190313.html> accessed 15 January 2017.

⁷² Gerald Andae, 'Kenya drone licence seekers hit 1,000' (Business Daily, August 14, 2016). <http://www.businessdailyafrica.com/Licence-seekers-hit-1-000-as-KCAA-finalises-regulations/1248928-3355292-12epfvr/> accessed 15 January 2016.

⁷³ Ibid.

⁷⁴ Kiarie Njoroge, 'Authority limits civilian drone operators to height of 400ft' (Business Daily, March 31, 2016) <http://www.businessdailyafrica.com/Authority-limits-civilian-drone-operators-to-height-of-400ft/539546-3141692-4r4ai9z/index.html> accessed 15 January 2017.

⁷⁵ Ibid.

⁷⁶ Ibid. Also see, Julia Austin, 'The New Drone Rules in South Africa' (AFK Insider, December 18, 2015) <http://afkinsider.com/108641/the-new-drone-rules-in-south-africa-broken-down/> accessed 12 February 2017.

in various registries across the country;⁷⁷ reviewing and re-engineering of procedures and other processes relating to land data; capturing land rent data; reviewing the Land Rent Information System and even modernising the national Geodetic Framework.⁷⁸ In order to digitise land records, the Ministry has in particular operationalized the Electronic Records Management System (ERMS) and up-scaled the digital access systems.⁷⁹ The Ministry has also been engaged in efforts to modernise land registries so as to make them easily accessible to the public and to facilitate easy storage and retrieval of land records.⁸⁰ It is worth noting that the Ministry recently announced a disruption of normal services at its headquarters in Ardhi House, Nairobi relating to land transactions, as it sought to load its land paper records to electronic platforms so as to enable digitisation.⁸¹ Already, various registries including Kisumu, Meru, Mombasa, Kwale, Kilifi, Eldoret, Bungoma, Kiambu, Thika and the Central Registry in Nairobi are now digitised, a consequence of a process that began in September 2016.⁸² The Treasury put a tender advertisement in December 2016 inviting bids for the provision of digitisation services of land records in various registries.⁸³ All this is in an effort to better manage land information or data, which is very critical for land tenure security. Digitised land records enable the online conduct of searches and submission of documents, thus cutting on time usually wasted by various officials and property lawyers in conducting land transactions.⁸⁴ These also reduce opportunities for rent seeking or capture by bureaucrats and cartels, thus presenting an opportunity for corruption.

Mapping and survey also present a good opportunity where UAV technology may be employed in facilitating quicker and more reliable surveying and mapping of land rights. At present, surveying for purposes of creating cadastre maps is largely done through different spatial

⁷⁷ Editorial, 'Hasten digitization of all land records' (Daily Nation, January 16, 2017) <http://www.nation.co.ke/oped/Editorial/Hasten-digitisation-of-all-lands-records/440804-3519904-135abva/index.html> accessed 21 January 2017.

⁷⁸ Ministry of Lands & Physical Planning, 'Key Achieved Projects' http://www.ardhi.go.ke/?page_id=216 accessed 21 January 2017.

⁷⁹ Ibid.

⁸⁰ Ibid.

⁸¹ Collins Omulo, 'Digitisation of Lands records to disrupt services' (Daily Nation, January 15, 2017) <http://www.nation.co.ke/news/Digitisation-of-Lands-records-to-disrupt-services/1056-3518110-ubdewd/> accessed 21 January 2017.

⁸² Ibid.

⁸³ Republic of Kenya, 'Tender Document for Digitisation of Land Records in Various Registries' (2016) http://supplier.treasury.go.ke/site/tenders.go/index.php/public/tender_view/9999 accessed 21 January 2017.

⁸⁴ Mwaniki Wahome, 'Automation of land records set to be completed next year' (Daily Nation, July 15, 2015) <http://www.nation.co.ke/business/Automation-of-land-records-set-to-be-complete-next-year/996-2792196-nftuxf/index.html> accessed 21 January 2017.

referencing systems.⁸⁵ This has contributed to difficulties of integrating all survey plans so as to obtain a seamless cadastre map.⁸⁶ The upshot of this is the absence of survey data such as Registry Index Maps and survey plans in a single and common referencing framework, which would greatly eliminate disputes and inconsistencies in the interpretation of survey plans.⁸⁷ The use of UAV technology in mapping would alleviate this problem.

There have also been efforts towards establishing a Kenya National Spatial Data Infrastructure (KNSDI) with an ultra-modern centre to house the infrastructure's secretariat having been completed.⁸⁸ The National Spatial Data Plan is meant to guide physical development activities on space besides availing a spatial illustration of various projects, by helping provide information on the location of various physical objects.⁸⁹ This is usually critical for the crafting and identification of a national strategy geared towards land development in a country.⁹⁰ A National Spatial Data Infrastructure encompasses all standards, policies and institutional arrangements that are necessary for the delivery of spatial information from various sources to potential users.⁹¹ It thus provides a basis on which spatial data is discovered, downloaded, evaluated and finally applied by various users including civil society, academia, government and the private sector.⁹² As a starting point, in order to develop such an infrastructure, it is imperative that all existing spatial data is documented.⁹³ Documentation of existing data that is key to the

⁸⁵ Gordon Wanyumba, 'The structure of the Cadastral System in Kenya' (2013) 1(1) *Journal of Land Administration in Eastern Africa*, Ardhi University <http://repository.tukenya.ac.ke/bitstream/handle/123456789/851/Journal%20of%20LAEA%201st%20Edition%20UPLOADED%20IN%20SPACE%28%20APRIL%202015.pdf?sequence=1&isAllowed=y> accessed 21 January 2017.

⁸⁶ David Kuria, Amos Kasaine, Abdulkadir Khalif & Silas Kinoti, 'Developing a National Land Information Management System-The Kenyan Strategy' Paper prepared for presentation at the "2016 World Bank Conference On Land and Poverty" The World Bank - Washington DC, March 14-18, 2016, 7.

⁸⁷ Ibid.

⁸⁸ Global Spatial Data Association (GSDI), 'Kenya: New Geo-Spatial Data Centre to house National Spatial Data Infrastructure Secretariat' (March 22, 2016) <http://gsdiassociation.org/index.php/news/regional-sdi-news/26-sdi-africa/384-kenya-new-geo-spatial-data-centre-to-house-national-spatial-data-infrastructure-secretariat.html> accessed 21 January 2017.

⁸⁹ Ministry of Lands & Physical Planning, 'Key Achieved Projects' http://www.ardhi.go.ke/?page_id=216 accessed 21 January 2017.

⁹⁰ J Okuku, A Bregt & L Grus, 'Assessing the Development of Kenya National Spatial Data Infrastructure (KNSDI)' (2014) 3 (1) *South African Journal of Geomatics*, 1.

⁹¹ RO Odongo & AJ Rodrigues, 'Metadata Models and Standards for Kenya National Spatial Data Infrastructure: A Case study of 12 Government Ministries' School of Computing Studies and Informatics, University of Nairobi. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.119.4597&rep=rep1&type=pdf> accessed 21 January 2017, 1.

⁹² Ibid.

⁹³ Ibid.

development of the Spatial Data Infrastructure can be improved, as illustrated above, by the adoption of newer technologies. It is therefore safe to state that the KNSDI is only possible through the prudent use of ICT, and is by itself, an innovation of ICT.⁹⁴

Besides this, there still lies potential of the usage of technology in various other areas in the land sector such as in land valuation and taxation, land use planning and management, and in the sustainable management of fragile lands, among other applications.

III. Policy and Legal Frameworks Facilitative of ICT Use in Land Sector

The policy and regulatory environment relating to the use of ICT, not only in the land sector but in virtually all sectors is complex as it is characterised by various sectoral laws that are somewhat disparate. In this section, we assess the legal and policy framework that would potentially be employed to facilitate the increased employment of technology in the Kenyan land sector, as we have urged.

The Constitution of Kenya provides for the right to access information held by the State and other persons especially where it is required for the enforcement of one's fundamental rights and freedoms.⁹⁵ To implement this constitutional provision, Kenya enacted the Access to Information Act, No. 31 of 2016, which further reinforces the provisions of the Constitution and provides for the mechanisms of implementation of this right. The statute provides that the government or a public authority shall provide the information requested within 21 days of such request,⁹⁶ unless such request falls within any of the listed exceptions.⁹⁷ In interpreting the provisions on the right of access to information under the constitution, the courts have since held that foreign citizens such as foreign corporations are not citizens for purposes of exercising the right to demand information from the State and that the right is exclusive to citizens.⁹⁸ In another case, while recognising that a state corporation was obliged by the Constitution to supply requested information relating to contracts it had engaged in, the High Court stated that the right to access information only accrues to a natural person and not a corporation.⁹⁹ However, the latter decision

⁹⁴ Ibid.

⁹⁵ Article 35 (1) a of the Constitution of Kenya 2010.

⁹⁶ Section 9 of the Access to Information Act 2016.

⁹⁷ Ibid., section 6.

⁹⁸ See the decision of Majanja J in *Famy Care Limited v Public Procurement Administrative Review Board & another & 4 others* [2013] eKLR.

⁹⁹ See the decision of Mumbi Ngugi J in *Nairobi Law Monthly Company Limited v. Kenya Electricity Generating Company (KENGEN) & 6 others* [2013] eKLR.

would not pass scrutiny under the new statute (Access to Information Act 2016), which defines a citizen as including both an individual and a private entity controlled by one or more Kenyans.¹⁰⁰ This means that any individual or corporation, so long as they are Kenyan citizens may lawfully demand information from a public entity such as the Ministry responsible for land and other state entities charged with land administration and governance. We construe this right in its expanded form under the enabling legislation as indirectly but subtly imposing an obligation on state agencies to ensure that they have updated and reliable land records, to enable the fast-tracking of information and expeditious delivery of such information.

In addition, the guiding principles governing land in Article 60 of the Constitution including secure land rights also indirectly impose a duty on state entities to ensure that they have proper and reliable records to avert fraud. Perpetuation of fraud in land matters and failure to relay reliable land information in good time is a curtailment of the constitutional right to secure land tenure. Further, section 7(2) of the Land Registration Act 2012 provides that the registrar of each Land Registry around the country shall make information relating to land parcels accessible to any person, upon their paying the prescribed fee. Section 9 of the same statute provides that the Land Registrar shall maintain the register and any document in a secure, reliable and accessible format including electronic files. Section 10 further provides that subject to the right to access information under the Constitution, the Registrar shall make information accessible to the public by electronic means or other means as prescribed by the Chief Land Registrar. Again, these statutory provisions mandate state agencies to put in place mechanisms such as electronic and computerised systems to facilitate the relaying of updated records and enhance accessibility to the public.

On the ICT regulatory front, Kenya commissioned the National Broadband Strategy,¹⁰¹ the draft National Spectrum policy¹⁰² and the National ICT Master plan¹⁰³ for the years 2013-2017 and brought all these under the governance of the ICT Authority. As a policy document, the National Broadband Strategy envisages the presence of a high quality broadband network across the country to fuel growth and investment in the country. We consider this as critical since the deployment of the drone technology that we propose will be heavily reliant on whether there is enough broadband network or spectrum to facilitate its rolling out. Importantly however, the strategy actually identifies the digitization of land registries and the development of the National Spatial Data Infrastructure, as focus areas for implementation.¹⁰⁴ We urge that proper mapping

¹⁰⁰ See section 2 of the Access to Information Act, No. 31 of 2016 as read together with section 4.

¹⁰¹ <http://www.ca.go.ke/index.php/national-broadband-strategy> accessed 12 February 2017.

¹⁰² <http://www.mediapolicycentre.org/wp-content/uploads/2014/07/Draft-SpectructionPolicy.pdf> accessed 12 February 2017.

¹⁰³ <http://icta.go.ke/national-ict-masterplan/> accessed 12 February 2017.

¹⁰⁴ National Broadband Strategy (n 105) 41.

of land rights holding and usage through drone technology is a critical component of the digitization of land records to ensure the digitized records are accurate and reliable particularly in areas where there are scanty paper records. The Kenya Information and Communications Act 2013 provides for the establishment of the Communications Authority of Kenya (CA) which is the regulatory agency concerned with licensing and regulation. For drone technology to be employed, the relevant persons or authorities will need to apply for licenses for spectrum so as to have an infrastructure on which to roll out the technology. The Ministry of Lands and Physical Planning should thus apply to the CA for its spectrum share to enable it to roll out of drone and other technologies to capture data accurately.

In this context however, we note that there is not enough regulation relating to prevention of fraud and in dealing with the vulnerabilities that accompany technology. Kenya is yet to enact a law against cybercrime yet cyber-attacks present a formidable challenge to maintaining the integrity and sanctity of land records and land information.¹⁰⁵ Once proper mapping of land rights holding and use is done using drone technology and the same is stored using electronic files, it must be protected from hacking and being tampered with so as to remain reliable while also ensuring that it is accessible. This is particularly important bearing in mind that the processes of digitization and computerization of records and land reforms generally, have been thwarted severally by interested parties and cartels.¹⁰⁶ It would not be far-fetched thus to suggest that the same persons with vested interests would wish to compromise the integrity of data. The fast tracking of the Cybercrime Bill¹⁰⁷ and its consequent enactment as well as the Data Protection Bill¹⁰⁸ would aid in the maintenance of the integrity of data. We are however aware that the enactment of laws alone will not completely obviate the risk of the integrity of land information being compromised. The laws are however a good starting point as they may deter potential hackers.

In light of the potential that ICT has in the country, Kenya's economic development blueprint, the Vision 2030¹⁰⁹ underscores the importance of universal access to ICT. The policy document contemplates that Business Process Outsourcing (BPO) will drive the economy in the areas of

¹⁰⁵ See, Michael Murungi, *Cyber Law in Kenya* (The Netherlands, Kluwer International, 2011) 205-209. Also see, Lilian Ochieng', 'Kenya lost Sh15bn through cybercrime last year, report says' (Daily Nation, October 28, 2015); Okuttah Mark, 'Cybercrime costs Kenya govt Sh5bn a year: report' (Business Daily, October 28, 2015).

¹⁰⁶ James Kariuki, 'Nairobi blames ministry cartels for land theft' (Daily Nation, January 2, 2017) <http://www.nation.co.ke/business/Nairobi-blames-ministry-cartels-for-land-theft/996-3504340-11r6819z/> accessed 12 February 2017.

¹⁰⁷ See, http://kenyalaw.org/kl/fileadmin/pdfdownloads/bills/2016/CyberSecurityandProtectionBill_2016.pdf accessed 12 February 2017.

¹⁰⁸ Available here: <http://www.cickenya.org/index.php/legislation/item/174-the-data-protection-bill-2012#.WKCKDIF9600> accessed 12 February 2017.

¹⁰⁹ Available here: <http://www.vision2030.go.ke/> accessed 12 February 2017.

ICT by virtue of Kenya's geographical location and her developed workforce.¹¹⁰ By recognizing ICT as a key pillar driving economic growth in the country and stimulating investment, Vision 2030 essentially obligates the government to put in place the requisite ICT infrastructure. It is not surprising thus, that digitization of land records among other land reforms related to ICT, are being undertaken. We are of the view that the mapping of land rights holding and use, by way of Unmanned Aerial Vehicles (UAVs), is also an ICT project worthy pursuing in the land sector considering the centrality of land to the social, political and economic spheres in the country.

IV. Examples of Use of Digital Technologies to Revolutionize Land Information Management in other Countries

A number of countries around the world have embraced various digital technologies in order to revolutionize their land information management systems to enhance reliability and accessibility. This has been the result of recognition that technology has a huge potential of ensuring proper and reliable land data, which is critical for stimulating investment and timely decision making. In this section, we look at three countries - Tanzania, Philippines and Rwanda- that have made use of UAVs with a view to drawing important lessons that may be of use to Kenya as it seeks to adopt the technology.

A. Tanzania

Tanzania has recently deployed GPS-enabled drone technology for geospatial mapping.¹¹¹ This has been of much utility in terms of delivering useful information that has been utilised by government in planning for its various projects and programs. In particular, Tanzania has been using drones to gather information of a highly detailed form, on the floodplains besides enabling it to forecast and plan for how water will move in the event of floods.¹¹² The land information by this drone technology has also been used in delineating the actual boundaries of land thus eliminating the insecurity of tenure that so frequently affects the people especially in rural areas.¹¹³

In addition, the Tanzanian government has also deployed the drone technology to map out land holding so as to properly demarcate land boundaries and thus avert conflicts over land.¹¹⁴ Local media reported in 2014 of several clashes among and between farmers in the northern Maynard

¹¹⁰ The Republic of Kenya, 'Kenya Vision 2030' Chapter 3 on Economic Pillar, 77.

¹¹¹ The World Bank, 'Tanzania: Using Drone Technology to Secure Land Rights' (July 25, 2016). <http://www.worldbank.org/en/news/video/2016/07/25/tanzania-using-drone-technology-to-secure-land-rights> accessed 22 January 2017.

¹¹² Ibid.

¹¹³ Ibid.

¹¹⁴ Kizito Makoye, 'FEATURE-Tanzania turns to drones to bring peace in bitter fight for land' (Reuters, September 8, 2016) <http://www.reuters.com/article/tanzania-landrights-idUSL8N1BD36T> accessed 22 January 2017.

region in Tanzania over land.¹¹⁵ Farmers in the south west region of Morogoro have also killed hundreds of livestock on grounds that the livestock's owners had let the animals free to roam and destroy their crops.¹¹⁶ This was caused by unclear demarcation of land boundaries.¹¹⁷ It is this challenge that the Tanzanian government has sought to overcome through the use of drone technology. Indeed, in a project supported by the World Bank and the Tanzania Commission for Science and Technology, boundaries have been mapped and over 300,000 land titles issued to citizens.¹¹⁸

What basically happens while mapping land information using drone technology is that GPS-enabled drones conduct aerial surveys while in the skies. The positioning enables them to capture high-resolution images, which are then used by planners at the lands department to not only identify but also digitise the boundaries of any contested land.¹¹⁹ The advantage that drone technology has over the traditional methods of mapping that have been in place is its quick mapping, reliability and being less costly compared to sending surveyors to map out land physically.¹²⁰ In addition, it makes it possible for quick surveying or land mapping of remote areas, which are largely unsurveyed and without title deeds.¹²¹ Drone technology thus, facilitates the issuance of title deeds, helps to promote security of tenure and also enhances the chances of land being used as collateral to secure credit.

Initially, drone technology was employed in Tanzania to help in the mapping of floods in Dar es Salaam.¹²² However, this was later extended to other uses.¹²³ With over 70 percent of her population in Dar es Salaam living in informal settlements that are prone to flooding,¹²⁴ Tanzania has used of drone technology to map flooding areas so as to plan in advance.¹²⁵ Drones help to

¹¹⁵ Ibid.

¹¹⁶ Ibid.

¹¹⁷ Ibid.

¹¹⁸ Ibid.

¹¹⁹ Ibid.

¹²⁰ Ibid.

¹²¹ Ibid.

¹²² For instance, see the community-based mapping project in Tanzania dubbed the 'Ramani Huria Initiative' (Open Mapping), see <http://ramanihuria.org/> accessed 22 January 2017.

¹²³ These other uses include mapping and surveying land for purposes of titling. See, Makoye (n 119) above.

¹²⁴ Denise Soiselo, 'Using Drones to Map and Model Flood Risks in Dar es Salaam, Tanzania' (Floodlist, November 1, 2016) <http://floodlist.com/protection/using-drones-map-model-flood-risks-dar-es-salaam-tanzania> accessed 22 January 2017.

¹²⁵ Ibid.

generate accurate maps of the localities and thus assist administrators in drawing up accurate plans to protect persons that are usually at risk in flood-prone areas.¹²⁶ After tracing the movement of floods, this land data is used to help the government plan in advance and put mitigation measures such as upgrading infrastructure or install drainage systems to deal with the threat.¹²⁷

We consider these challenges that Tanzania has been able to overcome by use of drone technology to map land information as not alien to Kenya. As such, we propose that Kenya adopts the technology to help it map land data, which will be critical for planning various programs.

B. The Philippines

The Philippines has also applied drone technology in mapping land for purposes of surveying and titling.¹²⁸ The country has around 24 million parcels of land of which only about half are surveyed and titled.¹²⁹ The high costs associated with surveying land have been cited as one of the reasons for the many pieces of unsurveyed and untitled land.¹³⁰ Usually, a subdivision survey is normally conducted which involves the measuring and mapping of land and only then can an owner of a piece of land apply for the issuance of a title.¹³¹ This situation of untitled land means that there is no security of tenure presenting a handicap to economic growth and poverty eradication.

In a bid to accelerate the process of titling land in Philippines, the Asia Foundation has partnered with the Foundation for Economic Freedom and Omidyar Network on a project titled Technology for Property Rights project- which encompasses the use of drones to conduct surveys.¹³² In conducting a land survey, drones are flown over the land, which is the subject of

¹²⁶ Kizito Makoye, 'Drones help communities map flood risk in Dar es Salaam slums' (Thomson Reuters Foundation, January 4, 2017) <http://reliefweb.int/report/united-republic-tanzania/drones-help-communities-map-flood-risk-dar-es-salaam-slums> accessed 22 January 2017.

¹²⁷ Ibid.

¹²⁸ Asian Surveying & Mapping, 'Philippines Accelerate Land Mapping with Drones' (July 11, 2016) <https://asmmag.com/features/feature/11197-philippines-accelerate-land-mapping-with-drones.html> accessed 22 January 2017.

¹²⁹ Mari Chrys Pablo & Oliver Petzold, 'Using Drone Technology to Improve Land Titling in the Philippines' (The Asia Foundation, June 29, 2016) <http://asiafoundation.org/2016/06/29/using-drone-technology-improve-land-titling-philippines/> accessed 22 January 2017.

¹³⁰ Ibid.

¹³¹ Ibid.

¹³² Ibid.

the intended survey in a criss-cross fashion.¹³³ These drones record the images of the land on the ground from the sky during flight. The images are used to create aerial maps.¹³⁴ In order to ensure the accuracy of data collected, special control points are marked on the ground before the drone flight.¹³⁵ These control points are then used to link the grid system on the ground to the aerial map.¹³⁶ The high resolution maps that are created as a result of aerial mapping using drones are then printed and reviewed by community members for accuracy.¹³⁷ Unlike maps created through traditional surveys, those generated through the use of drone technology are of a higher resolution and have more details and enable the recognition of various landmarks and buildings, thus facilitating the resolution of disputes.¹³⁸ Another advantage of drone technology is that it is faster, enabling mapping and surveying of around 40 hectares in a single day.¹³⁹

According to a study conducted in the Philippines investigating the effectiveness and of using drones as an alternative tool for surveying land, it was found that the use of drone technology is more cost effective and faster.¹⁴⁰ The most common method of surveying land in the Philippines is the conventional method of using total stations or the Global Navigation Satellite System (GNSS) receivers, or a mix of the two.¹⁴¹ These instruments are however, ineffective particularly in densely populated and crowded areas, as they usually demand enough reception of satellite signal and point-to-point visibility.¹⁴² Attaching the receiver to a drone enables more accurate mapping and helps alleviate the need for establishing special ground control points on the earth surface.¹⁴³

¹³³ Ibid.

¹³⁴ Ibid.

¹³⁵ Ibid.

¹³⁶ Ibid.

¹³⁷ Asian Surveying & Mapping, 'Philippines Accelerate Land Mapping with Drones' (July 11, 2016) <https://asmag.com/features/feature/11197-philippines-accelerate-land-mapping-with-drones.html> accessed 22 January 2017.

¹³⁸ Ibid.

¹³⁹ Ibid.

¹⁴⁰ Maria Isabel Almenteros, Angela Arnante & Rhea Lyn Dealca, 'Drones: A Gamechanger in Land Surveying and Titling' (FEF, June 21, 2016) <http://www.fef.org.ph/fe/drones-a-gamechanger-in-land-surveying-and-titling/> accessed 22 January 2017.

¹⁴¹ Ibid.

¹⁴² Ibid.

¹⁴³ Ibid.

In particular, the study established that the drone technology in land mapping is not only cost-effective but is also time-efficient. Up to 60% of surveying costs under the traditional surveying method are the logistic costs incurred by the survey team.¹⁴⁴ Using drone technology eliminates the need for logistic teams and thus obviates these costs.¹⁴⁵ On the other hand, drones are able to map large areas in a short time span and thus enable quick mapping of land and titling. As a consequence, the study recommended a policy change in Philippines to allow the use of drones as an addition technique in land mapping and surveying.¹⁴⁶ It also recommended the development of the capacity of geodetic engineers in using drones for conducting surveys.¹⁴⁷

C. Other Countries

Other countries that have attempted the use of drones to map land include Peru with the assistance of the global land rights organisation, the Land Alliance.¹⁴⁸ Rwanda was the first to use drone technology to enable delivery of emergency aid in the world.¹⁴⁹ Owing to hugely impassable roads due to mud and poor infrastructure, Rwanda has taken advantage of the platform provided by drones to use it for emergency medical services provision.¹⁵⁰ A California based logistics company named, Zipline, has designed a fixed wing drone that has been delivering medical supplies to rural health facilities.¹⁵¹ Drones have been used to carry emergency blood supplies to far flung areas in good time and thus helped save lives.¹⁵² Unlike normal drones, the fixed wing drones such as those used in Rwanda are unique in the sense that they disappear out of the line of sight during flight and may therefore require special regulation.¹⁵³

¹⁴⁴ Ibid.

¹⁴⁵ Ibid.

¹⁴⁶ Ibid.

¹⁴⁷ Ibid.

¹⁴⁸ Kevin Barthel, 'Drones for Land Rights' (Land Alliance, December 2, 2015) <http://thelandalliance.org/2015/12/drones-for-land-rights/> accessed 22 January 2017.

¹⁴⁹ Jane Coaston & Belinda O'Donnell, 'Africa Specific: Rwanda Has Launched the World's First National Drone Delivery Service' (MTV News, October 20, 2016) <http://www.mtv.com/news/2945787/rwanda-drone-delivery-network/> accessed 22 January 2017.

¹⁵⁰ Zoe Flood, 'From killing machines to agents of hope: the future of drones in Africa' (The Guardian, July 27, 2016) <https://www.theguardian.com/world/2016/jul/27/africas-drone-rwanda-zipline-kenya-kruger> accessed 22 January 2017.

¹⁵¹ Ibid.

¹⁵² Ibid.

¹⁵³ Ibid.

In addition, Tanzania has also been exploring and indeed used drone technology in the fight against poaching.¹⁵⁴ Wildlife conservationists have used drones to map the location of wildlife and been able to evacuate them to safe locations and also to locate poachers.¹⁵⁵

The various applications to which drone technology has been put in the various countries are an indication of the potential that it holds. However, we need to be wary of the concerns that this technology raises. Some of the reasons why many governments particularly in Africa have shied away from adopting drone technology with the exception of Rwanda and Tanzania are the security and privacy concerns that it raises. It must be noted that drone technology, as is virtually the case with everything else in society, operates within a socio-political context. Drones have traditionally been the exclusive preserve of the military, which uses them for conducting air strikes and spying, and thus, their ominous reputation may be justified.¹⁵⁶ For drone technology to be used effectively in Kenya, it must shed the negative political and social perceptions that society has of it. *First*, there is need for awareness raising for the public to accept the use of drone technology to improve land information gathering. *Secondly*, the security and privacy concerns that drone technology presents must be addressed so as to garner support for it.

V. Conclusion and Way Forward

We have demonstrated the potential of Unmanned Aerial Vehicles (UAVs) in spatial data acquisition, land mapping and surveying and other applications such as in supply of emergency medical services. The provision of reliable land information enables for proper planning, data integrity and efficient issuance of titles thus serving to unlock dead capital and contributing to enhanced security of tenure. UAV mapping has higher resolution imagery compared to the traditional surveying method, thus serving the useful purpose of giving more accurate data, reducing time and costs involved in verification of coordinates and logistical costs for survey teams. We have also urged for the need to take stock of the societal context within which this drone technology will be undertaken and measures towards sensitization of the public regarding drones be made to enhance their acceptability. There is also need for a regulatory framework to deal with the security and privacy concerns that the use of drones presents.

Our concern with land information management in Kenya currently is its unreliability and inaccessibility. Efficient and effective land information management can improve security of land rights in Kenya and neutralize land cartels and intermediaries who act as gatekeepers

¹⁵⁴ David Dolson et al, 'Farmer-Elephant Coexistence: Unmanned Aerial Vehicles (UAVs) for Reducing Elephant Crop-Raiding' Final Report to the International Elephant Foundation, June 2016. http://www.resolve.org/site-BiodiversityWildlifeSolutions/files/2014/12/Human-Elephant-Coexistence-Final-Grant-Report_RESOLVE.pdf accessed 22 January 2017.

¹⁵⁵ Ibid.

¹⁵⁶ Joseph Lindley & Paul Colton, 'Game of Drones' 1 http://eprints.lancs.ac.uk/75187/1/Game_of_Drones_pre_print.pdf accessed 12 February 2017.

opening way for corruption. Kenya has not optimized on use of ICT in the land sector considering its level of ICT development and other uses that it has put technology into. While technology is not a silver bullet/panacea to wipe out corruption and can be manipulated as IFMIS has shown; the use of drones can improve land information management and thus contribute to secure land rights for Kenyans. It can also minimize opportunities for fraud.

Kenya can do more to deepen and capitalize on the digital dividend it already has to improve land information systems - it can lead the way in shedding the antiquated manual land information system and resolving the problems of unclear land holding that is inimical to tenure security and use of land rights as collateral for loans. It should step up its use of technology in the land sector to collect, collate, store and disseminate land information. We note that digitization of manual land records remains the focus of the Ministry responsible for land.

While digitization of existing land records is important and needs to continue, in a situation where there is double titling owing to incomplete and inaccurate land information; there is need to diversify the nature and type of technologies used. In this regard, we are proposing that the Ministry should deploy unmanned aerial vehicles such as drones to capture information on land rights holding and use. This is more efficient and removes the possibility of inaccuracies and corruption that affect how information is captured and reported. The use of geographical positioning system enabled drone technology for mapping land rights and use will yield detailed data necessary to determine boundaries between land holdings and help in addressing land tenure issues in rural and urban land.

We are aware that the use of drones, traditionally used in the military, may be contested and resisted by some arguing that their use by civilians may get out of hand. They are also perceived to be vulnerable to hacking, which can compromise the integrity of the data. While we recognize these concerns as valid, we hasten to point out that the uses of drones have diversified with advances in technology to include dealing with criminals, addressing poaching, mapping disaster vulnerability and for leisure to capture events. We should not throw away the baby with the bath water, as there are technologies that can address the vulnerabilities. The mere use of computers also predisposes a system to hacking or other attacks, yet we have not done away with computers.

KCAA should fast track the promulgation of the draft regulations and rules to regulate the use of drones to enable their deployment in land information system collection and collation. To support the use of drones, there is need for capacity building beyond traditional disciplines such as survey and the use of multidisciplinary approaches to capture land information. The Ministry responsible for land can also apply for allocation of spectrum to enable it deploy technology effectively.

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