

# Utilization of LADM for Smart Village Development in Indonesia

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**Key words:** database, village, land administration domain model (LADM)

## SUMMARY

Village in Indonesia is the smallest administrative unit that have the authority to carry out activities in the fields of government administration, development implementation, and community development in village scope. Because of its definition, information about land in the village is also easier to obtain and monitor. Therefore, this study aims to build a village information system that is integrated with land information in the village. This is based on the Minister of Home Affairs Regulation No. 3 of 2017 regulates on improving management and information services to establish good governance which is building village information systems so the government systems can work well. Although the village does not have authority in land matters such as land ownership or land taxation, the village can greatly assist the implementation of land information systems in Indonesia.

This study discusses the development of a database model in the village that helps villages in managing their area. The method used in this study is a combination of a hierarchical database model and a relational database model based on the concept of land administration domain model (LADM). The concept of the database model is adjusted to the needs and authority of the village to help the implementation of land information systems in Indonesia. The definition of the entity and its relationships are adjusted to the regulations in Indonesia.

The results of this study are in the form of a database model in the village that is integrated with population data, land ownership, and land and building taxation in the village that is in accordance with the LADM concept

## **RINGKASAN**

*Desa di Indonesia merupakan satuan wilayah administrasi terkecil yang memiliki kewenangan melaksanakan kegiatan di bidang penyelenggaraan pemerintahan, pelaksanaan pembangunan, pembinaan dan pemberdayaan kemasyarakatan dalam lingkup desa. Dikarenakan desa merupakan satuan wilayah administratif terkecil, informasi mengenai pertanahan di desa juga menjadi lebih mudah diperoleh dan dipantau. Oleh karena itu, penelitian ini bertujuan untuk membangun sistem informasi desa yang terintegrasi dengan informasi pertanahan di desa. Hal didasarkan pada Peraturan Menteri Dalam Negeri No. 3 Tahun 2017 mengatur mengenai peningkatan pengelolaan dan pelayanan informasi untuk mewujudkan penyelenggaraan pemerintah yang baik, salah satunya adalah dengan membangun sistem informasi desa agar sistem pemerintahan kabupaten/kota dapat berjalan dengan baik. Walaupun desa tidak memiliki kewenangan di dalam urusan pertanahan seperti kepemilikan lahan maupun urusan perpajakan suatu lahan, tetapi desa dapat sangat membantu pelaksanaan sistem informasi pertanahan di Indonesia.*

*Penelitian ini membahas pembangunan model basis data di desa yang membantu desa dalam pengelolaan wilayahnya. Metode yang digunakan dalam penelitian ini adalah merupakan kombinasi dari model basis data hirarki dan model basis data relasional yang berbasiskan oleh konsep land administration domain model (LADM). Konsep model basis data tersebut disesuaikan dengan kebutuhan dan kewenangan desa guna membantu pelaksanaan sistem informasi pertanahan di Indonesia. Pendefinisian entitas dan relasinya disesuaikan dengan peraturan-peraturan di Indonesia.*

*Hasil dari penelitian ini adalah berupa model basis data di desa yang terintegrasi dengan data kependudukan, kepemilikan lahan, dan perpajakan bumi dan bangunan di desa yang sudah sesuai dengan konsep LADM.*

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## 1. INTRODUCTION

According to Regulation of the Ministry of Home Affairs No. 45 of 2016, the Village is the smallest administrative region in Indonesia which has its own authority and must have clear boundaries. In addition, according to Regulation of the Ministry of Home Affairs No. 44 of 2016, the Village has an authority to carry out activities in the fields of government administration, development implementation, fostering and community empowerment within the scope of the village. This becomes the basis that the village can carry out the implementation and monitoring of activities in the community closely.

In addition, Regulation of the Minister of Home Affairs No. 3 of 2017 regulates on improving management and information services to realize good governance. The Information Management and Documentation Officer (*Pejabat Pengelola Informasi dan Dokumentasi/PPID*) is responsible for collecting, documenting, storing, maintaining, provision, distribution and service of information and documentation within the Ministry of Home Affairs and Regional Government. In Appendix I of the regulation regarding the organizational structure of the district it is stated that PPID is responsible for assisting the management of information at the village scale. This becomes the basis that the development of village information systems is very important.

According to Ministerial Regulation No.4 of 2016, there are details of village-scale local authority in the fields of health, infrastructure, public facilities, water, settlement, and society. The details of the management authority make the village must know the characteristics of the region and the community well. Therefore, the village information system is strived to help the implementation of the city and village government to the maximum. Seeing the authority of the village that can not be separated from the importance of information on the characteristics of the region, then spatial information is sought to be integrated into the village information system. The spatial information referred to here is land information.

Although full authority regarding land ownership and licensing is managed by the National Land Agency, authority regarding land use tax obligations is managed by the regency / city government and the Directorate General of Taxes, and the authority to regulate the spatial layout of an area is regulated by the Regional Development Planning Agency, the development of land information systems in villages the good can help maintain the land system in government. The village can provide land information in its area which can then be verified by each government agency / institute. This makes the implementation of government activities run efficiently.

Land information systems in the world have the operating standards listed in the International Standard Operation (ISO) 19152: 2012 governing the Land Administration Domain Model (LADM) in the form of land administration system patterns that contain legal information, subject / person / organization, spatial units, survey data or object identification, land geometry / topology data (Lemmen, 2012). Therefore, ISO 19152: 2012 becomes the basis in the development of administrative and land information systems in the village. ISO 19152: 2012 will be adopted and adjusted to the needs and local characteristics in the village. The case study of this research is Pakutandang Village, Bandung Regency, Indonesia

## 2. MATERIAL AND METHODS

The Smart Villages is built to increase economic and social development, and develop sustainable energy, healthcare, education, water and sanitation infrastructure as the main key to improve livelihoods, incomes, human security, gender equality and democratic engagement (Holmes, 2017). The concept of smart is realized by experts as the integration of information technology within rural people's lives, so that it produces benefits and sustainability between information technology and rural communities (Herdiana, 2019). Village government has a position as a form of joint government between self-governing communities with local self-government (Eko, 2015). Smart Village concept consist of several component which is related to the land availability (Eko, 2015), also based on information technology to develop link between smart governments, smart community, and smart environment in Indonesia (Herdiana, 2019). Meanwhile, Land Administration System (LAS) is main infrastructure to facilitate land policies in countries which consists of social, legal, economic, and technical framework where managers and administrators contribute to manage the lands (Enemark, 2009). Therefore, to build smart village in Indonesia, land and technology are the main components. Land Administration Domain Model adopts the concept of LAS which can support the development of application software and data quality management (Oosterom, et.al, 2015). So that, this research method is adopting the LADM concept to build the smart village system using database concept to support smart village system.

ISO 19152: 2012 regulate LADM concept, which consists of four scope: parties; ownership rights; spatial units; sources and spatial representations. There are four main basic class in LADM concept. Figure 1 shows the relations conceptual model of LADM:

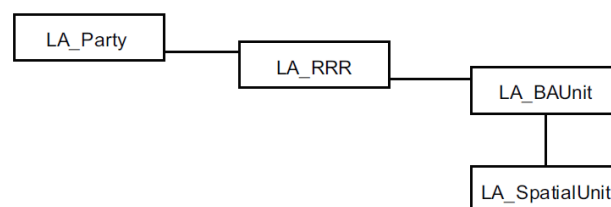


Figure 1. Basic classes of LADM (Source: ISO 19152: 2012)

Figure 1 explain that LA\_party class represents parties, LA\_RRR represents ownership rights, LA\_BAUnit represents basic administrative units, and LA\_SpatialUnit represents spatial units. Parties can be a party or a group, but group also included in party. Therefore, LA\_Party as

superclass which has subclass, namely LA\_GroupParty representing group, which consist of parties. LA\_Party has aggregate relationship to LA\_GroupParty, which parties are included in the group as members. Figure 2 shows the relations conceptual in parties.

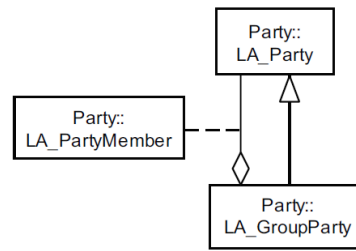


Figure 2. The relations conceptual in parties (Source: ISO 19152: 2012)

LA\_RRR is a superclass of LA\_right as rights, LA\_responsibility as responsibilities, and LA\_restriction as restrictions where LA\_Right is connected to the LA\_Mortgage (also as subclass of LA\_restriction) as mortgage. Figure 3 shows the relations conceptual in ownership rights.

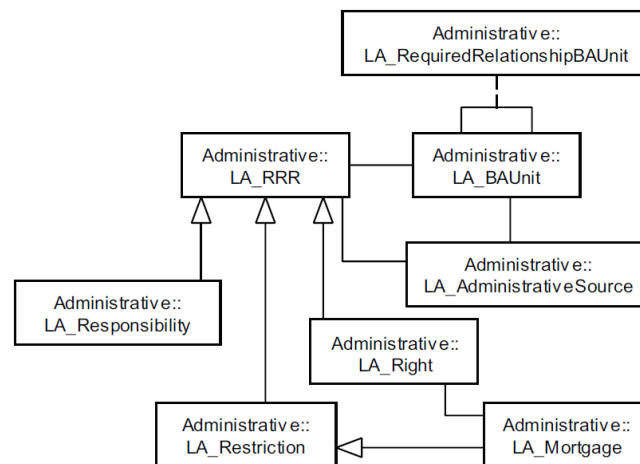


Figure 3. The relations conceptual in ownership rights (Source: ISO 19152: 2012)

Spatial unit may be grouped into two forms, which as spatial unit groups and sub spatial units. The main class of basic special unit is LA\_SpatialUnit, which has as alias, namely LA\_Parcel. Figure 4 shows the relations conceptual of spatial units.

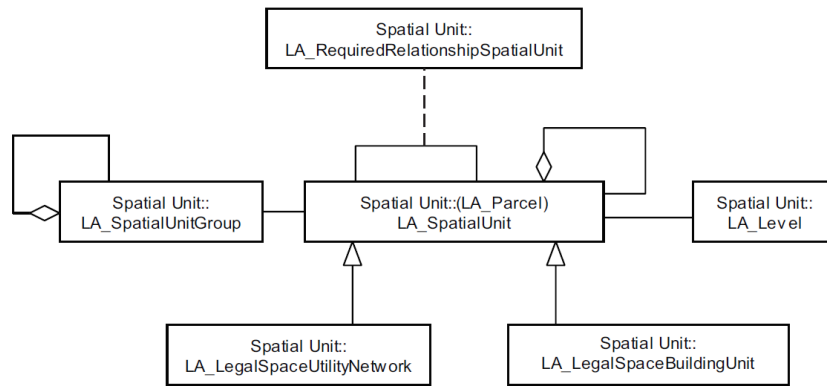


Figure 4. The relations conceptual of spatial units (Source: ISO 19152: 2012)

As for the additional classes, such as for tax purpose, land use purpose, etc. are connected to the basic administrative units (LA\_BAUnit), which connected to the spatial data and the ownership rights. The classes which connected the parties and basic administrative units is ownership rights class. The additional class could be connected to the additional classes. Therefore, Source: ISO 19152: 2012 is the basic methods to build the physical scheme of database relationship for smart village, also considered the village needs.

### 3. RESULT AND DISCUSSION

The result of this research is physical scheme of database relationship, which can be shown in Figure 5.

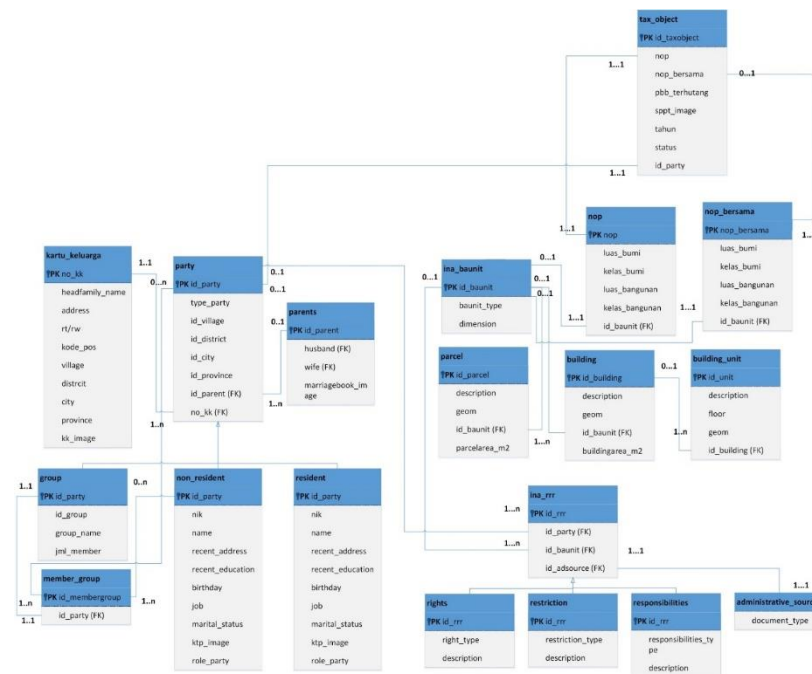


Figure 5. The physical model of database relationship

Figure 5 shows three main classes and one additional class. Three main classes are ‘party’ for instance is parties, ‘ina\_rrr’ for instance is ownership rights, and ‘ina\_baunit’ for instance is basic administrative units. One additional class is ‘tax\_object’ for instance is land and building tax. There is a relation modification in parties but still follows the LADM concept. The additional class in party is ‘kartu\_keluarga’ for instance is family card, which is legal identification for the family in Indonesia, and ‘parents’ for instance is a marriage couple who registered in book of marriage. The superclass is ‘party’ and the subclasses are ‘resident’, who is live in the village and registered as permanent resident, ‘non-resident’, who is live in the village but registered as resident in other village, ‘group’ is organizations or group of people who is registered as the member of village. There is also ‘member\_group’, which an additional class to connect the individual party and group in order to list which resident is the member of the group. ‘Party’ has relation to ‘kartu\_keluarga’ and ‘parents’. The additional class of parties scope which not mentioned in LADM class is developed to give the village government to manage the people easily in their village.

In ownership scope, the physical models is using standard LADM concept, only one additional class was adding in this scope, namely ‘administrative\_source’ represents documents of ownership rights. The spatial units scope is consist of three classes, which are ‘parcel’ for instance as parcel, ‘building’ for instance as building, and ‘building\_unit’ for instance is unit in building, which usually used in strata title.

The external classes in this physical model is taxation scope. The main class of taxation scope is ‘tax\_object’ which has two relation to ‘nop’ and ‘nop\_bersama’. ‘NOP’ is an identification of taxation unit where only one party is responsible for its taxation unit, and ‘nop\_bersama’ is identification of taxation units where group of individual object responsible for its taxation unit.

This concept accommodates taxation units in strata title. One unit in apartment flats has two tax identification and responsible for two taxation unit, which is unit of apartment/flats and unit that are used together.

The physical model of database relationship could support the village government to maintenance their territory and supports the Indonesia Land National Agency (*Badan Pertanahan Nasional/BPN*) and Indonesian Tax Directorate in the Ministry of Finance to give the actual information in the ownership rights and taxation matter in the village. Furthermore, the additional classes in the parties’ scope is giving the village government to maintenance their residents, especially in licensing problems.

#### **4. CONCLUSION**

Smart village development needs two components which are land and technology. In order to manage the problem in the village, LADM concept adoption is use to build relation model of database which can be modify in an accordance to the village needs. The basic support that can village government do is the ownership rights for BPN and taxation information.

## 5. ACKNOWLEDGMENT

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