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# Technology for Land Governance: Ensuring that Women Benefit from the Revolution

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## ABSTRACT

Innovative technologies for land governance can promote clear land tenure and effective land administration, reduce corruption, and support economic growth. Mobile technologies offer real-time access to information and open communication between people and government services. These technologies are revolutionizing land governance around the world; however, without additional steps to ensure that women and men equitably benefit from the technology revolution, the application of these technologies may amplify the preexisting inequalities that women face. This paper applies Toyama's amplification theory of technology to explore women's differential access, capacity, and perceived motivation for technology adoption and benefits. The paper proposes recommendations for ensuring that new technologies for land governance are responsive to the heterogeneous needs and desires of both women and men, including developing technologies with women in mind, user testing new technologies with women, and extensive sensitization.

## Keywords:

*Land Governance*  
*Land Administration*  
*Gender*  
*Technology*  
*Mobile Technology*  
*Blockchain*

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## **1. INTRODUCTION**

Innovative technologies for land governance can promote clear land tenure and effective land administration, reduce corruption, and support economic growth. Mobile technologies offer real-time access to information and open communication between people and government services (Zambrano, Seward, & Ludwig, 2012). Going further, mobile technologies for documenting land rights have the potential to transfer land governance into the hands of the people. Emerging technologies like drones, GPS improvements, Public Key Infrastructure (PKI) and Self-Sovereign Identity (SSI), and blockchain have introduced new ways of gathering, storing, and validating information that are efficient, transparent, and safe from physical degradation and malfeasance. These technologies are revolutionizing land governance around the world; however, without additional steps to ensure that women and men equitably benefit from the technology revolution, the application of these technologies may amplify the preexisting inequalities that women face.

## **2. THE AMPLIFICATION THEORY OF TECHNOLOGY AND WOMEN'S LAND RIGHTS**

The findings around the benefits of technology for users have varied, with some asserting that technology enables socioeconomic growth and others finding that technology amplifies social inequalities (Wyche, Simiyu, & Othieno, 2016). The amplification theory of technology asserts that technology magnifies existing forces, including existing inequalities. In contradiction to the argument posed by some technology advocates that technology in and of itself is a transformative and equalizing force, Toyama (2011) argues that technology is merely a tool, the impact of which is determined by human capacity and intent. Technology projects that are not designed with a specific context in mind, that do not adapt to socio-cultural norms, and that do not respond to real local needs are unlikely to achieve their intended impact. Worse, such technology projects are more likely to benefit those with preexisting capacity – particularly the well-educated and wealthy – rather than to equalize the playing field (Toyama, 2011). For example, research has found that technology projects intended to promote equality in education did not achieve their desired outcomes and instead provided greater benefit to students with preexisting wealth and capacity (Ibid.).

Toyama (2011) identifies three spheres of inequality that contribute to technology's role as an amplifier of social inequality. These are 1) differential access, 2) differential capacity, and 3) differential motivations. Differential access refers to the financial resources required to acquire and utilize technology effectively; unsurprisingly, wealthier individuals have better access to technology than poorer individuals. Differential capacity refers to disparities in education, social skills, and connections that enable a user to benefit from a technology. Toyama argues that differential capacity is the most critical factor in the ability of technology to reduce social inequalities. Finally, differential motivation refers to what users want to do with the technology to which they have access (Ibid.). Toyama's application of the amplification theory of technology is gender blind, however, and can benefit from the application of a gender lens across the spheres of social inequality. Applying a gender lens to the theory raises the question: What are the gender dimensions of technology access, capacity, and motivation and what impact do these have on women's technology adoption, particularly for land governance?

A recent and growing body of research explores the gender dimensions of technology, particularly around mobile technology adoption (Rowntree, 2018; Wyche et al., 2016; GSMA, 2015). Less

commonly explored are the gender dimensions of technologies for land governance, especially emerging technologies such as drone technology, GPS improvements, Public Key Infrastructure (PKI) and Self-Sovereign Identity (SSI), and blockchain. These technologies gather textual and spatial data, define identity, or support the backend of land administration and cadastral systems. Here, a gender lens is applied to Toyama's three spheres of inequality in the adoption and benefit of land governance technologies.

It is important to frame the discussion by noting that technology cannot fill the gap left by insufficient rule of law (Toyama, 2011). As such, technology cannot create rights where rights do not already exist or where rights are very weak (Wyche et al., 2016). While technology can be a conduit for recording and registering rights, women must first have rights to be recorded. In many countries, land is governed by patriarchal systems and norms that prioritize male interests. In such systems, women tend to have weaker rights to land. Technological advances could exacerbate this challenge and serve as an additional barrier to women's land rights. Medici Land Governance<sup>1</sup> implemented a systematic land titling program in urban and peri-urban Lusaka, Zambia in 2018 that gathered data for over 45,000 parcels using mobile technology.<sup>2</sup>

During the enumeration process, the team found that patriarchal norms of land ownership were a more significant barrier to women's land rights than technology challenges. Polygyny was common in the enumerated areas and, on multiple occasions, women referred enumerators to their husbands to determine which wife – if any – should have the parcel registered in her name (M. Paul, key informant interview, April 23, 2019). While Medici Land Governance introduced an affordable and accessible technology to rapidly document land rights, the technology alone could not close the gap for women, highlighting the need for additional, complementary interventions. Without intervention to promote women's participation in decision-making, such programs could formalize women's customary status as secondary rightsholders.

## **2.1 Women's Differential Access to Technology**

Within this frame of women's weaker land rights, women also face differential access to technology. While mobile technology has transformed how the world accesses information, women have less access to mobile phones and mobile internet than men. Women are 10% less likely to own a mobile phone, are 18% less likely to use mobile phones to access the internet, and are more likely to struggle with literacy and digital literacy than men (Rowntree, 2018).

In Sub-Saharan Africa, the gender gap for mobile ownership is 14%. Cost of phones and credit, as well as network coverage, are two of the primary barriers that women in Sub-Saharan Africa face (Ibid.). Additionally, women have lower access to sophisticated mobile services because they tend to own lower-end handsets without internet capability (research has found that women tend to own less expensive phones than men) (GSMA, 2015). This gap increases significantly in rural areas due to lower income levels, lower levels of education, and poor infrastructure (Ibid.). For land governance

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<sup>1</sup> Medici Land Governance was established as a public benefit corporation to use advanced technology including blockchain to improve trust in information and institutions while helping individuals secure their land rights and improve their economic situation.

<sup>2</sup> Global News Wire. (2018). *Overstock Subsidiary Medici Land Governance Signs MOU with Zambian Ministry of Land and Natural Resources to Build Blockchain Land Titling Program* [Press release].

technologies, this could mean that women are less likely to use mobile technologies to access information about land rights, particularly where these technologies are built for smartphones; to utilize e-government services for land administration; and to participate in land titling and certification programs utilizing mobile technologies, thereby exacerbating the social inequalities that women already face.

## **2.2 Women's Differential Capacity to Utilize Technology**

Women tend to have differential capacity to utilize and benefit from technology, which could also impact the gender-equitable application of land governance technologies. Even among individuals who own smartphones, for example, literacy and digital skills can be a persistent challenge, especially for women (Chair, 2017). Digital skills and confidence are critical barriers for women in both emerging and mature mobile markets, and men are more likely than women to learn how to use technology independently, i.e. men do not require assistance to adopt a new technology. For example, research conducted in China found that 48% of female respondents cited not knowing how to use a mobile phone or more complicated mobile phone features as a barrier to mobile technology adoption, as compared to 41% of male respondents (GSMA, 2015). Women face differential capacity around digital skills and confidence because they tend to be less educated than men. Furthermore, technology design can present an additional barrier, particularly when the technology is not intuitive or is in a language that women do not understand (Ibid.). In addition to women's differential capacity to utilize land governance technology, there is a potential long-term implication for the role of women in land governance: As technology evolves in the land governance space, women's lower digital literacy may prevent them from entering into land administration as a career with repercussions for women's overall ability to access and use land administration institutions.

The gender-blind development of technology also presents a challenge within the sphere of differential capacity. Though most women and men will never interact directly with drones, GPS, or blockchain, there are gender risks in their design. Research has found that most developers of emerging technologies are men who may not design applications with women's heterogeneous constraints and needs in mind, with potential implications for women's inclusion in the benefits as technologies such as blockchain become more prevalent in daily lives (Ovenen, 2019). For example, recent research has found that even artificial intelligence can amplify gender bias, potentially because the technology is primarily developed by men (Kuchler, 2018).

The second barrier is a more subtle, but generally unconscious bias. Mobile operators often do not focus on female customers and potential female customers, and policymakers typically place a low focus on gender relative to other priorities. There is, for instance, a lack of focus on gender by policymakers in the ICT sector: of the 119 national broadband plans in place in 2012, only 30 countries included a gender component (GSMA, 2015). In combination with women's differential capacity to utilize land governance technologies, the gender-blind development of technology could create a vicious cycle whereby women's lower digital literacy prevents them from entering into land administration as a career, women feel less comfortable accessing male-dominated land governance institutions, and as a result women are less likely to utilize both technologies and services.

To address women's differential capacity to utilize land governance technologies, developers and distributors of new technologies need to consider the barriers that women face: weaker digital skills



and confidence, lower literacy, and higher likelihood to speak only a local language. As such, technologies should be intuitive and targeted toward low-literacy populations, with a focus on translating technologies into the languages that both women and men are most likely to speak. Additionally, to overcome technology design bias in the short-term, innovative technologies could be user-tested with heterogeneous groups of women as well as men, to ensure that their design accommodates and responds to their unique needs. In the long-term, it is worth exploring diversifying the pool of technology developers to include greater numbers of women and representatives from developing economies.

### **2.3 Women's Differential Motivations for Technology Use**

Perceptions of women's differential motivations for technology use may also limit women's access to land governance services. In one study across five Sub-Saharan African countries, women reported that they were wary of using the internet for fear of being perceived as neglecting their husbands and families (Chair, 2017). How women use technology might also present limitations. For example, women in lower- and middle-income countries tend to use mobile phones more often for voice services and are less likely than men to use sophisticated mobile services, such as the internet. This gap may be interconnected with women's differential capacity to utilize technology, as women with less education and income are also less likely access the internet (GSMA, 2015). Land governance technology distributors could target women and gatekeepers to raise awareness of the benefits of women's technology usage.

Differential access, capacity, and motivation may intersect and present complex barriers for women. For example, a woman who does not have access to a mobile phone or cellular service at her home may also struggle with weak digital skills and literacy. Were she presented with the opportunity to use a mobile phone, she may use the opportunity to connect with family and friends rather than to check on current land prices or the status of a land transfer request. With this in mind, technology solutions must consider the complex web of challenges and motivations that women face.

### **2.4 Recommendations for Ensuring that Women Benefit from Technology**

There are opportunities for overcoming women's differential access and capacity to land governance technologies and thereby promoting women's participation in the system. The Government of Rwanda initiated Irembo, a one-stop-shop government services platform with over 100 online services.<sup>3</sup> However, though Rwanda is heavily committed to information technology development,<sup>4</sup> many Rwandans face differential access and capacity challenges. Approximately 52% of the population has access to a mobile phone (GSMA, 2017), but cellular service is not universal throughout the country. As a result, peri-urban and rural Rwandans might need to travel to urban centers to access connection hotspots or rely on internet cafes to connect to the internet (Chair, 2017). In addition, approximately 30% percent of Rwandans and 35% of Rwandan women over the age of 15 are illiterate (UNESCO, 2019). Today, over 4000 'Irembo agents'<sup>5</sup> operate throughout the

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<sup>3</sup> See: <https://irembo.gov.rw/rolportal/en/home>.

<sup>4</sup> See, for example, the SMART Rwanda 2020 Masterplan:

[http://www.minecofin.gov.rw/fileadmin/templates/documents/sector\\_strategic\\_plan/ICT\\_SSP\\_SMART\\_Rwanda\\_Master\\_Plan.pdf](http://www.minecofin.gov.rw/fileadmin/templates/documents/sector_strategic_plan/ICT_SSP_SMART_Rwanda_Master_Plan.pdf)

<sup>5</sup> In Kinyarwanda, *irembo* means portal, gate, and access, among other translations.

country. Irembo agents walk women and men through mobile processes for land registration or land title transfers – among almost 100 other e-government services – helping users overcome access, literacy, and numeracy challenges that they might otherwise face in accessing the digital services platform.<sup>6</sup>

In Tanzania, the USAID Mobile Application to Secure Tenure (MAST) project also offers lessons for overcoming women's differential challenges to ensure that they benefit from land governance technology. The MAST project trained young women and men as trusted intermediaries for the collection of land rights data using a mobile app. The project targeted recruitment of women for these roles to establish a foundation for women's participation in the project. Over the course of two years, the project achieved parity in land rights document for women and men, in part due to the inclusion of women as trusted intermediaries. The project team hypothesized that this encouraged more women land users to participate in the project and register rights in their own names.<sup>7</sup>

### **3. CONCLUSIONS**

Innovative technologies are revolutionizing land governance; however, without additional efforts to ensure that these technologies are accessible to and benefit both women and men, the social inequities that women face may be unintentionally amplified. Women have differential access, capacity, and perceived motivation for utilizing technology, characterized by a lower ability to afford and maintain technology; lower digital skills and confidence, which are compounded by technology design that does not consider women's heterogeneous challenges and needs; and women's different motivations for utilizing technology – both real and perceived. According to the amplification theory of technology, land governance technologies implemented with the best of intentions but that are not accessible to women, that are not designed for their use, and which they are not motivated to use have the potential to disadvantage women and reinforce their unequal position in society.

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<sup>6</sup> Notes from original research in Rwanda, July 2019.

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## 7. KEY TERMS AND DEFINITIONS

**Blockchain:** A computer network designed to transparently and resiliently store short sequences of data, validate shared rules, and exchange economic value. A blockchain distributes the balance of power equally among all participants, such that no single entity can unfairly take advantage of the others. The size of the network shrinks and grows based on economic demand for its services.

**Public Key Infrastructure:** Public Key Infrastructure (PKI) is a collection of policies, procedures, and technology to support the distribution and encryption of information across systems. Keys can be issued to individuals or to private or foreign organizations. After the individual generates the key, he or she is responsible for keeping the key safe and reporting if the key information is compromised or stolen. The private key can be used to digitally sign or encrypt a digital package that cannot be



created in any other way. This signing of the package can create certainty that only an individual or entity with access to the private key would be able to create that package.

**Self-Sovereign Identity:** More than a single technology, Self-Sovereign Identity (SSI) is a new paradigm for designing digital identity systems. The paradigm and its encompassing social movement recognizes an individual should own and control their digital identity without intervening administrative authorities. SSI allows people to interact in the digital world with the same freedom and capacity for trust as they do in the offline world.