



# The Land Administration Domain Model – A literature survey



Jenny Paulsson<sup>a,\*</sup>, Jesper M. Paasch<sup>b,2</sup>

<sup>a</sup> KTH Royal Institute of Technology, Real Estate Planning and Land Law, Brinellvägen 1, Stockholm 10044, Sweden

<sup>b</sup> Lantmäteriet, the Swedish mapping, cadastral and land registration authority, Gävle 80182, Sweden

## ARTICLE INFO

### Article history:

Received 1 July 2015

Received in revised form 5 August 2015

Accepted 6 August 2015

### Keywords:

LADM

ISO 19152

Literature survey

Land administration research

## ABSTRACT

The international standard for land administration, LADM, ISO 19152, has been the subject of numerous research activities during the last one and a half decade, with topics ranging from technical implementation issues and the registration of real property to legal and organisational aspects. However, some areas have been more researched than others.

The aim of this study is to provide an overview of the research as evidenced by research publications 2001–2015 to discuss the distribution of interest areas within LADM research.

In total 184 publications on LADM have been analysed in the study. The result shows that technical and real property registration issues have been in focus throughout the surveyed period, whereas there has been less focus on research on legal and organisational matters. There has, however, in recent years been a slight increase in legal research, whereas research on organisational matters, such as efficiency and how to organise and manage interests in land and the benefits and costs for implementing the standard, still is lacking in comparison with the other investigated fields of research, and should be an important area to research now during the implementation phase of LADM.

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## 1. Introduction

Land administration is a huge field concerned with providing and managing interests in land, water and air ranging from the processes of establishing and securing rights for the individual right holders to the processes of administering these rights in accordance with the “greater good” for society. Land administration is, generally speaking, about interests in land and part of a nation’s legal framework, providing tools for conflict resolution between e.g. land owners and others with interests in the same piece of land.

It has, due to their origin in local legislation and traditions and thus, being part of a nation’s legal and administrative framework, been difficult to compare the similarities and differences in land administration systems internationally in a standardized manner since, land administration is a corner stone in the development of society. Solutions to overcome these difficulties are e.g. initiatives for describing the role and content of cadastres such as the cadastral template<sup>1</sup> initiative and the report on Guidelines on Real Property Units and Identifiers (UN, 2004). They aim at describing

cadastral systems for comparing best practices as basis for improving cadastres and further the understanding of their importance in establishing national and international spatial data infrastructure (SDI).

The need to provide descriptions of relations in land in a structured and standardized way resulted in 2012 in the publication of an international standard for land administration, the Land Administration Domain Model, LADM, by the International Organisation for Standardization, ISO (ISO, 2012). The LADM is subject for the literature survey presented here.

The main theoretical input to the standard was provided in the earlier published Core Cadastral Domain Model, describing relations between interest holders and land and was an initiative to provide a conceptual description of interests in land. The aim of the model is to create a standardized semantic framework to enable translations of real property terms between countries (van Oosterom et al., 2006).

Furthermore, another model, the Social Tenure Domain Model, STDM, has been developed alongside with the LADM. The STDM provides a land information management framework integrating formal, informal, and customary land systems and administrative and spatial components by facilitating the recording of all forms of land rights, types of rights and right holders (Lemmen et al., 2007; Augustinus et al., 2006). The STDM is not a formal standard like the LADM, but has nevertheless received much interest within the land administration community. The STDM is connected with the LADM

\* Corresponding author.

E-mail addresses: [jenny.paulsson@abe.kth.se](mailto:jenny.paulsson@abe.kth.se) (J. Paulsson), [jesper.paasch@lm.se](mailto:jesper.paasch@lm.se) (J.M. Paasch).

<sup>1</sup> [www.kth.se/en/abe/inst/fob](http://www.kth.se/en/abe/inst/fob).

<sup>2</sup> [www.lantmateriet.se](http://www.lantmateriet.se).

<sup>1</sup> <http://cadastraltemplate.org/>.

and Annex I of the standard gives an overview of the LADM class names with their aliases in the STDM (ISO 19152, Annex I).

Many authors address the LADM and the STDM simultaneously in their publications. This article therefore, includes the STDM in the survey as a specialization/closely related model to the standard, focusing on social tenure. LADM is in this article forthwith used as a term for both the LADM and the STDM, unless otherwise noted.

### 1.1. Background

We have during our involvement in LADM research noticed that LADM research has covered a number of topics ranging from more legislative aspects about terminology and rights to data management and visualization. Although, LADM is describing relations in land with a basis in legislation and informal rights, we have noted a tendency to focus on non-legal, e.g. registration and technical, questions in LADM research rather than on more legal issues. Many publications also describe LADM more in general than focusing on and analysing specific aspects. A result of this observation is the question concerning what future research should focus on.

It seems therefore, reasonable to investigate the previous and current research on LADM and the publications where it is presented. We are not aware of any survey on the state of LADM research, but believe that a survey could be an input for discussing what future research activities should focus on.

### 1.2. Aim

The aim is to provide an overview of research concerning the development and implementation of the standard based on conference papers and other research publications written in English, and to discuss and analyse the distribution of interest areas and the contents of this research.

The intended readership is researchers conducting LADM research, land law specialists as well as other academics and professionals engaged in land administration and modelling of property rights not previously engaged in this field of research. We also hope that the results of the survey will be relevant on national and international levels. The LADM is a neutral framework for structuring interests in land and international organizations such as UN-Habitat and FAO have expressed an interest in the standard.<sup>2</sup> The United Nations have for example stated that the establishment of flexible cadastral infrastructures may be possible tools for supporting “a vast array of legal, technical, administrative and institutional options in designing and establishing an appropriate cadastral system, providing a continuum of forms of cadastre ranging from the very simple to the very sophisticated” (UN, 1996b, Section 4.5). This survey may help to identify areas where more research is needed to facilitate the development and implementation of flexible and cost effective cadastral systems.

### 1.3. Methods and delimitation

This article contains the result of a literature survey focusing on the contents of publications on LADM. We have used a classification system initially developed by Paulsson and Paasch (2013) for dividing the publications into four categories; legal, technical, registration and organizational.<sup>3</sup> The survey identifies contents and trends in this field of research. We then present suggestions for focus areas in future research and how to increase the variety in topics and areas and participation of researchers from different spheres and countries.

The study has been limited to the literature published between 2001 and 2015. Most publications were located on the Delft University of Technology web site dedicated to LADM related publications<sup>4</sup> and the publication database of the International Office of Cadastre and Land Records (OICRF) within the International Federation of Surveyors (FIG).<sup>5</sup> LADM and STDM related keywords were used to identify publications.<sup>6</sup> The lists are not completely up to date and additional publications have been located through online searches.

The reason to concentrate on the last 14 years is that the development of cadastral modelling, resulting in the LADM, has been going on for this period of time. The publications listed on the two websites were selected for study because these are the major collections of research publications in this field and therefore, provide a representative overview of the research that has been conducted. These publications are written in English since, they are intended for an international audience. This limits the number of publications on national LADM issues, often published in the country's own language because of its primarily national interest. These publications are therefore, not easy accessible for the international community. For example, only five non-English language publications (in Dutch, French, and Spanish) were found on the above mentioned websites during the survey. Publications in national languages are of major importance for creating an understanding of the LADM, but we have deliberately not tried to estimate the total number of non-English publications due to practical reasons of locating them.

Each publication is analysed and classified as belonging to one of the categories described in Section 2. The survey revealed that many of the publications could be assigned to more than one of the four categories. Two or even three themes were often addressed in the same text. A publication often covers more than one theme, which in Paulsson and Paasch (2013) is solved by using so-called primary and secondary themes. The primary theme is dominant in a publication, e.g. registration. The secondary theme (or themes), e.g. “legal” (or “legal” and “organizational”) is (are) the less dominant theme(s), covered in the publication. We have used the same approach in this study.

The surveyed publications range from a few pages of conference proceedings to analyses of LADM issues in doctoral theses. We have omitted non-research related publications providing introductory information on LADM, descriptions of workshops, information material, descriptive reports and articles, publications with just a reference to LADM or similar. Furthermore, publications where the online link to the publication does not work have been omitted from the study since no assessment of the content could be made.<sup>7</sup>

The survey covers in total 184 publications presenting LADM research in Europe, North and South America, Africa, Asia and Australia.

<sup>2</sup> UN-Habitat, The United Nations Human Settlements Programme, was e.g. supporting the LADM workshop in Kuala Lumpur, Malaysia, in 2013, see <http://mirror.unhabitat.org/content.asp?cid=12581&catid=5&typeid=6&subMenuId=0>, FAO, The Food and Agriculture organization of the United Nations, have made their web based Open Tenure software LADM compliant, see [www.fao.org/fileadmin/user\\_upload/nr/land.../OPEN.TENURE.pdf](http://www.fao.org/fileadmin/user_upload/nr/land.../OPEN.TENURE.pdf).

<sup>3</sup> Paulsson and Paasch (2013) use the categories for classifying research on three-dimensional (3D) real property. We consider the categories to be valid for analysing even other areas of land administration, such as LADM.

<sup>4</sup> <http://wiki.tudelft.nl/bin/view/Research/ISO19152/LadmPublications> (accessed 01.05.15.).

<sup>5</sup> <http://www.oicrf.org/> (accessed 10.05.15).

<sup>6</sup> Keywords are “LADM”; “Land Administration Domain Model”; “STDM”; “Social Tenure Domain Model”; “CCDM”; “Core Cadastral Domain Model” and “cadastral modelling”.

<sup>7</sup> Online searches for the (few) missing publications did not produce any results.

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