# THE SOCIO-ECONOMIC IMPACT OF IMPROVING LAND REGISTRATION AND LAND INFORMATION SYSTEMS IN SAUDI ARABIA

**MUHAMAD ALRAJHI**
*Deputy Minister for Land and Surveying, Ministry of Municipal and Rural Affairs*
*Kingdom of Saudi Arabia*

**PHILIP AUERSWALD**
*Associate Professor of Public Policy, George Mason University USA*
*CEO, Zilla Global LLC*
auerswald@gmu.edu

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**Abstract**

In Saudi Arabia as in other countries, the management of land is a core function of government. As a consequence, the process of creation and maintenance of land registration and land information systems is, necessarily, administratively-driven. However, the benefits of improved of land registration and land information systems accrue overwhelming to citizens and private-sector companies in a range of forms, with potential for

- **Increase in economic efficiency**
- **Expansion of economic opportunity**
- **Promotion of urban vitality**
- **Nurturing of citizen well-being**
- **Contribution to environmental sustainability**

This paper describes the socio-economic impact of implementing improved land registration and land information systems in Saudi Arabia, with a focus on the contribution of this work to accomplishing urgent national objectives as defined in the Kingdom's National Transformation Plan 2020 and Vision 2030 documents.

# I. Introduction

In our era of digital disruption and virtual reality, policymakers and citizens alike tend to underappreciate the foundational socio-economic importance of land. Land remains the dominant asset class globally, the primary mechanism but which families build and hold wealth, and the literal platform on which all human social and economic activity ultimately depends—including that which takes place in digital worlds.

Land Registration Systems and Land Information Systems connect the physical reality of land with its social and economic possibilities. Land Registration Systems allow for security of ownership, occupancy, and transfer, that are prerequisites to land-related investment. Land Information Systems allow investments in land to be allocated efficiently so that land usage flows over time from lower-value to higher-value functions. Both Land Registration Systems and Land Information Systems are increasingly digital, providing a critical junction between digital and "brick and mortar" worlds.

In the Kingdom of Saudi Arabia, the development of land information systems has paralleled the development of the country. Today, the improvement of both Land Registration Systems and Land Information Systems is a national priority, reflected in the Kingdom's National Transformation Plan 2020 and Vision 2030 documents. More broadly, in Saudi Arabia as elsewhere, geospatial information has become ubiquitous and embedded in everyday life as never before. Consumer applications in navigation, fitness, and shopping are among many that depend on increasingly high-resolution geospatial data obtainable, and accessible, from a commercial mobile phone. Even in this context, however, policymakers frequently underappreciate the importance of Land Registration Systems and Land Information Systems as critical infrastructures underlying economic activity and social advance. This paper outlines the socio-economic impact of implementing improved Land Registration Systems and Land Information Systems in Saudi Arabia, with an emphasis on the particular pathways created by digital technologies.

## II. Definitions

A Land Registration System generally refers to systems for recording ownership, possession or other rights related to land (usually within a government agency or department). Land registration systems additionally may provide evidence title, facilitate transactions, and to prevent unlawful disposal.

A Land Information System (LIS) is a geographic information system for land administration. A LIS is organized around the land parcel as the basic unit and generally is built upon an accurate, current, and administratively accessible land-record cadaster with associated spatial data including the legal boundaries of land title. A LIS can, in turn, be integrated into other geographic systems, providing a vital

base layer supporting an array of government functions, including (but not limited to) land planning; infrastructure development and maintenance; environmental protection and resource management; emergency services; and social service programs.[1]

Land registration and land information systems naturally complement each other.

## III. Historical Background

Land information systems in the Saudi Arabia originated with the creation in 1950 of the first department of aerial surveying within the Ministry of Petroleum and Mineral Wealth. In 1960 the responsibility for the compilation, organization, and dissemination of geospatial information was distributed between the Ministry of Defense and Aviation (now the Ministry of Defense) and the Ministry of the Interior. In 1968 the collection, organization, and maintenance of digital map data for all urban areas was delegated to the Ministry of Municipal and Urban Affairs (MOMRA), where that responsibility has remained. In 1980 MORMA began the practice of disseminating geospatial information to all municipalities.

A critical change in land administration in KSA occurred in 2002 with the passage of The Realty in Kind Registration Law, issued by Royal Decree No. 6 on 9/21423H, which initiated the transition from a personal/deed-based system to a Torrens/title-based system. The Realty in Kind Registration Law was supported by two additional laws relating to surveying of land and the sale of units in a building:

- The Law of General Survey Authority; and
- The System of Ownership of Units, Estates, units, apartments and their Sorting, issued by Royal Decree No. 5 on 11/2/1423H, corresponding to 24/4/2002.

The transition to a title-based system remains a work in progress, however, as the cadaster underlying a title system has not yet been created comprehensively on a national basis.[2]

## IV. Current Status

A Torrens/title-based system is built upon the parcel as the basis of the land registry. The parcel, in turn, is defined by a precise technical survey translated into a map showing the location,

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[1] https://en.wikipedia.org/wiki/Land_information_system

[2] https://www.tamimi.com/law-update-articles/overview-of-saudi-real-estate-laws-and-practice/?utm_source=Mondaq&utm_medium=syndication&utm_campaign=View-Original

dimensions/boundaries, structures, landmarks, and attributes. The data describing the parcel constitute an essential layer of the LIS.

The responsibilities related to land management and land information in the Kingdom of Saudi Arabia are within the responsibility of MOMRA. These include:

- Geo-surveying
- Aerial Survey
- Topographical mapping
- Land use planning (general designations—i.e. "commercial" or "residential")
- Demarcation
- Rights / restrictions
- Land use planning

Appendix 2 offers a further description of the land and surveying work undertaken at MOMRA, within the Deputy Ministry of Land and Survey.

The Ministry of Justice maintains responsibility for the following functions:

- First enrollment of a parcel in the land registry
- Supervising the work of judges upon first enrollment
- Following land-use restrictions following the first enrollment

In addition to responsibilities of Ministries and other entities at the level of the national government, municipalities also have significant responsibilities. These include:

- Maintaining records of modification to registration / following registration
- Permitting and documenting current land use at a level more detailed than that maintained by— "barbershop" or "grocery store" rather than simply "commercial use"
- Granting permissions for, and documenting, structural modifications

In addition, ministries throughout the government gather data that has potential to be included in a national LIS regarding:

- Roads
- Hospitals
- Traffic conditions
- Environmental conditions
- Demographics
- Business characteristics
- Business activity

Appendix 2 offers a list of some of the key ministries and examples of the data they gather.

# V. Challenges

The functional challenges that the Kingdom of Saudi Arabia faces in undertaking a transition to improved Land Registration Systems fall primary in two categories:

- Associating geo-physically well-defined parcels to ownership information—that is, the creation of a national cadaster

- Interlinking the LIS to the updates that occur at the level of the municipality to registration data, structural data, and to the planning map—that is, linking Municipal Data Systems to the National LIS

The two functional challenges are, in turn, reflected in two key administrative/organizational challenges

- Coordination between MOJ and MOMRA (and, to a lesser extent, with other Ministries)
- Coordination between the national government and municipalities

The absence of a unified and complete land registration system had resulted in numerous conflicts over access rights and ownership rights. Millions of titles still are not linked to precise geospatial coordinates. Systematic sources of conflict exist between ownership claims initiated under royal decree and Sharia Law.

In addressing these challenges, the government seeks directly to accomplish the creation of cadastral base layer and the integration of government data assets into a national-scale LIS.

Doing so will have multiple functional benefits, including (but not limited to):

- Improving urban planning
- Improving environmental management and disaster response
- Creating a common platform for access to government services, particularly in cities
- Reducing the number and duration of land-related disputes
- Improving the management of government land
- Ensuring the fiscal sustainability of land registration and land information systems

We address each of the functional challenges for Land Registration Systems in turn.

*Creating a National Cadaster*

The Ministries of Municipal and Rural Affairs and the Ministry of Justice are working together, in partnership with the Real Estate General Authority and other ministries, to implementing forward-looking solutions for both land registration and land information systems. As part of its commitment to creating this future, MOMRA and MOJ have recently collaborated on prototyped cadastral surveying using a multitude of cutting-edge technologies. These prototyping efforts have helped to establish cost baselines and directions for future planning.

In KSA as in other countries that are undertaking, or have recently undertaken, national-scale improvements to Land Registration Systems and are endeavoring to create a national LIS, the challenges of execution are substantial. The desirability of high technical accuracy and the requirement of legal procedure can conflict with the limitations of budgets and the urgency of national timelines and goals. In KSA, the national commitment to the Vision 2030 goals creates a government-wide responsibility to act in an expedient manner. The particular urgency associated with meeting Vision 2030 goals creates an additional challenge for the cross-governmental effort to create a national cadaster. However, that same time pressure has the benefit of inducing innovation and breaking down that the bureaucratic barriers that too often separate Ministries, isolate data resources, and impede the creation and deployment of the highest-impact solutions.

*Linking Municipal Data Systems to the National LIS*

As highlighted by this description of intra-governmental division of labor, municipalities play an important role in updating the Land Registration System. However—importantly for the overall effectiveness of land administration in KSA—*the changes effected by the municipalities are disconnected from any national scale LIS*. Indeed, each of the more than 300 municipalities within the Kingdom has its own system for recording and storing changes to land registries—from industry standard software that is interoperable with that used by MOMRA to poorly maintained paper-based records.

The devolution of the updating function to municipalities that has occurred in KSA over time creates a significant additional challenge to the creation of a national cadaster. The reason for this is that neither MOMRA nor the MOJ possesses the most up-to-date information on ownership and planning data. In large numbers of cases, records at the municipal level serve as the only documentation of transfers of ownership, subdivisions of parcels, and other changes to parcel attributes.

*Lack of Comparables; Promise and Limitations of Technology*

The absence of a cadaster in KSA contrasts with the high-level of development and the rapid advancement of the economy. While the map base layer (including topographical and structural characteristics) exists and is maintained a high standard, the institutional issues highlighted above have impeded progress with the creation of a national cadaster. Furthermore, because the creation of a national cadaster is a fundamentally different task than the maintenance or improvement of a cadaster, KSA has few natural comparable cases to use as reference.

The rapid advance of technology is another reason for the difficulty of learning from the experience of others. Artificial intelligence, Internet-of-Things (IoT), Blockchain, multi-image photogrammetry, and crowdsourcing technologies are among those that are changing the boundaries of what is possible in the improvement of Land Registration and Land Information Systems.

For all of these reasons, countries such as Saudi Arabia that are currently in the process of creating cadasters have little choice but to innovate, as there are few current referent cases and comparables that are sufficiently current to act as a guide for action.

## VII. The Broad-based Impacts of Improved Land Registration and Land Information Systems

The ultimate objectives of the improvement of Land Registration and Land Information Systems in the Kingdom of Saudi Arabia are to create broad-based social and economic impact, in support of, and consistent with, the Vision 2030 goals.

The socio-economic impacts of improved land registration and land information systems in Saudi Arabia are in five primary categories.

*Increasing Economic Efficiency*

The fundamental impact of improved Land Registration and Land Information Systems is directly through increased economic efficiency. This dimension of impact operates via multiple channels:

- **Increasing confidence** in the accuracy and currency of land data increases the dynamism of the real estate market
- **Improving management of government lands** reducing squatting, fraud, and other market frictions
- **Reducing the number of land disputes** and **increasing speed by which land disputes are resolved** when they occur
- **Increased economic participation** through the creation of land-based opportunity (without the requirement of ownership redistribution) and the expansion of digital skills via education and project-based learning-by-doing
- **High-resolution prioritization of tourist locations**

*Expanding Economic Opportunity*

The expansion of economic opportunity is a second category of impact, operating primarily through two pathways:

- **Strengthening SMEs** by providing small firms with access to geospatial data previously only accessible by large corporations

- **Fostering new firm formation** by creating a publicly-accessible base layer of data on which new firms can build services and applications

The process of creating the cadaster itself has the potential—depending on technical design—to provide work and training opportunities at scale, providing an additional vector of impact via

- **Expansion of digital skills** via education and project-based learning-by-doing
- **Reduction of the gender digital divide** by creating accessible economic opportunities for women throughout the country

*Promoting Urban Vitality*

Another significant dimension of impact is in improved urban planning. As the traditional 2-dimensional, ownership-focused cadaster is replaced by a dynamic, three-dimensional, land information system with dozens of data layers (if not more), geospatial data is converted from a static tool in planning to an active tool in urban administration and development:

- **Offering a centralized, digitalized, state-of-the-art platform for the provision of municipal services**
- **Providing the platform for urban planning** and the base layer for assessing the progress of urban initiatives

*Nurturing Citizen Well-Being*

The creation of the LIS also holds the potential for improved citizen health and wellness by providing up-to-date environmental tracking such as highly-localized air quality tracking information

- **Nurturing wellness through improved environmental tracking**
- **Enabling the real-time, predictive deployment of wellness support services**

*Contributing to Societal Resilience and Environmental Sustainability*

Finally, the creation of the LIS allows for significant and discontinuous improvements in governmental processes related to societal resilience and environmental sustainability. Impacts include better anticipation of extreme events, better management of extreme events when they occur, and overall improvements to processes by which environmental assets are identified and managed. Specific pathways of impact in this category include:

- **Improving flood management**, particularly in urban areas
- **Improving environmental stewardship** in the context of extractive industries
- **Improving predictive analytics** on environmental trends

## VII. Conclusion

In this paper we have sought to summarize the current state of the transition to improved Land Registration and Land Administration Systems in the Kingdom of Saudi Arabia. While we titled the paper "The Socio-Economic Impact of Improving Land Registration and Land Information Systems in Saudi Arabia," the impacts we have described are neither guaranteed nor automatic. Rather, they require sustained investment, coordination, and collaboration involving multiple ministries in the national government, municipalities, the private sector, and academic institutions. Despite the dramatically increasing speed by which data systems can be created and deployed, the transition to improved Land Registration and Land Administration Systems in Saudi Arabia will take time. Institutional change always lags technological change. This setting is no different.

Nonetheless, for a country like Saudi Arabia that is in the process of making once-in-a-generation investments in the future, the value of improved Land Registration and Land Administration Systems is potentially enormous. Better data does not lead automatically to better decisions, but it can be an important pre-requisite. Of the different categories of data infrastructure that can inform decisions of long-term public importance, land information is certainly among the most important.

The default approaches of the past certainly will not be sufficient to realize the possibilities of the future. Consequently, "catalyzing innovation" is an appropriate theme, not only for this year's Land and Poverty Conference but also for the signification transformations in land administration that are occurring today in Saudi Arabia and elsewhere around the world.

Additional challenges for Land Information Systems include

- Implementing a cost-effective strategy for more frequent updates to the map base layer
- Establishing a pathway toward to creation of a 3D LIS to able better planning

## Appendix 1

The foundation of land and survey in KSA is the geodetic reference system, based on 13 international reference points and roughly 300 live points are constantly in contact with various satellite GPS servers and systems. The geodetic reference system permits the precise identification of locations and boundaries throughout the KSA.

The base of the map layer is aerial survey, which is conducted every 5 or 10 years (depending on the location), with a resolution of either 7-centimeter or 10-centimeters (also depending on the location). When updated maps are required, they are undertaken with satellite imagery, providing 40-centimeter resolution. The use of drones as an alternative to satellite imagery is planned. Drones can achieve 5 centimeters resolution, but are restricted to the very localized imaging required to update for a specific development or to resolve a specific claim. The map layer constructed in this manner allows DMLS to define physical boundaries. DMLS has high-quality parcel-scale map data.

DMLS has piloted the use of panoramic surface imagery using technologies from various vendors. The images are high-cost but very high fidelity, augmented imagery. The next step is to combine the imagery from the surface mapping and base map data layers. AI/machine learning provides one avenue for this work. The use of multi-image photogrammetry is another frontier lowering the cost of obtaining high quality surface imagery.

DLMS has undertaken a prototype of a web portal that would allow access of its map resources to authorized users. The physical boundaries can be overlaid in the majority of cases in which the planning document exists and is available. The vision with the web interface is to allow access the map data, including street names, the physical boundaries, the parcel numbers, and the map underlying a photo image. Obstacles encountered in going from the prototype of the web portal to the full version because included managing the functional reliability of the system so that it wouldn't crash/lose data and designing the system to accommodate large numbers (upwards of 30,000) envisioned users.

## Appendix 2. Users for the Land Information System

Land administration refers to the comprehensive set of administrative, technical, and regulatory processes that are employed to manage the use and development of land resources. In the Kingdom of Saudi Arabia, the responsibilities for land administration at the national level are primarily distributed across the following six government ministries:

- **The Ministry of Municipal and Rural Affairs**

Responsibilities: Regional and urban planning, resolution of land disputes, land endowment, land survey, and land title registration

- **The Ministry of Agriculture**

Responsibilities: Reclamation, allocation, and distribution of arable land, and implementation of forest and rangeland regulations

- **The Ministry of Petroleum and Mineral Resource**

Responsibilities: Management of reclamation of mining and oil-related land

- **The Ministry of Finance**

Responsibilities: Administering funds for real estate development and national spatial strategy for government-related land

- **Ministry of Justice**

Responsibilities: Documenting and maintaining the rights relating to each identified land property

- **Ministry of Commerce and Industry**

Responsibilities: Provision and development of industrial land and real estate affairs


## Appendix 3. Customers for Land Information Systems

<u>**Primary**</u>

**Municipalities:** Multiple departmental planning uses

- **Planning department:** Need updated topographical map
- **Utility department:** Need underground and surface data (manhole, pole, streetlight)
- **Licensing department:** Licensing of shops/establishments (restaurants, barbershops, hotel)
- **Permissioning department:** Changes to surface structures
- **Landscaping department:** Maintaining public spaces
- **Surveying department:** Licensing surveyors

**Government**

- **MOMRA**
  - **Deputy Ministry for Land and Survey**
  - **Deputy Ministry for Land Dispute**
  - **Deputy Ministry for Land Donation**
  - **Deputy Ministry for Municipal Properties**
  - **Deputy Ministry for Town Planning**
  - **Deputy Ministry for Master Planning**

## Secondary Users

**Government**

- **Utility Companies (semi-governmental)**
- **Ministry of the Environment**
- **Ministry of Transport**
- **Ministry of Water and Agriculture**
- **Ministry of Minerals**
- **Ministry of Finance**
- **Ministry of Economics and Planning**

**Private sector**

- **Banks**
- **Financial service companies**
- **Real estate service providers**
- **Survey firms**
- **Citizens**
- **Schools**
- **Students (assignments for GIS classes)**