

Contemporary land administration: the importance of being infrastructure

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SUMMARY

Failure to recognize land administration systems as infrastructure potentially creates funding and maintenance problems. Wider economic, social, and environmental benefits of effective land administration are put at risk. Land administration must be recognized as critical, public good infrastructure. Arguments for land administration as infrastructure reside within the land administration discipline: mainstream views regularly fail to recognize the argument. An evaluation approach for testing land administration as an infrastructure is developed and applied. The method utilizes tools for defining and classifying infrastructure, public goods, and critical infrastructures. The analysis tends to support the position of land administration as a critical, public good infrastructure. As a consequence, infrastructure funding and maintenance regimes need to be depoliticized; land administrators must continue to promote land administration outwardly; and the evaluation approach must be extended and enhanced for use in other land administration projects and studies. This paper summarizes a more extended work currently under review with the Journal of Land Use Policy.

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1. INTRODUCTION

The term ‘land administration’ gained prominence in the mid 1990s. It is generally defined as the collection of processes managed by government, using public or private sector agencies, related to managing land tenure, land value, land use, and land development (*c.f.* UN-FIG, 1999; Dale and McLaughlin, 1999; Williamson *et al.*, 2010). It is seen as an essential tool for enabling effective land management

The term ‘infrastructure’ was first used in the 18th century to describe the form and function of rail tracks (Groot, 1997). Over time it evolved to include many shared structures that made society more livable (Pappas, 1990): water supplies, sewage networks, ports, electricity grids, and road networks provide examples.

Generally speaking, land administration systems are not recognized as infrastructure. While land administrators suggest it clearly is (NRC, 1993; Groot, 1997; Coleman and Nebert, 1998; Finley *et al.*, 1998; McLaughlin, 1999; Williamson, 2001; Enemark, 2001; Bogaerts *et al.*, 2002; Aanestad *et al.*, 2006; Roberge and Kjellson, 2009; Williamson *et al.*, 2010), the core literature dealing with infrastructure design, construction, management, and finance regularly fails to include land administration systems (Rainer, 1990; Niskanen, 1991; World Bank, 1994; Targowski, 1996; Borgman, 2003; Howes and Robinson 2005; Nickolov, 2005; OECD, 2006; Brooks and Menon, 2008; Underhill, 2010; Weber and Alfin, 2010). The lack of recognition also exists in practice. In the contemporary context across many developed countries, key government agencies and projects dealing with infrastructure provision regularly fail to consider land administration systems. Examples include Australia (Infrastructure Australia, 2008), the United States (Moteff *et al.*, 2003), the United Kingdom (Infrastructure UK, 2010), Germany (Bundesministerium des Innern, 2009), and the Netherlands (Luijff *et al.*, 2003).

The failure to recognize land administration systems as infrastructure creates two serious and distinct problems, among others. First, the public exposure and funding channels available to more recognized infrastructures such as public transport and water supply networks become difficult to access. Williamson (2001; 2001a) explains how the significant policy focus afforded to physical infrastructures is disproportionate to the attention given to land administration infrastructures, the systems that underpin their design and construction. Second, the need to apply flexible or adaptive management approaches to land administration systems is not recognized. Adaptive management ensures learning, rehabilitation, regeneration, and decommissioning programs are built into the lifecycle of an infrastructure (*c.f.* CMP, 2007). The concept first gained prominence in the field of natural resource management (Bormann *et al.*, 1999; *c.f.* Holling, 1978). In the context of land administration these approaches are essential: people to land relationships and their management regimes

must be dynamic (Van der Molen, 2002). Without adaptive management, infrastructures stagnate, decay and eventually fail. Williamson (2001; 2001a) related how many land administration systems were not adapted from 19th century management paradigms and are unable to play the integrative role crucial to modern economic management, urban planning, and environmental management. Enemark (2010) indicated how well organised land administration systems are essential for meeting global challenges.

The prevailing outcome is that recognized benefits inherent to land administration are put at risk: public wealth (Dale and McLaughlin, 1999), private wealth (Wallace and Williamson, 2006; 2006a), stability (Feder and Nishio, 1998; Deininger and Binswanger, 1999; Deininger, 2003), and sustainable decision-making (UN-FIG, 1999) are all jeopardized. Further, the secondary benefits are also put at risk (e.g. good governance, transparency, social inclusion, and effective disaster management).

Given the importance placed on infrastructures in contemporary society, it appears land administration must be recognized as core, public good, critical infrastructure. To illustrate how this can be done an assessment of the infrastructure concept against land administration was undertaken. Tools utilized include those for defining infrastructure (Star and Ruhleder, 1996), critical infrastructure (Moteff *et al*, 2003), and public goods infrastructure (Kaul *et al*, 1999). The synthesis of the studies that follows identifies the reasons for poor recognition of land administration as infrastructure. Approaches for overcoming the lack of recognition are suggested. The conclusion summarizes key findings.

2. METHODOLOGY

The notion that land administration systems are infrastructures was tested through three discrete observational studies, and a subsequent synthesis. In each study a different tool for defining infrastructure was applied and observed in the land administration context. Respectively, these were Star and Ruhleder (1996)'s infrastructure dimensions, Kaul *et al* (1999)'s public good axes, and Moteff *et al* (2003)'s critical infrastructure criteria. The three studies made use of sample data relating to the land administration arrangements of various countries and regions. Key data sources included: Land Equity International's global comparison of land administration systems (Land Equity 2006; Burns, 2007), the *International Property Rights Index* Report (Dedigama and de Soto, 2009), the *Economic Freedom of the World Annual Report* (Gwartney *et al*, 2010), and The World Bank *Doing Business* indications (2010) relating to property registration (<http://www.doingbusiness.org/data>). The results from each study were synthesized in a qualitative manner: a number of key discussion points were generated. The synthesis creates new clarity on the notion that land administration is infrastructure. While the approach has limitations (as described in subsequent cities), it represents a first attempt an empirically testing land administration services as infrastructure.

3. BACKGROUND

The vast majority of literature linking land administration with the infrastructure concept emerges from within the land administration discipline itself. In most cases, use of the term is cursory and not explored in depth.

Use of the term within the discipline first began appearing in the mid to late 1990s (*c.f.* Finley *et al.*, 1998; McLaughlin, 1999). The emergence of the term in land administration was a result of the popularization of the spatial data infrastructure (SDI) concept of the mid 1990s and beyond (*c.f.* NRC, 1993; 2001; 2003; 2007; Groot, 1997; Coleman and Nebert, 1998; Williamson *et al.*, 2003; Aanstad *et al.*, 2006; Rajabifard *et al.*, 2010). A number of these works link the term infrastructure to the earlier concept of the multipurpose cadastre (*c.f.* McLaughlin, 1975; NRC, 1980). Also during the 1990s, the post cold war expansion of the European Union enhanced recognition of land administration as a fundamental infrastructure for modern market-based economies Bogaerts *et al.* (2002).

Later in the 1990s and throughout the 2000s an institutional gap between SDIs and land administration emerged in a number of countries. Consequently, only very generalized models of SDIs emerged (*c.f.* Williamson *et al.*, 2003). The lack of commonality across nations helped undermine the notion of land administration as central to SDIs or as infrastructure in their own right.

At any rate, land administrators continued to push the infrastructure concept into the 2000s. Williamson (2001) and Enemark (2001) used the theme of sustainability to make clear arguments for land administration as an infrastructure. Likewise, Roberge and Kjellson (2009) and Williamson *et al.* (2010) again argued for land administration systems as infrastructure. However, despite the considerable amount written arguing for land administration systems as infrastructures since the 1980s, the case tends to reside within the discipline: the argument is far more obscure to the mainstream.

Meanwhile, in parallel with the arguments of land administrators, many other bodies of literature dealt with the ‘infrastructure’ concept. The frenzy was sparked by the publication of Choate and Walter’s (1981) *America in Ruins: The Decaying Infrastructure*. Later, the NRC’s *Infrastructure of the 21st Century* expanded the term’s meaning to be more than just the physical infrastructure (NRC, 1987). The definition provides a strong argument for land administration as an infrastructure. However, in general, the notion of land administration as an infrastructure is rarely touched upon in these other bodies of literature (*c.f.* Rainer, 1990; Howes and Robinson, 2005; OECD, 2006; Weber and Alfin, 2010; and Underhill, 2010). Where mention of land is made in these documents, it is generally in relation to unlocking its value to fund more traditional forms of built infrastructure (*c.f.* Peterson, 2009).

One of the larger bodies of literature worth mentioning deals specifically with infrastructure investment in developing economies (World Bank, 1994; Merna and Njiru, 2002; UN-ESCAP, 2007; Brooks and Menon, 2008). Again, land administration systems are not included within these descriptions. They are, however, the subject of much literature relating to development economics (*c.f.* North and Thomas, 1973; Deininger and Binswanger, 1999; and de Soto, 2003).

Literature differentiating between ‘hard’ and ‘soft’ infrastructures is also worth mentioning (*c.f.* Stough, 2003; Niskanen, 1991). The term ‘information infrastructures’ was also part of

this discourse (Targowski, 1996; Weill and Broadbent, 1998; Barbu *et al*, 2001; Borgman, 2003; Aanestad *et al*, 2006). Arguably, land administration systems exhibit characteristics of hard (survey marks, coordinated reference stations (CORS), and geodetic stations), soft (the institution of property, land information), and information infrastructures (DCDBs, land information infrastructures).

Throughout the 1990s and 2000s a number of approaches emerged to enable definition of infrastructures. Star and Ruhleder (1996) offered eight dimensions to enable the assessment of an activity as an infrastructure: embeddedness, transparency, reach/scope, learned as part of membership, links with conventions of practice, embodiment of standards, built on an installed base, and becomes visible upon breakdown. The eight dimensions, yet to be tested against land administration systems, aim to provide a generic proof for the existence of an infrastructure.

Another approach relates to the concept of critical infrastructures. Originally any “Infrastructure so vital that their incapacitation or destruction would have a debilitating impact on defense or economic security” was classified as critical (Clinton, 1996). Post 9/11, the term expanded to include assets such as national monuments, which if damaged could cause significant loss of life or adversely affect a nation’s morale (Moteff *et al*, 2003). Telecommunications and information networks, energy and water systems, health and emergency services and transportation networks, among others, have all been classified as critical under Homeland Security’s criteria (Moteff *et al*, 2003; Nickolov, 2005). Land administration systems have yet to be tested against these criteria.

The debate relating to public good infrastructures provides another approach. Originally recognized by Adam Smith in 1776, the term gained renewed prominence in the 1990s and 2000s, particularly with UN agencies (Kaul *et al*, 1999 and 2003) and development banks (*c.f.* ADB, 2002). They defined public goods as those that are *non-excludable* and *non-rival* in consumption (Figure 1 – bottom left quadrant). Other goods exhibit other natures, for example: club goods (private parks or roads), common property (community facilities or parks), or private goods (private cars). Different goods can be managed using different regulatory devices and financial arrangements. Based on these criteria, Aanestad *et al* (2006) discussed the implications of SDIs as public goods particularly within the health care industry. Again, land administration systems are yet to be tested against these criteria.

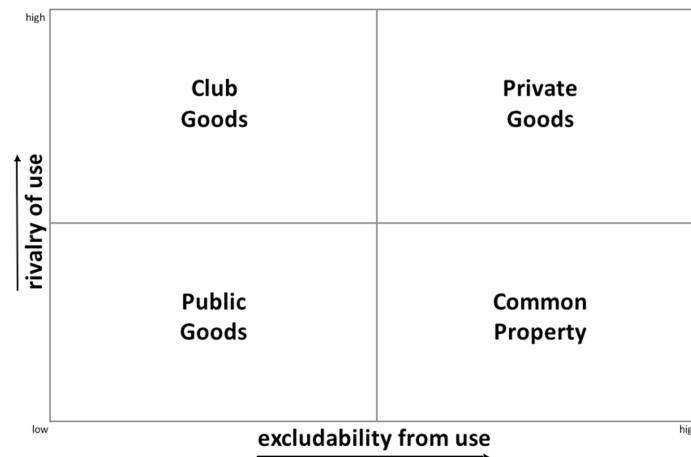


Figure 1. Classification of public goods (adapted from ADB (2002))

In summary, various lines of infrastructure literature fail to mention land administration systems. Reasons include: the silo mentality of disciplines; the failure of land administrators to fully engage across disciplines; the fractured approaches to land administration globally; and the lack of a visible or physical presence for land administration. These range of new approaches for defining infrastructure are yet to be applied to the land administration context.

4. RESULTS

4.1 Land administration and the infrastructure dimensions

The results of the test against Star and Ruhleder's (1996) infrastructure dimensions are presented in Table 1. Fourteen countries were tested against the eight criteria. Analysis was based on the methodology used in the World Bank's *Doing Business* indications reports (World Bank, 2010). An assessment of each country against the eight dimensions based on the perceptions of an expert panel in the realm of comparative land administration, and impressions from Land Equity (2006) and Burns (2007), was undertaken. The scope was limited to only the formal land administration systems within a country: accurate data on informal or non-government recognized land administration systems were not available. This restriction means results are conservative. A very strong argument for inclusion of informal systems existed; however, the necessary data was not available. The study was also limited to the national level: countries where land administration lies at lower levels (for instance many federations – Australia, India, Switzerland, United States) received generalized analysis and results. In the case of Australia and Switzerland, historical developments mean state and cantonal systems are relatively similar and generalized results can be considered more or less appropriate. The United States has some homogeneity across states due to the heavy use of title insurance; however, along with India these results should be treated with a fair degree of caution. Indeed, the somewhat esoteric nature of Star and Ruhleder's (1996) infrastructure criteria means all values would be open to further conjecture and debate with a larger, more diverse, group of experts. Finally, only 'yes' or 'no' values were recorded: it was deemed inappropriate to use further divisions as the data and method for making such distinctions was not available.

Table 1. Adherence of land administration systems against the infrastructure dimensions

Country	Embeddedness	Transparency	Reach/Scope	Learned as part of membership	Links with conventions of practice	Embodiment of standards	Built on an installed base	Becomes visible upon breakdown			
East Asia & Pacific										YES	
Indonesia											
Philippines											
Thailand											
Eastern Europe & Central Asia											
Armenia											
Latin America & Caribbean											
Bolivia											
Middle East & North Africa											
Iran											
OECD											
Switzerland											
United States											
England											
Australia											
South Asia											
India											
Sub-Saharan Africa											
South Africa											
Ghana											
Namibia											

A number of points are worth making about the table. Of the fourteen countries, seven were found to exhibit all eight-infrastructure characteristics: a strong case for land administration is an infrastructure can be made. Further, all countries were deemed to exhibit varying levels of at least four of the eight criteria. An analogy can be made here with GLTN's (2008) continuum of land rights: whilst some countries have the complete set of infrastructure characteristics in place, many others are at varying stages of construction (or potentially decay). Countries whose systems failed to exhibit the complete set of dimensions tended to be economically poorer and generally subject to more social unrest. However, this study alone cannot identify a causal link. The most problematic criteria were found to be embeddedness, transparency, embodiment of standards and visibility upon breakdown. These problems most likely relate to: historical developments (that is, colonial systems and fragmented approaches); failure to integrate contemporary land administration projects with customary or informal approaches; a general distrust of systems by the citizens; inbuilt bias towards elites; and a general lack of good governance. The result is that public participation is low and the formal system or fledging infrastructure does not integrate well with other structures and social arrangements. In summary, formalized land administration systems can, and in many cases do, exhibit the complete set of infrastructure dimensions as described by Star and Ruhleder (1996).

4.2 Land Administration as a public good

The results from the study utilizing Kaul *et al's* (1999) public good axes are presented in Figure 2. Data points were derived from quantitative measures provided by The World Bank's

Doing Business report (World Bank, 2010). Of the eleven business indicators explored in the World Bank study, *Registering Property* was utilized. From this, the y-axis, *rivalry of use*, was derived through the use of *Time (days)*, the time to lodge a dealing in the land administration system. Higher lodgment times were deemed to represent a higher rivalry of use: lengthy lodgment processes generally impede the public good nature of a system. If lodgment takes too long, the system is ignored or decays in accuracy through duplication in an informal manner. The land administration system is no longer a public good asset but takes on the characteristic of exhausted common property. The x-axis, *excludability of use*, was derived through the use of *Cost (% of property value)*, the cost to lodge in the land administration system. Higher lodgment costs indicate higher excludability of use: high access costs exclude those who cannot afford lodgment: land administration becomes a tool for the wealthy elite. It is not a public good; rather, it is a club good. In summary, if a land administration system exhibited ‘relative’ low costs and times for lodgment, it was considered a public good. However, where this ‘relative’ line should be drawn is subjective and represents a limitation of the study.

The World Bank dataset enabled 178 countries to be plotted. The graph is divided into quadrants. The intersection of the axes is derived from the upper quartile of all lodgment times and the upper quartile lodgment costs for all countries. The upper quartiles were considered the highest values of rivalry and excludability that would still enable the land administration systems to be considered a public good. The approach arguably produces a broad definition of public good. It should also be noted that both axes are extended to negative values on the graph. Clearly, no lodgment time or cost can be negative, however, this graphical approach was taken in order to maintain relative to the shape of Figure 1.

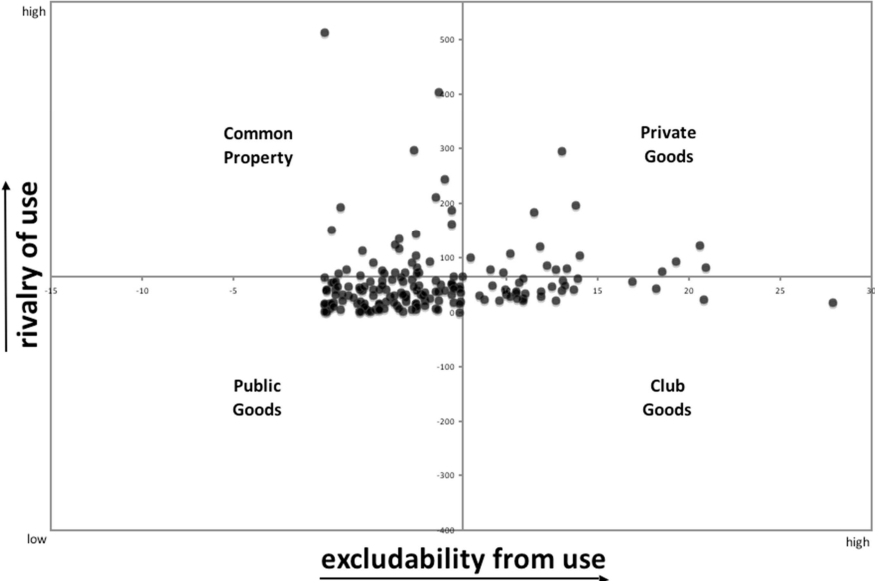


Figure 2. Formal national land administration systems plotted on the public good axes

A significant number of economies (59% - 105) deliver low registration times and costs in a relative sense (that is, the public good quadrant). Generally, these countries correspond to

economic and regional groupings of wealthier nations: an argument can be made that land administration can, and does, perform as a public good. A smaller, but not insignificant number of countries (41% - 73 countries) do not exhibit the characteristics of a public good infrastructure. Land Equity (2006) and Burns (2007) provide a number of reasons as to why this outcome might be expected. In fact, it would be expected that these land administration systems were not performing as public good infrastructure. At any rate, in summary, the overall findings support the view that established, formal land administration, where they are functioning effectively, acts as a public good infrastructure.

4.3 Land administration as a critical infrastructure

The results from the study based on Moteff *et al's* (2003) critical infrastructure criteria are presented in Table 2. Moteff *et al's* (2003) argument is that an infrastructure, such as land administration, need only satisfy a single criterion to be considered critical. Data utilized in the study included the comparison of land administration systems by Land Equity (2006) and Burns (2007), the *International Property Rights Index Report* (Dedigama and de Soto, 2009) and the *Economic Freedom of the World Annual Report* (Gwartney *et al*, 2010). The same regional and economic groupings as the infrastructure dimensions were also utilized.

In terms of the economic security criterion a number assumptions and indicators were used. It was assumed that economic security derived from formal registration of property rights applies only in regions that have established formal land markets (*c.f.* Dedigama and de Soto, 2009; Feder and Nishio, 1998). In contrast, where informal land markets dominate (*c.f.* Land Equity, 2006; Burns, 2007), formal land administration systems are not seen as vital to the status quo of existing economic security and prosperity.

With respect to public health and safety criteria a number of assumptions and indicators were used. Land administration is considered to be vital to public health and safety in all regions tested in this study. This is derived from various published works (*c.f.* Gwartney *et al*, 2010; Tibaijuka, 2010; Land Equity, 2006). Furthermore, Harden (1968) in *The Tragedy of the Commons* argued that if an asset is not owned, there is no economic incentive to prevent it from abuse. Thus, the existence of a formal land administration system promotes public health and safety and the lack of one impedes it.

With respect to the national morale criteria, the following assumptions were used; the definition of national morale is taken from Miller (1941) as “the degree of confidence held by all of the people in the ability of the nation to cope with the future.” Particularly in the OECD countries, where there is high public confidence and participation in land administration processes, the loss of such a system would disable the property market and bring economic progress to a standstill. This would result in significant loss of national morale.

In relation to national defence a number of assumptions and indicators were used. Up until recently land administration was not perceived as critical to national security, particularly in developed nations. However, the rise in anti-terrorism activities during the 2000s resulted in large-scale people relevant spatial data, such as the parcel and property layers, being increasingly used. Additionally, the need to better enable natural disaster mitigation,

preparedness, response and recovery also resulted in emergency management agencies requiring land administration data. In developing nations, the importance of land administration for national defence is clearer. There is an increasingly important role for land administration to deliver human security in post-conflict areas (Lewis, 2004; Wakhungu *et al*, 2008; Leaning and Arie, 2000; and Törhönen *et al*, 2004). Moreover, a side effect of land administration projects in a number of developing countries, particularly in the Asian context, has been to minimize conflict between landholders.

Table 2. Land administration systems tested against critical infrastructure criteria

Country	Criteria for being considered Critical. Vital to...			
	national defense	economic security	public health and safety	national morale
East Asia & Pacific			✓	
Eastern Europe & Central Asia		✓	✓	
Latin America & Caribbean			✓	
Middle East & North Africa		✓	✓	
OECD	✓	✓	✓	✓
South Asia		✓	✓	
Sub-Saharan Africa			✓	

A number of points can be made from Table 2. Most crucially, the land administration systems of all regions are considered critical infrastructure: each region achieves at least one criterion. Moreover, in most regions, more than one criterion is achieved (the health and safety criterion is achieved in all regions). The land administration systems of wealthier regions (OECD) achieve all criteria. That is, the infrastructure is 'critical' for more than one reason. It is multipurpose in the true sense of McLaughlin's (1975) multipurpose cadastre. The economic security criterion is confirmed by Dedigama and de Soto (2009) and other land economists (Feder and Nishio, 1998). The notion that OECD countries use land administration to boost morale is more contentious. The validity of this notion requires further empirical testing, as does the notion that land administration delivers national defence. Finally, the somewhat subjective nature of this observational, or even synthesis approach, needs to be highlighted as a limitation of the study.

In summary, land administration is a critical infrastructure for public health and safety in all countries, for economic security in wealthier developed or developing countries that have a dominant formal land market; and for national morale and national defence in OECD countries where public confidence in the ability to undertake secure land transactions is high and vital to economic progress.

5. DISCUSSION

5.1 'Infrastructure' needs to be depoliticized

The term infrastructure has a diverse range of uses, exhibits a subjective quality, and appears open to manipulation. This is particularly evident in the context of large-scale financial investments undertaken by governments and the investment banks. An ongoing aim should be to depoliticize the term infrastructure, or at least its provision. The funding and maintenance

regimes of critical, public good infrastructure need to be decoupled from the short-term electoral cycles of governments and the financial interests of investment banks. This is a great challenge in the contemporary era where sustainable infrastructure systems are of great public interest, political and infrastructure provision systems are closely coupled, and large amounts of public infrastructure are often funded initially through private sector capital. However, evidence based approaches described in this paper potentially provide a useful starting point.

5.2 Land administrators must continue to engage with the mainstream

Whilst land administrators have been actively arguing for land administration as an infrastructure, their case has resided within the discipline. The case for land administration as an infrastructure needs to pervade the wider infrastructure discourse. This is a difficult task: land administration systems do not exhibit a visible or physical presence like other infrastructures. A more unified or coherent approach is required. There is a need to overcome the lack of shared definitions and understandings of the roles of land administration. Land administrators need to continue to promote a multidisciplinary approach. The International Federation of Surveyors (FIG) has made great strides in these areas, however, further dissemination of this work outside the land administration discipline is required.

5.3 Land administration is an infrastructure

In the past, infrastructures have been seen as visible networks on the landscape: more abstract services such as geodetic frameworks or land registries were not generally included. Moreover, many countries in the 19th century ran, and still run, privately insured deeds systems: the view that a country or state needed an overarching, publicly run system of registration and information provision was not necessarily agreed upon. These historical disparities between countries provide some explanation as to why land administration systems were not considered alongside more tangible infrastructures such as highways and electricity networks. At any rate, despite being excluded from wider discussions on infrastructure, all three tests validated the notion that land administration is an infrastructure. According to the studies conducted in this paper, formalized land administration systems can, and in many cases do, exhibit the complete set of infrastructure dimensions as described by Star and Ruhleder (1996), act as public goods in accordance with Kaul *et al's* (1999) axes, and are critical infrastructure as described by Moteff *et al* (2003). In general, these results complement and confirm the arguments made by land administrators, land economists, and land policy experts since the mid 1990s.

5.4 Evaluation approaches can be further enhanced

There exists potential to extend and enhance the evaluation approach outlined. The limitations were highlighted throughout the paper. At any rate, the synthesis provides a starting point for understanding land administration as an infrastructure. The approach has utility in individual countries and land administration systems at lower levels. It could be utilized by land administrators, in conjunction with pre-existing evaluation approaches, to produce indicators of land administration projects and their achievement of project deliverables and infrastructure requirements.

6. CONCLUSIONS

Land administration systems deliver public capital, private wealth, stability, order and improved environmental outcomes. Based on studies undertaken they appear to be critical, public good infrastructure. Failing to recognize land administration as infrastructure impedes funding and maintenance regimes and puts the benefits of the systems at risk. Land administration systems need to be better recognized as infrastructures, at high levels of governments and across the wider community.

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