

EVALUATING REDUNDANCY OF PARCEL-BASED DATASETS IN INDONESIA

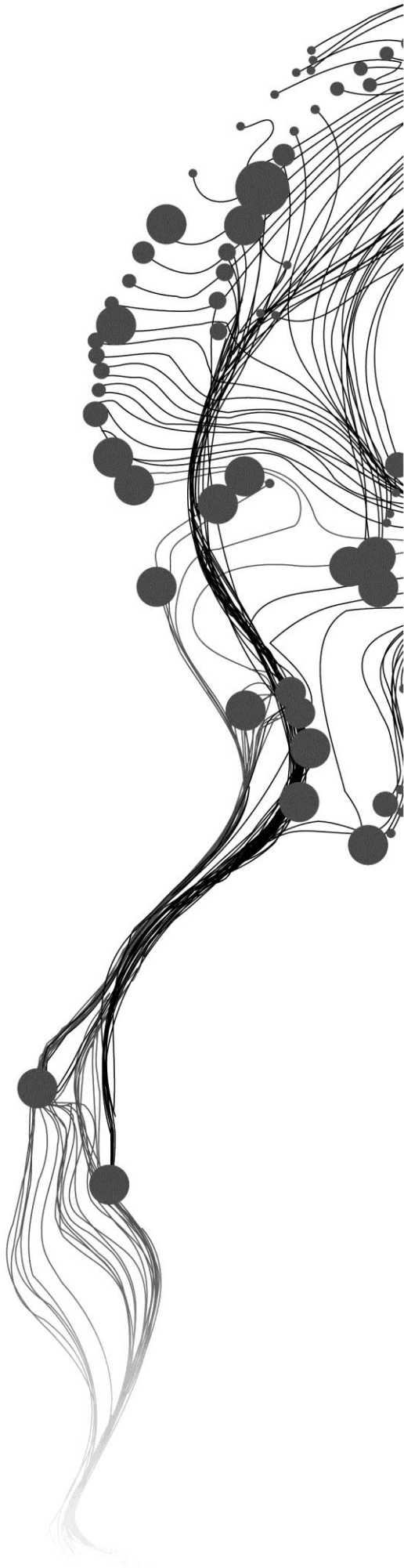
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February, 2013

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ABSTRACT

Land information management can serve many actors involved in land related activities. As an integral part of land administration, it manages parcel-based datasets as the core component. However, the overlap and duplication of effort to gather and produce parcel-based datasets can occur. Therefore evaluating redundancy of parcel-based datasets is needed. The main objective of this research is to evaluate the extent and nature of parcel-based datasets redundancy. Identifying the actors with their roles and the parcel-based data flows are treated as entrance to evaluate the redundancy phenomenon. From the identified actors, the users and producers who related to parcel-based datasets can be determined.

The frame of case study is used in conducting this research. Depok City serves as a case study. The literatures concern with the component of land administration, the use and users of land information management, the concept and cause of redundancy, the concept of SNA and the way to address redundancy are reviewed. From literatures, the variation types and the related indicators to evaluate the extent, the cause of redundancy and the role of social networks are developed as a framework. Interview is the only method applied for the primary data collection. The interview questions are based on the developed indicators. Documents related to the policy, regulation and the proposal to address redundancy are examined to amplify the views given by the respondents.

The results show who the actors are, the users and the producers of parcel based datasets. From the users it can be known from whom they obtain the data and from the producers it can be known who use their data. The results also reveal that more than one organization creates and manages parcel-based data for different purposes in line with their institutional mandates. The occurrence of the repetition on data creation and maintenance which involve certain processes and tasks to conduct based on certain policies and regulations can be found. The different standards in generating data are applied among producers. The data exchanges among producers also happen. The results also showing the awareness among producers about the redundancy issue. Related to the role of social network, the data is insufficient to derive any conclusions in relation to the indicators that have been developed.

According to the redundancy conceptual framework used, redundancy is constituted by repetition and management, repetition of processes and tasks, and management to handle replication and fault handling. The results of the evaluation show that the availability of data which meet to the standards that can be used to achieve defined objectives is a factor which can lead to redundancy. The redundant data on parcel-based datasets is generated through repetition of tasks and activities which related to the data handling. The management to replicate the data is in order to ensure the availability of data that can be used to meet the defined objectives.

Keywords: Redundancy, Parcel-based datasets, Evaluation

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LIST OF ABBREVIATIONS

Government Organizations

Central Level

BIG	: Geospatial Information Agency
BPN-RI	: National Land Agency of the Republic of Indonesia
DGT	: Directorate General of Taxes
KIP	: Central Information Commission
KPK	: Corruption Eradication Commission
Pusdatin	: Centre for Data and Information - National Land Agency of the Republic of Indonesia
UKP4	: Working Unit for Development Supervision and Control

Local Level

BAPPEDA	: Local Development Planning Office
BIMASDA	: Public Works and Water Resources Office
DISTARKIM	: Spatial Planning and Settlement Office
DPPKA	: Revenue and Financial Management Office
LO	: Land Office
TO	: Tax Office
VO	: Village Office

Land Rights

HGB	: Rights of Use Buildings
HGU	: Rights of Cultivation
HM	: Rights of Ownership
HP	: Rights of Use

Data

BPHTB	: Land and Building Transfer Tax
DBKB	: Building Cost Components List
NIB	: Parcel Identification Number
NOP	: Tax Object Number
PBB	: Land and Building Tax
SIMTANAS	: National Land Information Management System
SISMIOP	: Tax Objects Information Management System
ZNT	: Land Value Zone

Others

ASPERSI	: Indonesia Housing and Settlement Development Association
PT. PLN	: State Power Company
SDI	: Spatial Data Infrastructure
SNA	: Social Network Analysis

1. INTRODUCTION

1.1. Background

Land information systems (LIS) to manage land and property related data can be designed to serve one primary function or may be multifunctional and used by wide varieties of users (Dale & McLaughlin, 1999). According to Dale and McLaughlin (1999) the systems that focus on cadastral parcels, including multipurpose cadastres are the most important systems from land administration perspective. Because it registers rights to land, land administration needs an appropriate legal framework and transparent public administration structure (van der Molen, 2002).

From a land administration perspective, Dale and McLaughlin (1999) state that the responsibility for collecting and coordinating all parcel based information can be mandated into a single authority. Theoretically, under a single authority, duplication can be reduced, standard in the data quality can be consistently achieved (Dale & McLaughlin, 1999) and the data reliability increased (Bandeira et al., 2010).

In Indonesia, creation of the cadastre is subject to a number of complex institutional arrangements. The National Land Agency of Indonesia (BPN-RI) has 21 functions in order to build a land administration system for the country (Republik Indonesia, 2006b). Some of these functions are: to formulate and implement policies in surveying, measuring and mapping activities, to register land rights, and to manage all data and information related to land. According to Presidential Decree Number 4/2006, BPN-RI is responsible to gather and manage cadastral parcel data and information. However, it is the local land office that's conducts the process of gathering, updating and maintaining cadastral data with supports from the central and provincial office. This disaggregation of responsibility means there is a potential for duplication of parcel based datasets.

Indeed, the issue of duplication for other thematic datasets was recently discussed. According to Geospatial Information Agency (BIG formerly known as Bakosurtanal), in Indonesia there are 18 thematic maps produced by different overlapping government bodies (Kompas, 2012). Fourteen government bodies create thematic maps. On the other hand, the occurrence of redundancy on the parcel-based datasets is not known yet. To tackle this redundancy issue, appropriate arrangements are needed by drawing up certain mechanism between government bodies. Though, before drawing up these mechanisms, the definition, the extent and the cause of redundancy needs to be known.

The notion of redundancy consists of duplication and repetition. Previous studies related to redundancy on spatial datasets show that multiple actors were involved in the collecting, processing and maintaining of the same spatial datasets and leading to duplication (Nyemera, 2008). Redundancy can bring negative and positive impacts. Waste of resources, efforts and time in the data collection, process and dissemination, differences in accuracy and poor data quality are the negative impacts of redundancy while the positive impacts include the provision of alternative sources of data (Nyemera, 2008). However, it is important to know what is perceived as redundancy in land administration domain before investigating more on this issue. It is also necessary to seek relation between the cause, the extent and which elements affect the redundancy phenomenon.

The study of parcel-based datasets redundancy in Indonesia has not been conducted before. Researching in this area will benefit the BPN-RI or other any actors as producer as well as the users. A common

understanding of what redundancy means and to what extent for land administration context in Indonesia will be developed. The outcome of this research will assist the decision and policy makers in formulating policy for the country.

1.2. Redundancy: theoretical context

The concept of redundancy has been referred to in several different fields, from linguistics, to engineering, computer data storage, neuroscience etc. From computer data storage field, redundancy is defined as multiple data collection (Taylor, 2010); data is stored in multiple place and duplicated (Elmasri & Navathe, 2004); repetition together with management where management consists of replication plus fault handling (Schmidt, 2006). From the theory of communication, Bazzanella (2011) concludes that redundancy is the repetition of relevant information.

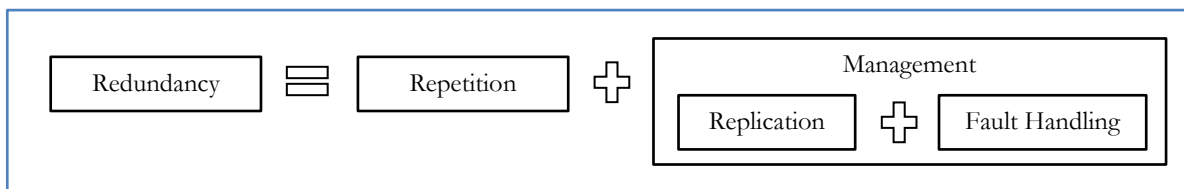


Figure 1-1. Redundancy conceptual framework by Schmidt (2006)

This research will use redundancy definition by Schmidt (2006) as a conceptual framework. According to Schmidt (2006), redundancy is defined as system ability to continue operations in the case of component failures with managed component repetition. Redundancy is constituted by repetition and management as shown on the Figure 1-1. Repetition is defined as a process of repeating or being repeated. In the other words, repetition means something that happens in the same way as an earlier event. Management is known as the process of dealing with or controlling things or people. Management is also can be understood as activities in accordance with certain policies to achieve defined objectives. According to this redundancy definition, the management part is dealing with replication and fault handling. Replication can be defined as a copy or something that comes out as a result of reproduction activities. From database management perspective, replication is a result of storing the same data in multiple places. Fault handling can be described as system ability to deal with errors. Fault handling mechanisms must be able to handle exceptions to the systems to ensure that the process itself is resilient and can continue after failures occur.

By using the conceptual framework of redundancy described above, this research will try to figure the phenomenon of redundancy on parcel-based datasets. Larsson (1991) defines parcel data as an unique identification of land units and can be used for other records while Dale and McLaughlin (1999) state that land parcels have the same meaning as cadastral parcels. Cadastral parcel is defined as a tract of land, being all or part of a legal estate; is a uniquely delimited tract of land within which a coherent set of definable property interests is recognized (Dale & McLaughlin, 1999).

The role of the actors in the land administration domain can be treated as an entrance to study the redundancy phenomenon. Social Network Analysis (SNA) was used by Vancauwenberghe et al. (2011) to analyse the network of spatial data exchanges in Flanders, Belgium. This method treats the relation between actors as main research object. By applying this method, the flows of spatial data among actors can be identified. Social network analysis can provide insight into the impact of the arrangements between actors on the access to and exchange of spatial data. Who are the producers, the users or the suppliers of parcel-based dataset can be identified using this method.

1.3. Research problem

The institutional arrangement of land administration system in Indonesia has set a mandate for BPN-RI to gather and manage parcel-based data, and register the parcel-based data attributes. BPN-RI's responsibility as a national agency is to provide cadastral data to all level of the governments in Indonesia and also other users for various purposes.

Many actors involved in land related activities can get benefit from land information system which characterize by properly organised of information collected and offers rapid accessibility (Lemmens, 2011). In the other hand, overlap and duplication of effort to gather and produce spatial datasets within government institutions should not be happen associated with authority related to the data. According to Dale and McLaughlin (1999) and Mohammadi et al. (2010), the reasons why this redundancy phenomenon emerges are largely related to the diversity of standards, unmet requirements of the users, issues on data sharing and accessibility, and the unavailability of spatial data infrastructure.

The occurrence of redundancy on parcel-based datasets in Indonesia is not clear. Therefore it is important to know to which extent the redundancy occurs and what the reasons behind the occurrence of this phenomenon.

1.4. Research objective

1.4.1. General objective

Based on the research problem, the main objective of this research is to evaluate the extent and nature of parcel-based datasets redundancy.

1.4.2. Sub-objectives

1. To identify actors and their roles.
2. To analyse the parcel-based data flows in study area using social network analysis.
3. To evaluate the parcel-based datasets redundancy phenomenon.

1.5. Research questions

1. To identify actors and their roles;
 - 1) Who are the actors' related to parcel-based datasets?
 - 2) What are actor's roles in the study area?
 - 3) What are the types of actor in the study area?
2. To analyse the parcel-based data flows in study area using social network analysis;
 - 4) How does the parcel-based dataset flow in the study area?
 - 5) What are data flow characteristics among actors?
3. To evaluate the parcel-based datasets redundancy phenomenon.
 - 6) What is the extent of redundancy in the study area?
 - 7) What is the cause(s) of redundancy?

1.6. Thesis structure

The thesis is structured in six main chapters as follows:

Chapter 1: Introduction

This chapter consists of introduction, research problem, and significance of the research, research objectives and research questions.

Chapter 2: Literature Review

This chapter discusses the components which constitute of land administration, LIS, a review of the redundancy way addressing redundancy and the SNA. The result of discussion is the conceptual framework for the research.

Chapter 3: Methodology of Data Collection and Analysis

This chapter outlines the methodology of data collection and processing of field returns to get knowledge on the notion and extent of redundancy.

Chapter 4: Data Results

This chapter presents the result of application of the methods.

Chapter 5: Discussion

This chapter presents the discussion of the case study and makes inferences from the theoretical perspective and the current findings about the notion and extent of parcel-based datasets redundancy in the Depok City.

Chapter 6: Conclusion and Recommendation

This chapter discusses the conclusion and recommendation of the case study and what lessons learnt in the thesis.

2. LITERATURE REVIEW

2.1. Introduction

This chapter aims to answer research question number 1. The components which constitutes of land administration, the use and users of land information system are discussed in Section 2.2. Knowing who the actors are in land administration domain is important as a basis to determine the producer and the user of parcel-based datasets. Parcel-based data as core component of land administration, the definitions of redundancy and the framework used in this research are discussed in Section 2.3. Previous researches related to redundancy on spatial dataset also discussed on that section. The theory and application of Social Network Analysis to analyse spatial data exchange between actors and addressing the redundancy on parcel-based datasets are discussed in Section 2.4 and 2.5 respectively. Section 2.6 concludes this chapter by a conclusion.

2.2. The use and users

Land administration requires a form to register and identify each land parcels on which people have certain rights as an individual entity (Lemmens, 2011). “*Land administration systems register rights to land and are consequently dependent on the institutions in which they have to operate*” (van der Molen, 2002). The institutions which land administration dependent on must provide legal certainty to the possession of land by individual or legal entity and give assurance regarding to the location, boundaries and the extent of the land.

The dynamic of the society with competing and overlapping concerns to land requires land administration system. An effective land administration system which enables to support the dynamic changes in society and to assist the decision making together with the implementation is a necessity to support sustainable development (Steudler et al., 2004; Williamson et al., 1999). In addition, L. Silva (2007) states that the collaboration of the different organizations involved in producing and managing spatial data is required in an institutionalized land administration system. However, indistinct division of tasks and responsibilities between government organisations causes confusion and passivity (van der Molen, 2002). The clear tasks and responsibilities are needed not only between government organizations in the same level, but also between organizations with different level, central and local government.

Conferring to Dale and McLaughlin (1999), information management is the integral part for the components which constitute land administration. The other land administration’s constituent components are juridical, regulatory, and fiscal. Each of the component deals with certain subject. Holding of and registration of rights in land are the main emphasis of the juridical components while the land development and land use are the prominent matters in the regulatory component. The utilization of the land in term of economics is the central attention for the fiscal component. From a users’ perspective, many sectors related to land gain advantages from the information provided in land administration systems (Lemmens, 2011; van der Molen, 2002). The information about the subject, the object, and the rights as an interconnected part is collected and stored in a land information system together with the attribute such as value and use.

Information management is associated to the process of acquisition, preparation, exchange, dissemination, storage and retrieval of information. As a part of information management, information system can be constructed by a complex network of overlapping, duplicating, conflicting, disjointed and often isolated elements (Hicks et al., 2006). This condition leads to situation where significant amount of information

held by an organization may be isolated, partial, outdated and impractical. As the results, the translation and verification of information are needed to ensure the information's quality and accuracy. The term of accuracy and reliability play an important role in a decision making process. The authoritativeness of information resources is the main factor for the acquisition and the use of the information resources (Fallis & Whitcomb, 2009). Good decision relies on the accurate and reliable information resources.

A wide variety of users requires and gets benefits from land information system. Table 2-1 below shows selected users and uses of spatial data according to Dale and McLaughlin (1999). Information about registration of rights which expected to give security of tenure is an important substance for economic development, social, environmental management (Bell, 2006), support good governance (Williamson et al., 2010), easily to predict legal actions (Lemmens, 2011) furthermore less work for the courts and less expense for individual (Larsson, 1991). The number, intensity and causes of conflicts relating to the use and transaction of land may decrease if the land rights are secured and the information is stored in a land information system. Under land administration system, operational mechanism for managing land tenure and facilitating a well-functioning property market are provided (Barnes, 2003). The documentation of land units, the owner together with the rights, restrictions and responsibility attached on land (FIG, 1995) can facilitate transactions concerning to the land and stimulates investment and development (Larsson, 1991).

Use of Data	User			
	Central Government	Local Government	Utilities	Retailers
Asset management	**	**	**	**
Building permits		**	**	
Cultural features	**	**	**	**
Customer identification		**	**	**
Development control	**	**	**	**
Environmental impact	**	**	**	
Health & safety	**	**	**	**
Landownership	**	**	**	**
Land market analysis	**	**	**	**
Population statistics	**	**	**	**
Street maintenance		**	**	
Taxation	**	**		
Utility management		**	**	

Table 2-1. Selected users and uses of spatial data (Dale & McLaughlin, 1999)

The accurate information stored in a land information system supports in decision making process regarding to the land. Better land use management and public control and land-policy measures are the advantages offered by the system (Lemmens, 2011). Fair land taxation and contribution for the governmental taxes like transfer tax, real property tax, income tax or fees for the registration of transaction (Bogaerts & Zevenbergen, 2001; Larsson, 1991) are the results of the existence of an accurate land information system. Banks and housing finance companies also rely on accurate information to provide loans based on land as collateral via information supply from land information system. Moreover, notaries, real estate agents, and land surveyors who play important role in land administration and other sectors as well as who use details information about the construction of buildings utilize information from land information system (Bogaerts & Zevenbergen, 2001; Dale & McLaughlin, 1999; Lemmens, 2011).

Land information systems to manage land and property related data can be designed to serve one primary function or may be multifunctional (Dale & McLaughlin, 1999). Multifunctional information system must meet the challenge of modern Geographic Information Systems (GIS) and the modern Information Technology (IT) environment (Enemark, 2004). Detailed information at the individual land parcel level combined with comprehensive information on the environmental conditions are the components of the multipurpose cadastre (Enemark, 2004). Effective public access and reliable infrastructure offered by the development of information technology will be the backbone of the society.

2.3. Parcel-based datasets redundancy

2.3.1. Definition of parcel-based datasets

As a core component of land administration infrastructure, land parcel lies in the bottom of the infrastructure (Enemark, 2005; FIG, 1995; Williamson & Ting, 2001). The interconnected systems within the areas of land tenure, land value, and land-use rely on the identification of land parcel in the cadastral system. Besides helpful for parcel identification, parcel subdivision and boundary relocation, cadastral parcel information is useful for land management, land use planning, valuation and facility management (Lemmens, 2011).

Larsson (1991) defines parcel data as an unique identification of land units and can be used for other records while Dale & McLaughlin (1999) state that land parcels have the same meaning as cadastral parcels. Cadastral parcel is defined as a tract of land, being all or part of a legal estate; *“is a uniquely delimited tract of land within which a coherent set of definable property interests is recognized”* (Dale & McLaughlin, 1999).

Detailed information at the individual land parcel level is an important part in land administration system (Williamson & Ting, 2001). A systematic collection of data on a land parcel basis contains non-spatial data associated with the parcel and spatial data describing the parcel (Konecny, 2009). According to FIG (1995), the parcel based system is geographically referenced to unique, well-defined units of land. To define the unit of land parcel, formal or informal boundaries mark the extent of lands held for exclusive use by individuals and specific groups of individuals. The detailed information conferring to FIG (1995) consists of *“geometric description of land parcels associated with other records describing the nature of the interests, the ownership or control of those interests, and often the value of the parcel and its improvements”*.

Surveyors survey the parcel and mapped into (digital) map with unique parcel identifier as an indication for each parcel. The unique identifier functions as key for parcel's attributes retrieval which is stored in records kept separate from the map. Different from other GIS systems, cadastre system provides information about geographical objects and their attributes (Lemmens, 2011) and that data have social and legal meaning and based on accepted social concepts (van der Molen, 2006).

Over time, land parcel term has been shifted into land object. According to Cadastre 2014 Principles, land parcels are one category of land objects which is defined as a piece of land in which homogeneous conditions exist within its outlines (Kaufmann, 2002). Legal content of a right or restriction and the boundaries cover the legal land objects where those right or restriction applies.

2.3.2. Defining redundancy

Many definitions can be derived from the term of redundancy. By using online dictionary, the term of redundancy can be defined as: *“the quality or state of being redundant: superfluity; the use of redundant components; an act or instance of needless repetition; the part of a message that can be eliminated without loss of essential information”* (Merriam-Webster Dictionaries, 2012). From the other source like Oxford Online Dictionary, redundancy can be defined as *“the state of being not or no longer needed or useful; the use of words or data that could be*

omitted without loss of meaning or function; the inclusion of extra components that are not strictly necessary to functioning, in case of failure in other components” (Oxford Dictionaries, 2012). The term also defined as *“repetition of messages to reduce the probability of errors in transmissions; the attribute of being superfluous and unneeded; (electronics) a system design that duplicates components to provide alternative in case one component fails; repetition of an act needlessly”* (Webster Dictionaries, 2012).

From the dictionaries’ definition mentioned above, the term of redundancy is indicating quantity, consisting of repetition, evaluating it as unnecessary and superfluity (Weizman, 2011). According to Bazzanella (2011), redundancy can be defined as a repetition on relevant information. In addition, redundancy looks to the quantity of information and influences equally counteracting another source of unneeded information. On the other hand, redundancy also can be viewed as an attribute of a system instead of bad or costly (Ostrom et al., 2000). Redundancy can be defined as a term of condition associated with the support when a particular system error occurs. The needs of repetition, inclusion of extra components in case of failure in other components, and a system design to provide alternatives, indicate redundancy as a backup mechanism. Referring to Hendawi and Frangopol (1994), system of redundancy provides signals and notifications preceding a downfall of the system.

Hoepfer et al. (2009) from engineering field, argue that redundancy as a duplication of particular component of a system aiming to increase overall system reliability. Moreover, redundancy is an essential parts of a structural system regarding to the presence and subsequent development of alternative load path or multiple load-transfer mechanisms (Fang & Fan, 2011) and duplication of critical components of a system to increase system’s reliability in the case of backup or fail-safe (Bazzanella, 2011). Redundancy strives to limit the bearing of single component with low reliability to the whole system and to improve reliability of critical component of the entire system (Hoepfer et al., 2009).

Redundancy cannot work without supporting factors. Schmidt (2006) from computer system field defines redundancy as system ability to continue operations under the situation when certain element failed to work with managed component repetition. The term repetition is an approach to provide a backup component or system for the error case as a basic precaution. The distinct goal providing component repetitions is to avoid single points of failure. This redundant condition will provide both high availability, fault protection against minor outages, and system recovery from fail state when needed. However, providing only back up component it is not sufficient. The system needs management to handle components faulty and makes back up component do all the functionality. Figure 2-1 below shows the conceptual framework of redundancy proposed by Schmidt (2006).

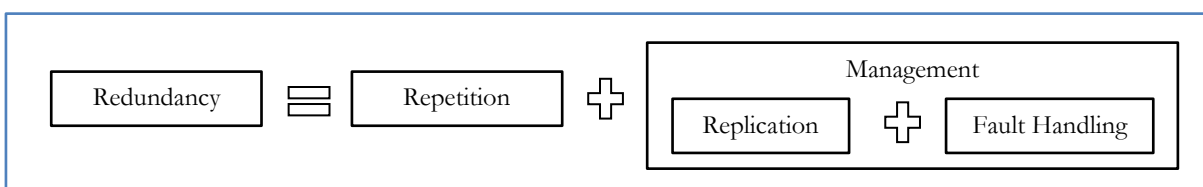


Figure 2-1. Redundancy conceptual framework by Schmidt (2006)

The definitions of redundancy as described above provide an overview of different approaches to define the term of redundancy. Beside some views that redundancy as something futile, different approach sees that redundancy as a mechanism to cope with fault condition. This research uses redundancy definition by Schmidt (2006) as a conceptual framework. Redundancy is constituted by repetition and management. Repetition is defined as process of repeating or being repeated. Management consists of activities related to replication process and fault handling in accordance with certain policies to achieve defined objectives.

2.3.3. Extent and nature of parcel-based datasets redundancy

According to Ostrom et al. (2000), redundancy term can be associated with four things: multiple in-use copies of the same unit, backup functional or informational copies of units, redundant strength, and redundant governance units which means that multiple units that govern and manage public goods or common-pool resources. In contrast, from land administration perspective, responsibility for collecting and coordinating all parcel based information, which is the core component in land administration, can be mandated into a single authority (Dale & McLaughlin, 1999) and usually a government organization (FIG, 1995). Reducing duplication of data and activities, achieving standard in data quality and increasing data reliability are the purposes of single authority's appointment to collect and coordinate parcel based information (Bandeira et al., 2010; Dale & McLaughlin, 1999). The reliability of data is the major concern for parties with respect to parcel based information due to social and legal meaning attached to it.

Previous studies related to redundancy on spatial data, reveal that redundancy is understood as engaging many organizations in the collecting, processing and maintaining of the same spatial dataset within and between organizations leading to duplication (Nyemera, 2008). The organizations engage in the collection, processes and dissemination of the same or similar activities are for specific reasons. Duplication is the key term on that study. The causes of redundancy founded in the study are related to the data quality, standards, accessibility, sharing and dissemination, collaboration, coordination, communication, geospatial policy, data management, and lack of national data clearing house. Furthermore, fragmented work processes in the public sector and the uncertainty of which public organization is responsible for such dataset also the causes of redundancy (de Vries & Nyemera, 2010). Each of public institutions strives to make the dataset available due to the limited and scattered data in which those data is a necessity for public sector activities.

Data access and data quality in the same way are the factors that causing of redundancy (de Vries & Lance, 2011). The uncertainty of data access and data quality is lead to a strategy for creating data backups to support the activities conducted by each institutions. Quality check by comparing each dataset from different sources as a mechanism to prevent administrative failures, is shown that the data quality as a major concern for public management. Limited access affects the institution not to rely on one single data custodian and choose to collect and maintain data themselves which as more certain processes. de Vries and Lance (2011) argue that the data comparison and being independent to collect and maintain data by each institution are a backup mechanism to cope with the unavailability and unreliability of data. It indicates that in an uncertain situation, redundancy offers a backup mechanism in case of a particular organization fails to provide data.

Related to the standard, information communication technologies together with government imperatives are the driven factors of standardization (Wallace & Williamson, 2006). Unified standard applicable in land information system helps to avoid duplication and supports in the efficient exchange of information (FIG, 1995). Every standard has its own level of detailed and to determine what standard is used must be set and agreed upon before work starts (Kresse et al., 2012). Consideration has to be taken into account that land information system as a part of land administration as its nature is embedded in legal rules and regulations and technical standards (Stubkjær, 2008). Agreement to implement certain standard is intended to prevent the use of various standards within the system. The independently growing system from each other even in one organization resulted a jungle of information, many redundancies, problems with coding, networking and distribution of information (Barth, 2011).

From the theoretical perspective it can be known that mandate to collect and coordinate parcel based data and information as a core component of land administration can be given to a single authority.

Theoretically under a single authority duplication of data and activities can be reduced and data quality and reliability can be achieved. In addition, the data availability and data access also are important factor with regard to the data uncertainty. Wide variety of users as mentioned in Section 2.2 get benefit from land information system. Public and private sectors utilize land information system to support their activities. In an uncertain situation, redundancy can appear as a backup mechanism to ensure that every process keeps running. Knowing who are the actors, the producers and users of parcel based datasets becomes important to study about redundancy. Section 2.4 will describe about Social Network Analysis as a method to analyse the actors involved in spatial data exchange and access.

2.4. Social Network Analysis (SNA)

The spatial data exchange involves more than one party as an actor, the actor as the producer and as the user. To study about redundancy, firstly the producer(s) and the user(s) of spatial data must be known. *“In the network perspective, an SDI is operationalized in terms of organizations that are producing and using spatial data in a shared environment and the flows of spatial data between these organizations”* (Vancauwenberghe et al., 2011). SNA focuses on actors and the relations between actors, actor as a node and relation as tie. By applying SNA to study about redundancy, the data flow between actors (which also represent the relation between nodes) can illustrate the source(s) means the producer of the data and the destination(s) means the user of the data or any other actor as intermediary between them.

A social network is a social structure consists of individuals as nodes which are connected to one or more specific types of interdependency (Roy et al., 2012). There are two characteristics which differentiate social networks, the pattern of relations and the content of the relations (Bodin & Crona, 2009). The pattern of relations is basically depending on the focus of network while the content essentially different for each network. The relations, the form of relations and content are the main research object in network analysis (Vancauwenberghe et al., 2009).

To specify what kind of relations being studied is important when studying social networks. The basic idea behind this statement is that *“behaviours, actions, and decisions are best investigated by examining relationships among actors rather than by simply analysing their attributes”* (Chauvet et al., 2011). The attribute data refer to the personal characteristic of individual, organizations or groups and often used to explain attitudes or behaviour. The relational data concern contact of connection between individual and groups. This relational data is not the properties of individual but the properties of the whole system of individuals (Vancauwenberghe et al., 2009). To analyse the relations, SNA offers the method.

In the context of spatial data infrastructure, according to Omran and van Etten (2007) exchange of spatial data is an essentially social phenomenon which always involves two or more parties. Data access and exchange which usually happen on spatial data infrastructure can be seen through the network perspective. Social Network Analysis (SNA) views social relationships in terms of network theory about nodes and ties (Roy et al., 2012). An individual actor within the network is known as nodes while the relationships between the actors known as ties. Basic statement of SNA is that actors are part of social systems connecting them to other actors (Vancauwenberghe et al., 2009). Hence, the tie on a certain network shows that one actor mutually dependent to the other actor. Under the network perspective, by looking to the ties, the spatial data flow between actors can be analysed and the role of the actors, as producer or user, can be determined.

Structural relations between actors are more important than individual characteristics in shaping actors' behaviour. Consequently, understanding the network structure is needed to assess data flow and access in a particular setting (Omran & van Etten, 2007).

Vancauwenberghe et al. (2011) apply SNA to analyse spatial data infrastructure (SDI) from a network perspective. The collection of technological and non-technological arrangements that give shape to network of spatial data exchange between actors can be defined as an SDI. The identification of spatial data flows among public organizations in Flanders, Belgium is the main objective for their research. The organizations were asked by using questionnaire to indicate whether they used, produced and/or received the data and indicate the supplier if they received the data from more than one organizations. According to Carrington et al. (2005) the network study draw extensively on survey and questionnaire data due to the enablement of researcher to decide on relationships to measure and on actors/objects to be approached for data. There are three main SDI arrangements in the study area: partnership SDI-Flanders, the provincial SDI initiatives, and provision of cadastral data by the Federal Public Service Finance. SNA was used to analyse these different arrangements' interactions.

The findings from their research are the available SDI arrangement in the study area is complementary to each other. This mean that the actors involved in the study area redistribute each other's data to specific group of users. The finding also reveals that SNA useful to demonstrate the hierarchical characteristics of an SDI by illustrating the data distribution from the higher administrative level to the lower administrative level. The overlap between the different SDI arrangements and the provision of identical or similar data by multiple arrangements to the same users also can be demonstrated by SNA. Moreover, the illustration of formality of an arrangement can be discovered as well.

SNA focuses on actors and the relations between actors, actor as a node and relation as tie. The function of each actors and connectedness between actors under certain arrangement can be seen using SNA. Network of spatial data exchange is constituted by organizations and flows. The spatial data exchange between data producers and data users under certain relationship, can demonstrate the characteristic of data flows. Looking into network perspective, the analysis of spatial data flows between data user and data producer arranged and facilitated by an SDI can be made. By examining the data flows, the role of each actor with their characteristic can be known. In term of redundancy from land administration domain, to determine actors who act as producers and users of parcel-based datasets is important. Build upon the information of actors involved together with their functions, evaluation of redundancy on parcel-based datasets can be conducted.

2.5. Addressing parcel-based dataset redundancy

This section discusses two of the causes of redundancy, the access and sharing issue and the spatial data infrastructure. From the Sub-section 2.3.3, it can be known that the causes of redundancy on spatial dataset related to the data access and sharing. The limited access and reluctance to share data and information are causing to the reliance of the data user on more than one data custodians or even creating their own data. The following subsection discusses the importance and the factors that affect data access and sharing.

2.5.1. Information access and sharing

The availability of and better quality access to information are the effect of information technology's development. The access to information is important to support the economic and social development of a country. However, the access to the service is important not solely the access to the data (van Loenen et al., 2009). The access to the service allows the data to really contribute to the user's needs. According to van Loenen (2009), there are two common access policy cost recovery and open access. The open-access approach assumes that government information is available with price not more than the cost of reproduction and distribution and available to all with non-discriminatory basis. From economic point of

view, geographic information collected by government agencies is funded with public fund to complete their public tasks. In the cost-recovery approach, the collection, maintenance and distribution of information are not fully funded by public funds. The cost must be recovered through the sales of information with pricing arrangement at least meets the cost of creation and dissemination. Government may choose to have exclusive arrangement with restricted use and access of information (van Loenen et al., 2009).

With the cost-recovery model, government agency takes control of their budget and not affected by the fluctuating national budget (van Loenen, 2009). Cost-recovery model allows government agency to maintain their collection activities overtime which leads to situation where they can have accurate, reliable, and standardized databases. The cost-recovery model has limitations. van Loenen (2009) argues that the cost-recovery model is unable to indicate the hidden costs, administrative cost for managing the policy for instance. Moreover, this model can initiate other parties to collect identical information, to use substitutes or not use the information at all. In a monopoly or near monopoly of information products, government agency can act as a commercial player hence distorts competition. He concluded that while redundancy can be controlled, it can never be deleted. Even coercion may not result in complete annihilation of redundancy.

The information technology development allows institutions, organizations, and individual to locate, share, combine and reuse government information content (Dawes, 2010). Information infrastructure allows for effective distribution of reliable collected information use in decision-making processes at all levels (van Loenen, 2009). A wide range of users can be served by adequate information infrastructure. Nowadays, information sharing across organizations is a key strategic activity for organizations in the public sector. Model of information sharing across public organization that stressed on information protection has shifted to cross-organization information sharing (Yang & Maxwell, 2011). The reasons behind the shifting rendering to Yang and Maxwell (2011) are to improve efficiency, to reduce waste and the development of technology which allow the exchange of information based on standard transmission and exchange protocols.

The sharing of information as resources between organizations must have certain objectives. The objectives include to gain benefits, to improve its public image, or to expand its influence over others (Sharon, 1996), to obtain better quality of information, and the ability to deal with more complex problems (Goodchild et al., 2007). The economic benefits, lower cost to obtain data in a data sharing arrangement rather than to produce by their own for instance, is also a driven factor for sharing information (Dawes, 2010; Goodchild et al., 2007). However the recognition of the risks in data divergences, data misinterpretation and running out of resources is a concern among organizations when sharing information.

To be successful in the implementation of information sharing among public organizations, one should pay attention to the common barriers namely: technical, organizational and political barrier (Sharon, 1996). The technological incompatibility sometimes occurs. However, the development of information technology can overcome this barrier. Organizational self-interest and the dominant professional framework are two organizational barriers that commonly faced. To achieve self-interest goals without being dependent and losing autonomy are the options that overshadowed the organizations decision to share the information. The elite profession that is at the core of the organization program, strive to influence their model of thinking and acting on the agency's model (Sharon, 1996).

Political barrier centred over the decision and decision-making process. Information is a source and symbol of power. With the information held, authority is able to make and implement the decisions.

Hence, the authority refuses to share information because it considered as their trump card (Goodchild et al., 2007). Legislation sets the specific programs and the available fund to conduct by the government organizations. This resulted to the situation where the officials who responsible to conduct those specific programs tend to see the information is belonging to the program, not as an asset of whole organization nor the public (Sharon, 1996). The decisions which made by organization under hierarchical level: national, state, and local, also creating program's boundaries between organizations at the same level. The boundaries are likely to become a barrier between vertical organization and the single level of organization at the same level.

Conferring to Pardo et al. (2008) cross-boundary information integration is needed to achieve successful information sharing. The three components that constitute cross-boundary information integration are interoperability, shifting agency culture and the central role of policy makers. The interoperability not only related to the technology, but also to the interoperability of management and policy. The information policy takes overall view on how information resource can support government services (Sharon, 1996). The shifting agency culture in the mean of changing the work model is a critical step in an integration process. Yang and Maxwell (2011) propose a culture of information stewardship as opposed to information ownership. Information stewardship requires strong leadership to support information sharing efforts; trusted relationships based on mutual understanding and the shared responsibility. The process of integration has a scope of work beyond agency-based and single problem-focused. It means that the integration needs legislator and government policy-makers who have power to alleviate key constraints to the macro level. Bringing this integration issue to the macro level by the legislator and policy-maker is expected to generate strong political will of sustainable information integration strategies.

Exchange of information among government agencies, under the purpose of efficiency sometimes overrides the procedures and legal source (Wenjing, 2011). Government information sharing linked with the implementation of law and policy and sometimes fused. Wenjing (2011) postulates five basic principles should be followed in legal control of government information sharing. The five basic principles are concerning with the legal source of information, clear necessity to carry out the duties, reasonableness, transparent procedure to the public and dispute settlement.

The relation in the mean of information sharing must have certain objectives. Knowing and understanding what the objective is, will facilitate the establishment of relation between organizations. One should concern to the barriers that commonly faced in the subject of data access and sharing. Things that affect data access and sharing is not only the technological factor but also many other factors. The organization's paradigm shifting and the strong political will from all levels are expected to assist the process of information integration. The problems that related to the limited and scattered data which lead to redundancy, can be overcome if each of organizations is willing to provide the access and share their data.

2.5.2. Spatial Data Infrastructure (SDI)

“Spatial Data Infrastructure (SDI) is about the facilitation and coordination of the exchange and sharing of spatial data between stakeholders in the spatial data community” (Crompvoets et al., 2004). SDI consists of two fundamental components: role between people and data, and technological components which deal with access network, policy and standards (Crompvoets et al., 2004). Two fundamental components have dynamic nature. The needs of community that continues to change, rapid technology development, and the constantly changes of rights, restrictions and responsibilities between people and data are the causes for the dynamics nature. Therefore SDI involves not only spatial data, value-added services and the end-users, but also important matters concerning interoperability, policies and networks.

The implementation of standards, data and metadata, is the fundamental principles of the SDI (Harvey & Tulloch, 2006). The development of standards that promote interoperability, portability and maintainability of a sustainable SDI, will take times upfront in the design process (Croswell, 2000). In the process of defining standards, several things must be considered. Flexibility should be taken into account. Well-defined standards will accommodate specific needs of users without neglecting the broader needs of community. The excessive usage of users' resources in order to comply with the standards should be avoided. Implementation of the not well-defined standards would be counter-productive to the development of an SDI.

Data can be shared systematically through a data infrastructure. *"SDI encompasses the standards and information technologies, decision-making processes, human and financial management systems, and social structures that govern the acquisition, processing, distribution, use, and maintenance of geospatial information"* (Lance et al., 2009). Data distribution through informal channels and contacts among government institution can be considered as a limitation (Harvey & Tulloch, 2006). By facilitating and coordinating of the exchange and sharing spatial data between stakeholders, SDI have objectives to promote economic development, to stimulate better cooperation and government, and to nurture environmental sustainability. SDI serves as repository of different data produced by different organizations and that can be used by other organizations (L. Silva, 2007). Under SDI, duplication of efforts to produce data with the same end results can be minimized.

Grus et al. (2010) argue that SDI is a complex adaptive system. The different needs of large number of stakeholders and the complex relations make an SDI as a complex system. SDI needs coordinating system which enable to self-organize, be open to create its own structure and collaborate with other domains (Grus et al., 2010). That is why adaptability becomes one of conditions shown by the SDI. Outlining clearly what components that constitute an SDI is important in order to manage its complex system. One of the causes of its complexity is the human factor. People are the designer, the user and the producer who involve in an SDI. Knowing the human factor in SDI is essential.

Coordination is the key term on the establishment of an SDI. Data sharing must have conjunction with the coordination between government bodies. The vision to coordinate and the willingness to focus on the implementation of the policies, procedures and plans, are the main requirement to reduce duplication of work and data redundancy between government bodies (US Government Accountability Office, 2012) The well-functioning coordination body is the necessity on the having and preserving the continuation of an SDI (Grus et al., 2010).

Data sharing and cross-agency coordination involve conventions in the use of policy and technology in practices (Harvey & Tulloch, 2006). The policy including the privacy, pricing, and technical and nontechnical characteristic of data, should be taken into account. The public interest and technical issue cannot be separated in determining the policy that to be implemented (McKee, 2000).

SDI which enables user and producer to share and access spatial data, is built upon multilevel partnership. SDI facilitates a systematic spatial data sharing and distribution. Knowing the structure of and SDI is an important factor to preserve its continuation due to the involvement not only the spatial data but also value-added services, the end-users, interoperability, policies and networks. With the SDI as enabling factor, the objectives to save resources, time and effort to obtain datasets can be achieved. Duplication of expenses and work to gather and maintenance data, and the costs for datasets integration from other sources can be avoided.

2.6. Conclusion

This chapter aimed to address research question 1. By looking into the main functions of land administration, it can be derived that parcel data are the key component to look at. Secondly it found that land information system which is used to store and manage parcel-based dataset can serve for the vast array of users.

All these steps have derived the following conclusions:

- 1) Parcel-based data are the core component of a land administration infrastructure. It has different characteristics from others spatial data. The main characteristic of parcel-based data is that not only contains spatial data but also non-spatial data which has legal meaning. The non-spatial data shows the subject (who) and the rights (how) attached to the piece of land. The information about the subject, the object, and the rights together with the attribute such as value and use is collected and stored in a land information system which is serves for a wide variety of users. Because parcel-based data has social and legal meaning and used by a wide variety of users, the data collection and management play a critical role.
- 2) Parcel data can be redundant. From the literature, it can be known that within a single authority to collect and manage parcel-based data the duplication of data and activities can be reduced and standard in data quality reliability can be achieved. Previous study related to spatial data redundancy reveals that redundancy can be caused of many factors. Redundancy also means as a backup mechanism. In uncertain situation where data is limited, scattered, and inaccessible, redundancy can occur as a coping mechanism to ensure all processes continue to run. To study about redundancy, knowing the actors involved with their functions is important.
- 3) SDIs and regulations of SDIs are one way to reduce redundancy in parcel-based data. The regulation of SDI is in the form of SDI data policies and SDI directives/laws. However, even with such regulations, coercion of redundant-free data remains problematic in reality.
- 4) The problems that related to the limited and scattered data which lead to redundancy, can be overcome if each of organizations is willing to provide the access and share their data. Knowing the barriers that commonly hampered the information sharing which are related to technical, organizational and political factors is important.
- 5) Studying redundancy is possible using SNA. SNA focuses on actors and the relations between actors, actor as a node and relation as tie. The recent study applying SNA as a method can demonstrate the data distribution and data provision in a multiple hierarchy arrangement. SNA can be applied to determine who the actors' involve, which the producers or the users are.

The next chapter will discuss about the data collection and data analysis methodology.

3. METHODOLOGY OF DATA COLLECTION AND ANALYSIS

3.1. Introduction

This chapter explains the general background of the methodology of data collection and analysis in order to answer research questions number 4 and 6. Previous chapter discusses the main function of land administration with parcel based-datasets as the key component. This chapter describes the methods that were used to obtain the data in the study area. Section 3.2 describes the objective of empirical data. Section 3.3 describes about the background of data collection followed by the types of variation and the indicators. Section 3.5 describes the data collection technique during fieldwork. The approach for designing questions, respondent criteria, respondents who were involved and the interview technique, describes in this section. Data processing and analysis and limitations faced in the field are presented in the Section 3.6 and 3.7 respectively. Section 3.8 concludes this chapter by a conclusion.

3.2. Objective of empirical data collection

The empirical data to know what the extent of redundancy and why the redundancy emerges are the objective of data collection. Data collection also intended to collect documents related to the policy, regulation and the proposal to address redundancy. A good way to go about that is using case study methodology. The purpose of case study is to allow an examination and to provide an understanding of a phenomenon (M. A. Silva & Stubkjær, 2002). Furthermore, by using case study method, researcher can preserved substantial characteristic of the wholes reality without separation into parts (Yin, 2003).

3.3. Background

The field data collection in Depok, West Java, Indonesia, started at 28th September 2012 until 25th October 2012. A questionnaire derived primary interview data. According to Carrington et al. (2005), the most common approach to study network is by means of questionnaire. However, van Duijn and Vermunt (2006) argue that interviews, observations, and secondary sources are also frequently used as data collection method. An interview checklist supported the interview to validate the completeness in relation to the problem definition. Questionnaire was intended to obtain data of the use of parcel-based data. Interviews were conducted in order to gather rich data and information. During interview, researcher directly engage participant in a conversation in order to generate participant's knowledge, interpretation and experiences on the notion of study area (Schultze & Avital, 2011). The interview questions were mainly divided into three sections: a part related to the use of parcel-based datasets, the part related to redundancy issues, and a part related to the access, standard, collaboration and policy issues. During the fieldwork, the proposed survey method did not generate all the answers due to many reasons.

In general 24 persons from different backgrounds were interviewed during fieldwork. Respondent criteria were determined by preliminary interviews with key person from academic institution and from the Depok Land Office (LO). Respondent criteria basically divided into two groups: users and/or producer of parcel-based datasets. Office visits and phone interviews were conducted to gather information.

3.3.1. Depok City as a case study area

Depok officially became an autonomous city at 1999. Before that time, Depok was one of administrative city which as a part of Bogor Regency. The City of Depok has an area of 200.29 Km² and is administratively in the province of West Java. It is adjacent to DKI Jakarta as capital city of Indonesia as

shown on Figure 3-1. As Jakarta's hinterland with road networks, under construction toll road, and railway networks which connect Depok to Jakarta and other Jakarta's surrounding cities (Bogor, Tangerang, Bekasi), Depok became a city affected by the expansion of Jakarta. In a 10 years period, the population of Depok increased 66.84%, from 1,160,791 inhabitants in 2000, to reach 1,736,565 in 2010 with the 8,670 people per Km² population density (Badan Pusat Statistik Kota Depok, 2010).

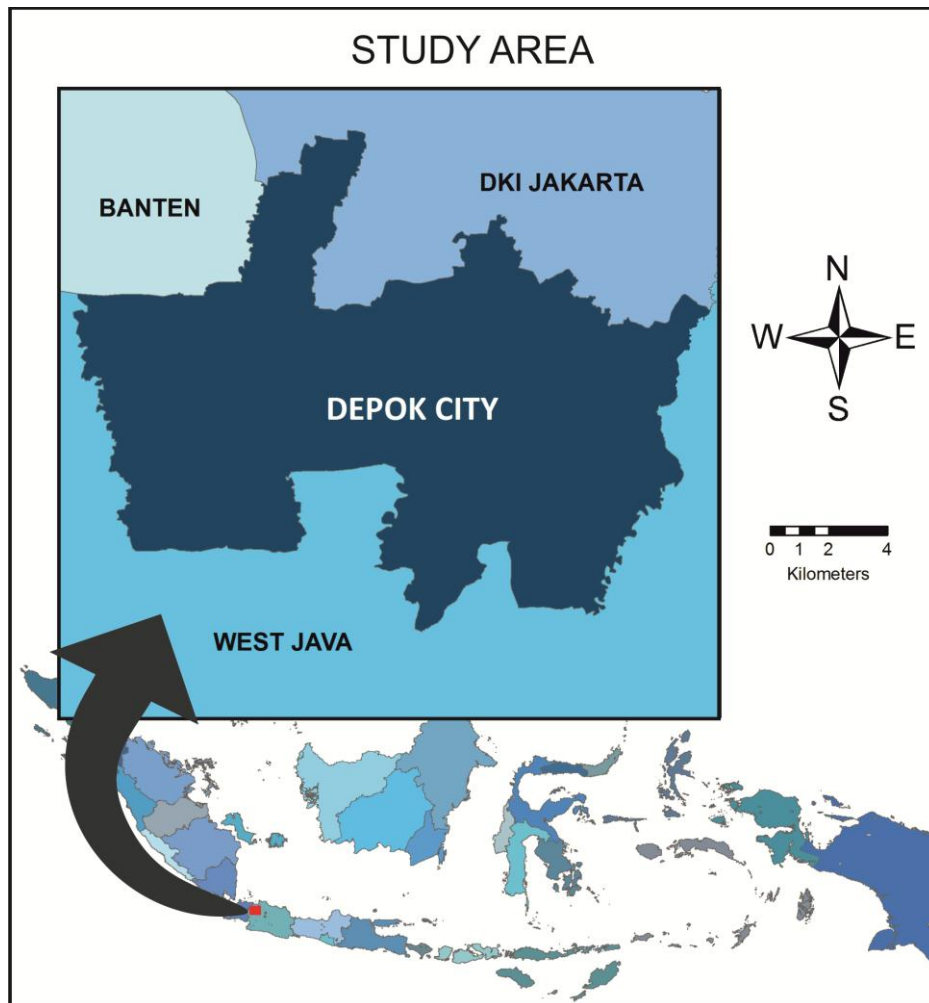


Figure 3-1. Study area

In line with the population growth, the needs of housing also increased. This situation affect to vibrant of the land and property market in Depok City. Land and building transfer tax (BPHTB), is the biggest Depok City's source of income followed by the land and building tax (PBB) (Virhdhani, 2012). Since January 2012, Depok City as 1 of 17 first cities has begun to manage BPHTB and land tax autonomously (Bisnis Jabar, 2012). According to Depok LO, 18,177 land titles were issued for the first time registration and 25,640 land titles were transferred in 2010 (Badan Pusat Statistik Kota Depok, 2010). The development of Depok as a city in Indonesia is having similar characteristic to other sub-cities close to major city, as a centre of economic growth, Tangerang and Bekasi for instance.

On the Depok City's Medium Term Development Plan (2011-2016), becoming "cyber city" is one of the flagship programs. The concept of "cyber city" in term of provision of free internet access across the city aiming to facilitate public services (Farida, 2011). Depok City is well-known as the productive city in generating innovative breakthroughs (Ruhyanto, 2012). The innovations in governance sector are the

development of the complaints handling mechanisms, and the establishment of forums across stakeholders in order to increase public participation.

However, on the two years in a row Depok City also received bad title for its public services. Corruption Eradication Commission (KPK) conducted integrity surveys on 2011 and 2012. On 2011, Depok City was placed at the bottom of all cities surveyed for its public services on issuing permits (building development and trading permit) and ID card (Viridhani, 2011). On 2012, the same integrity survey also placed Depok City with 16 other cities which get low mark (mark below 6 from 10) from 60 cities surveyed (Ganessa, 2012).

Depok City with its current arrangement related to the land administration; serve as case study in order to seek the phenomena of redundancy on parcel-based datasets.

3.3.2. Land administration perspective of Depok City

Depok LO carrying some of the tasks and functions of the BPN-RI set according to the laws and regulations. Depok LO provides land services which are same as services provided by other land offices across the nation. As city/district office, Depok LO is under the coordination of West Java Provincial Office. By way of vertical organization, Depok LO also works with local government. There are 31 local government organizations in Depok City. However, only few of those organizations which has mandate to the land matters work with Depok LO.

3.4. Which data to collect

Based on the research objectives and sub-objectives, data collection addresses three main issues: the extent of redundancy, the cause of redundancy and the role of social network. From those three main issues, the types of variation and the indicators for each type of variations are determined. The determination of indicators was referring to the literature as discussed in Section 2.3 and 2.4 on Chapter 2. From the determined indicators, the interview questions were developed. Documentary information also collected to support and amplifies the responses from the respondents. Table 2-1 below shows the indicator matrix as a framework to collect the data.

Issue	Variation types	Indicator	Interview questions	Other documentary search/artefact
Extent of redundancy	Volume of duplicated data	Type of similar parcel data in different organisations	- Do you have parcel data?	<ul style="list-style-type: none"> - Rules and regulations related to the data handling - Maps/databases
		Degree of sharing	- Who are the users of your parcel data?	
	Extent of repetition in data handling activities	Task repetition	<ul style="list-style-type: none"> - What is your organization mandates related to parcel-based datasets? - How do you obtain parcel-based data? 	
Awareness	Presence of processes to handle redundancy	<ul style="list-style-type: none"> - Do you know there is any organization which produces parcel-based datasets? - Do you know about duplication of parcel-based 		

			<p>datasets?</p> <ul style="list-style-type: none"> - Does it need certain policy addressing duplication of parcel-based datasets? 	
Cause of redundancy	Technical causes	Data format & dissemination	<ul style="list-style-type: none"> - What data formats do you use when obtaining or disseminating data? - What channel/media do you use to disseminate parcel-based datasets? 	<ul style="list-style-type: none"> - Rules and regulations related to the data handling, data and information access
		Standard	<ul style="list-style-type: none"> - What data standard is applicable? - Do you know what data standard applied by other organization? 	
	Institutional causes	Data access	<ul style="list-style-type: none"> - Who has authority to access the data? - How do user/other producer access your data? - How much it costs to access the data? - Is there any data access and dissemination policy? - What is your experience related to the obstacles in accessing other organization's parcel-based dataset? 	
Role of social network	Degree of interaction	Applicability	<ul style="list-style-type: none"> - In what purpose do you use parcel-based datasets? - Do you use parcel-based datasets form others? - How do you acquire parcel-based datasets? 	
		Interoperability	<ul style="list-style-type: none"> - Is it an official data? - Who are the users of your parcel-based data? - From whom do you get the parcel-based data? 	
		Frequency	<ul style="list-style-type: none"> - How often do you use the data? - How often do you get/update the data? 	

Table 3-1. Indicator matrix

3.5. Data collection technique

3.5.1. Preparation

Requirement of the data and possible respondents were determined by the formulated of research objectives and research questions, and also from the literature review. The survey using questionnaire aims to gather data of the use of parcel datasets: from whom the data came from, for what purpose and regarding to the time of use and access. After the information of current actors gathered, the next step was to obtain more on the issue of redundancy using interview method.

Interview questions checklist which contains three main sections was developed before conducting the fieldwork. The aim of prepared questions on interview checklist is to answer questions that related to redundancy. The questions intended to get answers regarding to: the use of parcel-based data; the source of the data; the purpose obtaining the data; experience, and cause of redundancy; the data format that being used; the data access and dissemination process; the data standard; the collaboration and policy issue.

3.5.2. Respondent criteria

Literature reviews on possible actors with their different roles related to parcel-based datasets were conducted simultaneously with preliminary processes. The possible actors related to parcel-based datasets are discussed on Section 2.2. The preliminary process covered the activities to gather information of respondent types or backgrounds and contact persons in the study area. This research categorizes actors into three different roles: who are the user(s), producer(s), and user and/or producer of parcel-based datasets. As an entry point to the current arrangement in the study area, preliminary interviews with key persons were conducted. Key persons are person with special knowledge and expertise about the issue concern to the study. Moreover, key person also can help to provide either basic information or later as respondents. Basic information that key persons can provide was contact person of potential respondents based on problem definitions. Key persons were coming from Depok LO, Pusdatin BPN-RI, Depok Municipality, and from University of Indonesia Research Centre for Applied Geography.

Before conducting fieldwork, informal communications with key persons were also established through electronic mails. The contact for the key person was gained from the partnership between academics, and as co-worker. Information about housing developers was gathered through Indonesia Housing and Settlement Developer Association's (ASPERSI) website <http://new.apersi.or.id/dpd/member/2/> (accessed Sept, 17th 2012). From that site, the listed company names were sorted into West Java region and Depok City based selection. There are six housing developers in Depok City area listed on the website. Information gathered was name of the company, address, phone number and contact person. Besides information about housing developers, basic information of government institutions which potentially deal with parcel-based datasets was also gathered through Depok City official website <http://www.depok.go.id/>. Information about banking institutions, infrastructure company such as electrical company and water company in Depok City were also handed in advanced from the Internet. For administrative purpose, recommendation letter from the University for conducting research was sent to Depok LO and Pusdatin BPN-RI.

3.5.3. Contacting respondent

The proposed fieldwork data collection sequence was in three steps: 1. initial interviews with key persons; 2. questionnaire distribution based on initial interviews' result; and 3. interviews with producers to gather more information. Three preliminary interviews were conducted with key persons from Pusdatin BPN RI, Depok LO and University of Indonesia Research Centre for Applied Geography. These initial interviews

were conducted in order to get input related to problem definitions and to gain insight of current arrangement between actors who deal with parcel-based datasets in Depok City.

Based on initial interviews with key person actors who deal with parcel-based dataset are: Local Land Office, Revenue and Financial Management Office (DPPKA), Spatial Planning and Settlement Office (DISTARKIM), Local Development Planning Office (BAPPEDA), Roads and Water Resources Office (BIMASDA), land surveyors, banking institutions, housing developers, infrastructure companies, and notaries. A recommendation letter from certain local government institution was required to conduct data collection activities involving government agency. Key person from Depok LO was providing me with the contact list of the officials who came from the institutions which usually deal with parcel datasets. Phone calls were made to the official to introduce and ask for an interview session. This was done simultaneously with the submission of recommendation letters as a procedural process. A list of licensed land appraisal, notary and licensed surveyors was collected from the Depok LO. The contacts information gathered from Depok LO was used as provisional "fixed" list as mentioned by Carrington et al. (2005). The name on the provisional fixed list can increase accordingly based on the new name mentioned by the respondents.

In the first week of data collection period, a questionnaire together with a recommendation letter from the university was deployed to the banking institutions located on Margonda Street Depok. Margonda Street is the main street which lies and divides City of Depok into two part, east side and west side. The criterion for selection is the bank that offers loan based on land as collateral besides the coverage of the bank, bank with national coverage. Twelve banks were contacted and received questionnaire together with recommendation letter. Most of the banks who received the letter told about duration period to process the letter. Usually for this kind of letter, it would take 2-3 days to process and confirmation will be given through a phone call whether the request is granted or rejected.

Based on the list from the ASPERSI website, housing developers in Depok were contacted by phone. The same method applied for the registered notary and listed licensed land appraisal. The lists collected from Depok LO were used as directories to contact this type of actors. Phone calls were intended to introduce research's aims and objectives and also to ask for their involvement as respondent in this research.

The contact data from ASPERSI website was invalid or unreachable, same case with the licensed land appraisal. Top 20 notaries from list refused to involve on the research. Busyness was the reason to refuse being engage in this research. Only four banks gave permission to their staffs to fill in the questionnaire.

As a result, decision was made to not use questionnaire as a method for data collection due to time constraint. That was in the third week from the 4 weeks available of the data collection period. Interview was decided as the only method for data collection. Researcher thought that time would be wasted only for confirming respondents. Not only time, but resources such as cellular phone credit to make phone call and cost for travelling would be over the budget. Choice was made by asking assistance from key person in Depok LO to get direct contact to the notary and housing developer. This approach was closely related to the snowball method.

3.5.4. Interview protocol

The interviewees from government institutions were the key persons in their respective organizations and professionals from private sectors. Interviews were conducted based on appointment made before according to respondent's time availability. Interviews were started in the second week of fieldwork period and conducted until the end of the fieldwork period. The duration of interview was approximately 40 minutes for each session. Most of the interviews were conducted in respondent's office. Only four

interview sessions were conducted by phone due to the respondents' time availability. In three cases respondents changed the schedule the day before interview session was planned. As a result I had to rearrange the interview session and ask the respondent to modify the time schedule.

Before each interview started, I introduced the aim and objective of the research, the duration of the interview session and respondent data confidentiality, and ask for permission to record the entire interview session. However, most of respondents categorized as user and come from private sectors did not want to have recorded interview session. Moreover, two village heads did not want to have recorded interview session as well. It seems they afraid that any information they shared will be treated in improper way and will be used against them. In addition, according to three respondents land issues are a sensitive issue in Indonesia. For respondents who did not want to have recorded session, researcher took a note for their answers. However the notes taken by researcher tend to be incomplete because it only written down point of the answers.

During every interview session, I introduced myself to gain the interviewee's trust. I provided personal information such as name, the institution where I come from and also brief description of the research being conducted. In order to confirm the information that had provided by respondents who categorized as producer, researcher made phone calls at the end of data collection period. The confirmations were conducted also for clarification to the answers that they provided.

3.5.5. Secondary data collection

Secondary data of different types from different organizations were collected. These related to the spatial data and rules and regulations. Spatial datasets produced by Depok Tax Office (TO) and Depok LO were collected. From the preliminary interviews, it can be known that two offices produce and manage spatial dataset. The Depok TO was no longer produced and managed the tax object and subject to tax data. The mandate has been shifted to the DPPKA. On the interview session with DPPKA official, the possibility to get parcel maps for certain location in Depok was asked. Same process conducted to obtain the map from Depok LO. The map which covers same location with the map gathered from the DPPKA was obtained.

Rules and regulations related to land registration, current tariff applicable in LOs, and data access were collected. Other relevant documents such as rules and regulations related to Tax Objects Information Management System (SISMIOP), land and building tax also collected.

3.6. Data processing and analysis

The data collection depends primarily on interview data through semi structured interviews. The voice recorded during interview was first transcribed in textual format in Ms Word. Transcriptions were made to facilitate data analysis. For unrecorded interview, notes contains respondent answers is used as source of information together with transcription for the recorded interview for the data matrix. To facilitate the presentation and analysis, data matrix will be presented. The data matrix will be treated as basis for the summarization of the use of parcel-based datasets based on respondent category. The summarization of the parcel-based datasets user and data producer will be followed by the analysis of the extent and cause of redundancy. Secondary documents will be treated to complement the views of the respondents. The variation types with its indicators on Table 3-1 will be used as a framework to analyse the data.

3.7. Limitations faced in the field

Difficulties were faced during the fieldwork period mostly related to gain contact to respondents. Asking for direct contact of people who usually deal with parcel-based data from the respondents which already

interviewed was the step taken. Respondents data such as contact person, phone number listed on the available directories were not up to date and invalid. Intended respondents also seem reluctance to be involved in this research. These factors were causing researcher to change the method data collection. Another strain was many respondents refused to have recorded interview session. This situation brings difficulty in analysis part because not all information can be written during the session. Bureaucratic burden also faced during the fieldwork, not only from government institutions side but also from private sector side. One of the signs of this issue was length of the time needed to process the research application letter. Awaiting instruction and disposition letter from the head of department or office branch was the reason often expressed. Moreover, only the designated person in the disposition letter can and willing to be interviewed. The changes of appointment to have interview were also an obstacle faced during the fieldwork. Researcher had to wait or even postpone the appointments due to respondents' hectic schedule.

3.8. Conclusion

This chapter described the method applied for data collection purpose to gather primary and secondary data. Interview was the only method applied for the primary data collection. Opinions, perception and actual information were gained from the key persons in their respective organizations and professionals from private sectors as the interviews results. The interview results will be used as the source of data matrix. To amplify the views given by the respondents, secondary documents in term of legal rules and regulations will be examined. The data matrix will be treated as basis for summarization based on respondent category in the results section. The indicator which is use as a framework to collect the data also will be used to analyse the data about the extent and the cause of redundancy.

The next chapter will present the results from the data collection phase.

4. DATA RESULTS

4.1. Introduction

This chapter presents the result of the methods applied on the data collection phase. This chapter aims to answer research questions number 2 and 3. Section 4.2 presents current situation in Depok City related to the land administration domain, the users and producers of parcel-based datasets. This section followed by the summarization of the data collected and the descriptions for each category of actors. For the users, the description is about from whom they obtain parcel based data and for what purposes. For the producers the descriptions mainly on what data are being produced and for whom they produce the data. Section 4.5 presents the descriptions of parcel-based data available on Depok City followed by analysis of the extent and the cause of redundancy and the role of social network. This chapter is closed by conclusions on the Section 4.8.

4.2. Current situation in Depok City

Presidential Decree Number 10 year 2006, set a mandate to BPN-RI to perform duties and tasks related to land in national, regional and sectoral level (Republik Indonesia, 2006b). Land survey and mapping, land registration, determining land rights, public administration related to land, and land data management and information are main duties and tasks of BPN-RI. As a vertical organization, BPN-RI operates in central level, provincial level, and city/regency level. In Depok City, Depok LO carries the tasks and duties of BPN-RI.

Preliminary discussions were conducted with respondent from Depok LO and academia from University of Indonesia. These interviews were conducted in order to gain insight of the current situation in Depok City related to the actors involve in the use of parcel-based datasets. Based on their work experiences and expertise, the information gathered from both sides was combined and then inferences of the current actors deal with the parcel-based datasets in Depok City were made. Besides individual applicants as the land's owner or interested parties in a buying and selling situation, notaries, housing developers and local spatial planning agency are the actors who deal with parcel-based datasets on their daily activities. Banking institutions that provide mortgage with land as collateral are also using parcel-based datasets. Though, the processes on how to obtain the data for each of actors are different.

From the preliminary discussion also can be known that not only Depok LO manages and produces parcel-based datasets. Other organization that manages and produces parcel-based datasets exists. Directorate General of Taxes (DGT) produces and manages parcel based datasets for land and building taxation purposes with the working area throughout the country. However, the DGT's authority to collect land and building taxes and land transfer tax has changed to local government according to Law Number 28 Year 2009 (UU No. 28/1009) about Local Taxes and Levies (Republik Indonesia, 2009).

In Indonesia according to regulation, registration of land ownership is optional. Depok LO can only register a piece of land if the land owner requests for registration. There is land registration program managed by central government and local government together with Depok LO called Program National – National Program (PRONA) and Program Daerah – Local Program (PRODA). These programs are funded by state budget or local government budget. However, the scope of these programs is limited due to limited budget. This situation leads to a condition where not all land parcels in Depok City are registered. For the unregistered land, the information of the land such as land status, land history, and the ownership can be obtained from the village office where the land is located. Village office also provides certain documents required by Depok LO on land registration processes.

Further information was gathered from respondents outside Depok City. The information related to the policy of data sharing and access. The policy related to the data access and sharing is developed in national level. Currently, Depok LO is at the level of the implementation set in national level.

4.3. Summary of data collection result

Table 4-1 below shows the total number of respondents. Respondents came from different organizations and levels. The detailed list of respondents can be found in Annex 1. The summary of data collection process is shown on Table 4-1. Table 4-2 summarized on how each of actors relate to parcel-based datasets. From whom each of actors obtains parcel-based data, and for what purposes is shown on the table. Further description for each of actor can be found on the next section.

Respondents →	Government Officials			Academia	Surveyor	Notary	Banking Institution		Housing Developer	Infrastructure Company
	Policy Makers	Office	Village Office				Consumer Credit	Land Appraisal		
Numbers	3	5	2	1	2	2	3	2	2	2
Activities	Interview, Document collection	Interview, Document collection	Interview	Interview	Interview	Interview	Interview	Interview	Interview	Interview

Table 4-1. Respondents contacted from different fields

Data Source Matrix

Respondent Initial	Organization	Type of Organization	Work Field	Use of Parcel Data	Retrieve From	Frequency of Use	Data Format	Type of Actor	Purpose of Use
A	Land Office	A	BA	√	TO, VO	DI	P, D	PD, US	Land registration process, land information management
B	Revenue and Financial Management Office	B	BC	√	LO	DI	P, D	PD, US	Collecting land and building tax
C	Spatial Planning and Settlement Office	B	BD	√	LO, AP	DI	P, D	US	City spatial planning, granting developing permit
D	Public Work and Water Resources Office	B	BB	√	LO, VO, AO	PR	P	US	Developing public infrastructures (road, bridge, waterways)
E	Mekarsari Village	B	BE	√	AP	DI	P	KE	Providing unregistered parcel data and information
F	Pasir Gunung Selatan Village	B	BE	√	AP	DI	P	KE	Providing unregistered parcel data and information
G	Pangestuti Notary & PPAT	D	DA	√	LO, VO, AP	DI	P	US	Providing legal affair services
H	Mega Shinta Cahya Putri Notary & PPAT	D	DA	√	LO, VO, AP	DI	P	US	Providing legal affair services
I	Bank Jabar Banten	C	DB	√	NO, AP	DI	P	US	Providing loans
J	Bank Negara Indonesia	C	DB	√	NO, AP	DI	P	US	Providing loans
K	OCBC-NISP	D	DB	√	NO, AP	DI	P	US	Providing loans
L	OCBC-NISP	D	DC	√	NO, AP	DI	P	US	As the assessment for loans
M	Bank BTPN	D	DC	√	NO, AP	DI	P	US	As the assessment for loans
N	PT. Lintas Sakti Pratama	D	DD	√	LO, NO, SO	DI	P	US	Developing housing
O	PT. Dinamika Alam Sejahtera (GDC)	D	DD	√	LO, NO, SO	DI	P	US	Developing housing
P	PT. PLN A/B Depok	C	CA	X					Not directly use parcel-based data
Q	PDAM Depok City, Tirta Asasta	C	CA	X					Not directly use parcel-based data
R	Surveyor	D	DE	√	LO, VO	PR	P, D	US	Benchmark in land survey
S	Surveyor	D	DE	√	LO, VO	PR	P, D	US	Benchmark in land survey

Table 4-2. The use of parcel-based data matrix (Produced by field analysis)

Key

A	Central Government	BA	Land registration & cadaster	CA	Infrastructure	LO	Land Office	DI	Daily	P	Printed	PD	Producer
B	Local Government	BB	Infrastructure & public work	DA	Legal affairs	NO	Notary	PR	By Project	D	Digital	US	User
C	Government-Owned Company	BC	Revenue & tax management	DB	Financial (Bank – credit provider)	VO	Village Office	TO	Tax Office	KE		KE	Data Keeper
D	Private Company	BD	Spatial planning	DC	Financial (Bank – appraisal)	AO	Asset Management Office	SO	Spatial Planning Office				
E	Academia	BE	Government affairs	DE	Housing developer	AP	Applicant						

4.4. Parcel-based datasets existing users and producers

As the results of data collection phase, the existing actors related to the parcel based datasets are shown on Table 4-2. The users are come from different backgrounds and field of work. The following subsections describe how each of the actors obtain and use parcel-based datasets for the user type and how each of the actors produces parcel-based datasets for the producer type based on the interviews.

4.4.1. Parcel-based datasets users

A. Spatial Planning and Settlement Office (DISTARKIM)

In the daily activities as one of the DISTARKIM Section Heads, he uses parcel-based data in the form of proof of land ownership as a requirement for granting permit to develop building for housing, factories, social or commercial facilities according to the city spatial plan. Besides for granting permit, parcel-based datasets are needed for urban spatial planning.

The permit's applicants submit their certificate of land title issued by Depok LO for the registered land, or proof of land ownership or land acquisition for the unregistered land. Together with proof of land ownership, applicant submits their proposed site plan. Field verification will be conducted by staff of DISTARKIM to see the suitability between the real situation and the proposed site plan. For the applicant who submit certificate of land title as a proof of ownership, DISTARKIM will not conduct any land survey activities. On the other hand for applicant who submits only proof of land ownership or land acquisition, DISTARKIM will conduct land survey and mapping activities. After the field verification has been conducted, DISTARKIM will issue recommendation letter and approve the site plan. This recommendation letter is a requirement for obtaining building permits. For housing developer, the printed approved site plan will be submitted to the Depok LO. This approved site plan will be used by Depok LO Survey and Mapping Section as guidance to conduct survey and mapping activities, for parcel subdivision and later on issues certificate of land titles.

Parcel based datasets is needed for urban spatial planning. The parcel based data will be used to create land use maps as a basis for further urban planning. The required data is merely spatial data. Though, he admitted that Depok LO cannot provide access to the data due to data confidentiality which is related to the land owner information.

B. Public Works and Water Resources Office (BIMASDA)

Mandates of BIMASDA are to build and maintain public infrastructures in Depok City. Parcel based datasets is needed on those two main activities. Infrastructure development often includes land acquisitions project and usually done before the construction phase. However, protracted land acquisition processes sometimes occur which is largely caused by the disagreement on land and property buying and selling price.

The team member of land acquisition project also consist representative from the Depok LO. The involvement of Depok LO's representatives in the project is in order to facilitate easy coordination among offices. On the land acquisition project, land ownership data submitted by the land owners affected by the project will be verified to the Depok LO if it is a registered land and to VOs if it is an unregistered land. After the compensation is agreed upon, the Depok LO's surveyors will conduct land survey and mapping. Following the land survey and mapping processes, Depok LO will register the land as Depok City Government's assets. After the land is registered as Depok City Government's assets, the data will be managed by the DPPKA Asset Division.

C. Notary

List of registered notary collected from Depok LO was used as directory to contact this type of actors. From top 20 names listed were contacted by phone calls, but they refused to be involved in this research. Two respondents can be interviewed after being contacted by one of Depok LO officials who responsible for coordinating the notary. One is a notary and the other one is an operational staff who works in a notary firm. Notary has a working area in accordance with the decree issued by the Head of BPN-RI. Their daily activities as Depok LO partners issue the land deeds for land transfer and mortgage which is needed in a land registration process. Clients can give authority to them to act as a representative in registering land. Their clients are varies from individual to corporate sectors such as banks, housing developers or other private companies.

Some works performed by notary are to check and verify documents submitted by their clients. Their daily activities mostly deal with paper based documents. In land registration process, documents are checked to ensure its authenticity and the completeness as required by regulations. Documents verification will be undertaken to Depok LO for clients who submitted their certificate of land title for the registered land, and to VO for clients who submitted their proof of ownership or proof of acquisition for the unregistered land. Same works process for document checking and verification also undertaken for mortgage as required by the banks.

The operational staff respondent stated that occasionally he takes advantage of good relationships with one of the Depok LO staff. Sometimes he requests for the information of the on-going registration or verification process or asks to speed up the process, rather than to check to the counter service. Observations conducted in the Depok LO also conferring to this practice.

D. Banking

From twelve banks which received the recommendation letter from the university and questionnaire, only four banks gave permission to their staffs to be my respondent. The reasons of their rejection were the data related to the customer is confidential and for internal purpose only.

Parcel-based datasets is required by the banks to provide loans with land as collateral. Three of the banks only accept registered land as collateral, while the other one also accept the unregistered land. However the less loan amount given by the bank for the unregistered land compare to if it has been registered. Certificate of land title as a proof of registered land is a requirement for loan application. For the bank which accepts the unregistered land to get loan, applicant can submit the proof of the ownership or the land acquisition and the proof of land and building tax payment. The document verification will be performed by notaries who have work contract with the banks.

According to the Central Bank regulation, bank can use internal appraisal for a maximum 5 billion Rupiah loan. The internal appraisals use standard method to evaluate the land and mostly related to the physical elements such as the location and the built infrastructures around the site. Appraisal also checks the tax object sale value and conducts market price checking. According to the two respondents of the banks' appraisals, Depok LO cannot provide the market price data even there is work unit in Depok LO deals with this issue.

E. Housing developer

Six housing developers were contacted, but only one responded. The rest of names and phone numbers were either invalid or unreachable. One of the housing developers as respondent was not listed on the ASPERSI website.

In a residential building permit application, one of the requirements is to submit the proof of land ownership. Housing developer also needs recommendation letter from the Depok LO. This recommendation letter is related to the land suitability with the development plans. The proof of the ownership, recommendation letter, together with the proposed site plan and other supporting documents are submitted to the DISTARKIM. After the building permission is granted, the approved site plan will be used by Depok LO surveyors to conduct survey and mapping and as guidance for land subdivision. Infrastructure company such as State Power Company (PT. PLN) uses this approved site plan to build their electrical grid.

Two of respondents from housing developer use notary's services to deal with legal issues related to the land. In the land acquisition phase, notary checks the land legal status, providing the land deeds for land transfer, and register the land to the Depok LO. The same services from notary also needed in the selling phase. Providing the land deeds for land transfer and mortgage, registering the land for the buyers are also conducted by the notary.

F. Infrastructure company

According to the respondent from Depok's branch State Power Company (PT. PLN), in giving services to the customers he does not directly use parcel-based dataset. The company only use information from their electrical substation network when new customers, individual customer, apply for the service. The address provided by the customer will be used as main information to determine the availability of the power grid owned by the company. From the address provided by the customer, the nearest power substation can be known. The substation load checking will be conducted to know the feasibility for the new load addition. Same process is applicable for housing developer. In addition, the company will be assisted by the approved site plan to build new substation or new power grid.

Depok Water Company known as PT Tirta Kahuripan is not giving its service yet. Depok City government officially manage the local company since November 1st, 2012 but no management board is available. The company hands over has been proceed since mid-year 2010. Before that time, the company was managed by Bogor Municipal. During the hands over period until the company's management board established, as local government owned company PT Tirta Kahuripan is under DISTARKIM supervision and management. Information about the use of parcel-based data by the company was coming from the same respondent in DISTARKIM. The same characteristic with the power company is known. The company use their own water distribution network to match with the client's address when providing services.

G. Land surveyor

The land surveyors who were interviewed had experience on the making of registration based map for the Depok LO, involved on the land adjudication process and also had experience on updating data for the TO. The registration based maps were made in order to complete the map that must be owned by the Depok LO. On the land adjudication process, parcel-based data for the unregistered parcels was obtain from the landowner and then verified with the data owned by VO. Both respondents also obtained based point information from the LO as reference point when conducting survey and mapping for other institutions

In the land adjudication process, the involvement of the adjoining parties and parcel direct measurement were done as the requirements and related to the legal aspect. The TO data updating process was conducted by digitising satellite imagery to gather parcel data. Field verifications were done to confirm the parcel's owner without any direct parcel measurement.

4.4.2. Parcel-based datasets producers

A. Depok Land Office (LO)

The Depok LO conducts survey and mapping for land registration and land value zone, creating based-map and thematic map, data recording, registering and determining land rights. The Depok LO also manages Sistem Informasi Manajemen Pertanahan Nasional – National Land Information Management System (SIMTANAS).

The Depok LO has the duty to issue certificate of land title. The issued certificate of land title is the result of some preceded processes such as the registration process, survey and mapping activities (depends on the prompted request, not applicable for transfers right of registered land for instance) and the determination of rights process. The issuance of certificate of land title is in order to provide legal certainty of the land possessed by individual, legal entity or the government.

The process of land registration can only be done by the Depok LO based on the land owner's request. However under certain program, land registration can be done without the request of the land owner. Basically, there are two methods for the first time land registration applicable in Indonesia, the systematic and the sporadic methods. The systematic method is based on the work plan and in the predetermined area, whereas sporadic method is based on the request of the interested party. Program Nasional – National Program (PRONA) and Program Daerah – Local Program (PRODA) are kind of systematic method and funded by the government.

The Depok LO also issues mortgage certificate for the registered land. This mortgage certificate issued over the certificate of land title holds by the landowner to obtain loan from the credit provider. Besides that, the Depok LO issues recommendation letter in the form of land use designation permit required by the DISTARKIM to issue a building permit.

The landowner or interested party (in case of buying and selling situation or on a dispute situation) are only the party who can obtain the service offer by the Depok LO or managing the application. However, the landowner and interested party can give authorization to the notary to manage the application. Exceptions are provided to the law enforcement officials to obtain services from Depok LO in order to investigation or inquiry purposes.

B. Revenue and Financial Management Agency (DPPKA)

Since January 2nd 2012, the mandate to collect land and building tax and land transfer tax have been shifted from the DGT in central level to the Depok DPPKA at the local level. Along with this mandate shifting, the data of subject to tax and tax object also transferred from the Depok TO into Depok DPPKA. The data of subject to tax and tax object managed in a system called Sistem Informasi Manajemen Objek Pajak – Tax Objects Information Management System (SISMIOP).

According to respondent from DPPKA, the SISMIOP's data currently not up to date therefore field verifications are needed. The subject and the object of tax data need to be updated in order to get the latest information. The land and building taxes is one of the revenue sources of the Depok City Government. The subject to tax, the extent of tax object (land and building), tax arrears, land value zones are the information that need to be updated. There will be a budget of 8 billion Rupiah for data updating activities on the year 2013. However, he admitted that currently there is no regulation from Depok City's government sets for the data updating process. Regulations set by DGT are used as a working guide.

In the field verification process, certificate of land title issued by the Depok LO can be used as a valid data source. The name of the owner and the extent of the land stated on a certificate of land title are used to update the SISMIOP's data. Citizen also can use certificate of land title as a proof to appeal if there is a difference on the extent of the land stated on certificate of land title and on the tax letter.

Respondent from DPPKA uses the SISMIOP database in his daily activities. Besides for internal use, to determine the amount of taxes, the data also can be used by law enforcement officers for investigation purposes. Data sharing and communication with the Depok LO already established in term of the fulfilment of land transfer tax. Depok LO will continue the process to issue certificate of land title as long as DPPKA has verified the payment of land transfer tax paid by the applicant. This process is conducted on a manual system by means the applicant submit the proof of tax payment to the Depok LO.

C. Village Office (VO)

The parcel-based data for unregistered land is stored in the VO which is known as "Letter C Book". The Letter C Book contains information about the tax payment for land in which it is located in a certain village. The Letter C Book recorded information about the land owner, the parcel, amount of the tax, and the changes of the situation related to the land owner. As a proof of land tax payment in the past, the land owner received *girik*, *petukur*, or *letter D*. People are known *girik*, *petukur*, or *letter D* as a proof of land ownership whereas those documents are a proof of land tax payment. However, according to Government Regulation Number 24 Year 1997 about land registration, *girik*, *petukur*, or *letter D* can be used as a proof of land ownership (Republik Indonesia, 1997b).

On the land registration process, the VO official must verify the land owner's *girik*/*petukur*/*letter D* with the information on the Letter C Book. After the verification is done, the VO official signed the copy of the Letter C Book where the intended land parcel information is recorded. As required by the Depok LO, the VO official also issues statement letter of land history and land dispute-free statement letter. Those three documents signed by the VO Head must be submitted by the applicant to the Depok LO for land registration process. Request for document verification also can be done by the third party, usually the notary, as long as they gained authority from the land owner or the interested party.

4.5. Parcel-based datasets in Depok City

This section describes the parcel-based datasets that are available in Depok City. Besides from the Depok LO, parcel-based datasets also can be found in the DPPKA and village offices.

4.5.1. Land Office

According to the PP No. 24 Year 1997 about land registration, the LO stores and manages the registration maps, parcel lists, survey certificates, land books, name lists and other supporting documents (Republik Indonesia, 1997b). The registration map is a map that describes the registered parcels for bookkeeping purposes. The parcel list is a list contains identified land parcel with a numbering system. The survey certificate is a document that contains the parcel physical data in the form of maps and descriptions. The land book is a document in the form of a list that contains the juridical and physical data of registered parcel. The name list is a list containing information about the land owned by the individuals or legal entities and information of kind of right attaches to the land.

The cadastral system adopted in Indonesia is a registration of titles with the negative system. Title is the strong evidence. The types of recognized land rights in Indonesia according to Law Number 5 year 1960 about Basic Rules of Agrarian Principle are Hak Milik – Rights of Ownership (HM), Hak Guna Usaha – Cultivation Rights (HGU), Hak Guna Bangunan – Building Rights (HGB), Hak Pakai – Rights of Use

(HP), Hak Sewa – Rights of Rent (RR), Hak Membuka Tanah – Rights to Open the Land, Hak Memungut Hasil Hutan – Rights to Collect Forest Products and other rights that not included in the mentioned rights which determined by other laws such as Hak Milik Satuan Rumah Susun – Right to Own of Strata Title (HM-Sarusun), and Hak Pengelolaan – Rights of Management (HPL).

The descriptions of most common rights in Indonesia are shown below:

- HM is applicable only for individual, Indonesian citizens, hereditary, transferable and can be used as collateral. HM is the strongest and fullest rights that can be obtained.
- HGB gives rights to develop buildings on land. HGB title is granted to Indonesia citizens or legal entities including foreign joint venture companies. The title is granted for a maximum period of 30 years and extendable for another 20-year period. This land right can be transferred to a third party and can be used as a collateral.
- HGU gives rights to cultivate a state-owned land for agricultural, fishery or husbandry purposes. The title is granted for a maximum period of 35 years and extendable for another 25-year period. HGU title is granted to Indonesia citizens or legal entities including foreign joint venture companies. This land right can be transferred to a third party and can be used as a collateral.
- HP is the right of use state-owned land or other land owned by others for a specific purpose for a period of 25 years. HP gives rights to use for social activities, religious worship, embassies and international organizations. HP granted on state-owned land is valid for a maximum of 25 years and extendable for another period of 20 while over HM land valid for a maximum of 25 years but cannot be extended. HP title cannot be used as collateral.

Parcel-based datasets are the parcel data obtained by conducting certain processes as a form of land registration. The processes consist of set of tasks comprise of collecting, processing, keeping, presenting and preserving of physical and juridical data in the form of maps and lists of land parcel. The physical data consists of textual and spatial components. The textual components are component that contains information about land parcel data which includes owners' name, address and other identities and attribute, and other related data. The spatial components are component that contains information about position, boundary and the extent of land parcel including information of the building which lies on the ground if any and number of map sheets which gathered through survey and mapping activities conducted by surveyors. Juridical data is data that contains information of owners' rights, restrictions, durations, responsibilities, kind of legal documents, legal proofs, and the encumbrance attaches to the parcel.

Every registered land parcel has a unique identifier called NIB – Parcel Identification Number (NIB). NIB consists of 13 digits of number. The first eight digits are parcel location code for the province, city/district, and sub-district sequentially. The last five digits are the parcel number.

In the area that has not been designated as an area of systematic land registration, registration base maps endeavoured to be available for the sporadic land registration purpose. A registration base map is a map that contains the ground points and geographic elements, such as rivers, roads, buildings and physical boundaries of land areas. Registration base map can be made by obtaining the available map such as map produced by the TO.

4.5.2. Revenue and Financial Management Office

The taxation principle in Indonesia is self-assessment which enables the tax payers as subject to tax to register the possession of tax object. However, due to the actual condition that not all subject to tax register their tax objects, DGT conducts the data collection activities under the SISMIOP program. SISMIOP is actually an integrated information management system to process the data and information of

land and building tax object and the subject to tax. The establishment and the maintenance of SISMIOP consist of the implementation of registration, data collection and assessment of tax object and subject to tax. The registration and data collection activities can be conducted in four ways: the submission of tax notification objects by the subject to tax, tax object identification, tax object data verification, and survey of the tax object.

Conferring to the DGT Decree Number KEP-533/PJ./2000, SISMIOP has five main components: Tax Object Number (NOP), the land block, land value zone (ZNT), building cost components list (DBKB) and computer program (Republik Indonesia, 2000). The NOP is the key element on the collection of land tax. NOP is characterized by its uniqueness, permanent and standardized which applies across Indonesia. Land block is the smallest grouping of land area used as the object locator. The boundaries of land block are determined by the physical characteristic that does not change in certain period of times such as roads, railways, rivers, or canals. Land block cannot exceed the boundaries of the village and can accommodate up to 200 tax object or an area of about 15 hectare. ZNT has characteristic by the difficulty to determine its boundary because of the fuzzy boundary. To determine the ZNT boundary is by referring to the tax object's boundary. ZNT also can be determined by the availability of land market data. The DBKB consists of three main components: the main component, the material and the facility. DBKB is applicable for each city/district which can be adjusted to the current material and labour prices.

SISMIOP has a geographic information system as an integrated part to manage spatial data. The input for spatial data comes from paper based maps, aerial and satellite imagery and field survey. The data collection which comprise of the identification, verification and the survey of tax object activities can be done by obtaining maps from other institutions or self-made. The scale of the map depends on the condition of the area. Scale for the urban area is 1:1.000; suburb is 1:2.000 or 1:2.500; and for rural area is 1:5.000. The scale of the map in one village must be the same.

4.5.3. Village Office

Village office manages parcel-based data which is stored in the form of "Letter C Book". Letter C book is a book which records the land tax payment by the landowners in the past. On every page of Letter C book contains information about the name of the landowners, owner serial numbers, parcel part numbers, and the class for the parcel. The parcel is divided into two classes: ground parcel and field parcel. Ground parcel is the parcel for residential purposes while the field parcel for the productive purposes such as paddy field. As a record for land tax payment, Letter C book also contains section which stated the parcel size and the amount of money that must be paid by the landowner according to the parcel size and the class of the parcel. Section that describes the change of the ownership is also available on the Letter C book. At the end of every page, there is section for village head to put signature.

4.6. Redundancy on parcel-based datasets

From the respondent interview results, reveal that two different institutions were carried the mandate related to the land, one to collect parcel-based taxes and the other one to register the land and define the property rights. The DGT as a part of Ministry of Finance was responsible to collect the land and building tax and the land transfer tax as one of state sources of revenue. BPN-RI through LOs which are located in city/district, carry the mandates to register the land and define the property rights. In Depok City, three different organizations manage parcel-based datasets for different purposes. The Depok LO manages parcel-data in accordance with the mandate to register the land rights, the DPPKA with the mandate to collect land and building tax and the VO manages the data for the unregistered land. Table 3-1 which contains indicator as mentioned in section 3.4, is used as an analytical framework to present the extent and cause of redundancy in the study area.

4.6.1. Volume of duplicated data

Type of similar parcel data in different organisations

Based on the responses from respondent from the Depok LO, it can be known that Depok LO creates and manages parcel based data as the part of land registration process. This process in accordance with the LO mandates to provide legal certainty through the issuance of certificate of land title for the land possessed by individual, legal entity or the government. The DPPKA manages the land and building tax object and the subject to tax data for taxation purposes which originally created and managed by the TO. Both datasets contain spatial and attribute data.

VOs are managing data and information about customary land, land that previously under the western laws, or land as tax object. The land tax payer holds the proof of the land tax payment. The village offices manage the list which called as Letter C book as the cross reference for the tax payment. The data is no longer used for taxation purposes. The proof of land tax payment and the statement letter for its authenticity from the village office head are needed in the land registration process.

During fieldwork, parcel maps produced by the Depok LO and the TO were collected. These maps are for the same location which is Beji Village. One of the villages located in Beji Sub-District. Figure 4-1 bellow is the map produced by the TO and currently used by the DPPKA and Figure 4-2 is the map produced and used by the Depok LO.

Comparison of parcel maps can be made. On the Figure 4-1, one can see the parcel with NOP 327800100100404110. On the Figure 4-2 we can see the parcels with last five digits NIB 08768, 08812, 08844, 03170. These four parcels are located on the same location with parcel NOP 327800100100404110. The parcel with NOP 327800100100404110 has been subdivided and registered in the Depok LO and got NIB: 08768, 08812, 08844, and 03170. However, the DPPKA is still managed the un-updated data therefore the parcel with NOP 327800100100404110 remains known as one single parcel.

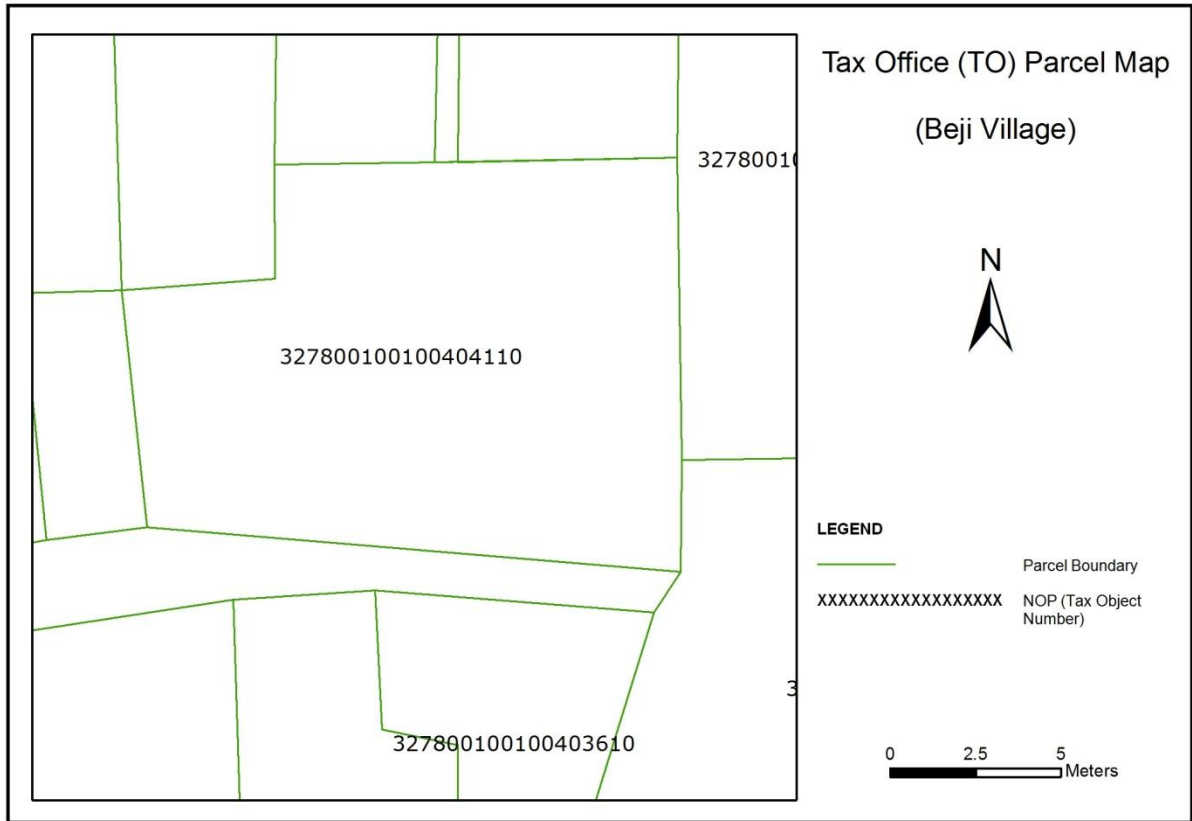


Figure 4-1. Parcel map produced by TO and currently used by the DPPKA

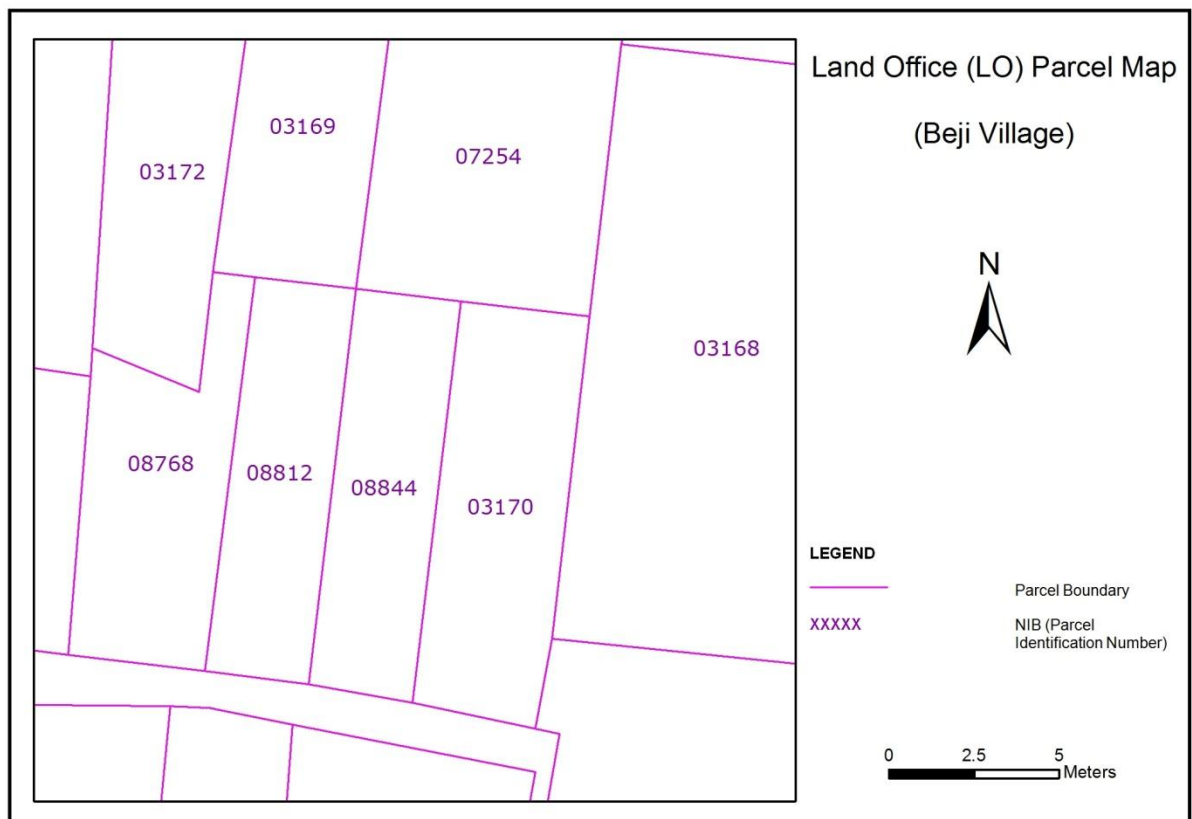


Figure 4-2. Parcel map produced and used by Depok LO

Degree of sharing

Every LO must have registration based maps, as well as Depok LO. The data for registration based maps can be made by field survey and according to legislation can use the available maps from the TO. Since the implementation of UU No. 28/2009, Depok LO obtains the maps from DPPKA to complete their registration based map. DPPKA has the complete parcel maps of Depok City even though the attribute data, in term of subject to tax is not up to date and the spatial data accuracy does not meet the applicable standards in Depok LO. In practice, the respondent from DPPKA also uses parcel-based data in the form of certificate of land rights to update their data. The extent of the parcel and the land parcel's owner stated on the certificate of land rights is treated as a valid data by the DPPKA to update their tax object and subject to tax data. The DPPKA update their data when Depok citizen as subject to tax submits their copy of certificate of land rights.

4.6.2. Extent of repetition in data handling activities

Task repetition

The DPPKA and Depok LO manage parcel-based data in a computerized system even though for different purposes. Both organizations require an accurate data to deliver the services. As a part of the land registration processes and the determination of rights, Depok LO conducts survey and mapping activities. Meanwhile, DPPKA also will conduct survey and mapping activities to update their current tax object and subject to tax data. The current data managed by the DPPKA, formerly the data which gathered by the TO from field survey. To the some extent, the BIMASDA also conducts survey and mapping activities. In case of application of the building permit for the unregistered parcels, surveyor from BIMASDA conducts survey and mapping to confirm the site plan proposed by the applicant.

4.6.3. Awareness

Presence of processes to handle redundancy

The issue of duplication on parcel-based datasets in Depok City is known only for specific respondents. A respondent from the Depok LO is aware that DPPKA manages parcel-based data and vice versa. Respondents from Pusdatin, DISTARKIM, academia and land surveyors are also aware of this situation. Respondents from the Depok LO, Pusdatin and DISTARKIM formerly were land surveyors. Respondents from Depok LO and Pusdatin have same view that there should be only one single data for land information system that can be used both by LOs and DPPKA for taxation purposes. The needs of an up-to-date data were the response given by the respondent from DPPKA associated with the issue of redundancy.

4.6.4. Technical causes

Data format & dissemination

Both printed and electronic data format is used when disseminating the data among Depok LO and DPPKA. But only printed format is used for the product such as certificate of land title or tax letter for the users. Portable storage media is a common media to disseminate data while the Internet channel is rarely used. In delivering products such as certificate of land rights and tax letter to the citizen as the user, both organizations still deliver in the printed format.

Standard

Information regarding to the standard relatively related to the standard on the spatial accuracy. According to respondent from Depok LO and additional information from surveyors, the Depok LO required land survey and conduct direct parcel measurement and mapping to obtain the data as required and to meet the spatial accuracy standard. While the TO based on the regulations is allowed to use remote sensing imagery to obtain spatial data. As the result, the level of spatial data accuracy is different. A land survey for the LO must involve the adjoining parties due to the legalization purpose while for the TO the involvement of the

adjoining parties on the field survey is not necessary. According to PP No. 24/1997, the LO is allowed to use parcel based map produced by the TO as land registration based map in case of the unavailability of parcel based map produced by the LO. However, due to the accuracy levels of the maps produced by the TO, the LO cannot use these maps for land registration purpose. Additional treatment such as adjustment and correction also must be done to handle the spatial data produced by the TO in order to conform to the standard applied by the LO. On the other hand, a respondent from the DPPKA admit that the spatial data produced by the Depok LO as a valid data and meet the standard applied in the DPPKA.

Figure 4-3 shows the overlay of parcel map from the Depok LO and TO that has been done by the Depok LO. It can be seen that parcels with NIB 08768, 08812, 08844, 03170 lay on parcel with NOP 327800100100404110. Adjustment of the map from the TO has to be done to meet the specifications required by the Depok LO such as the geo-reference. The maps' different levels of accuracy shown by the size and the shape of the parcels also can be seen on Figure 4-3.

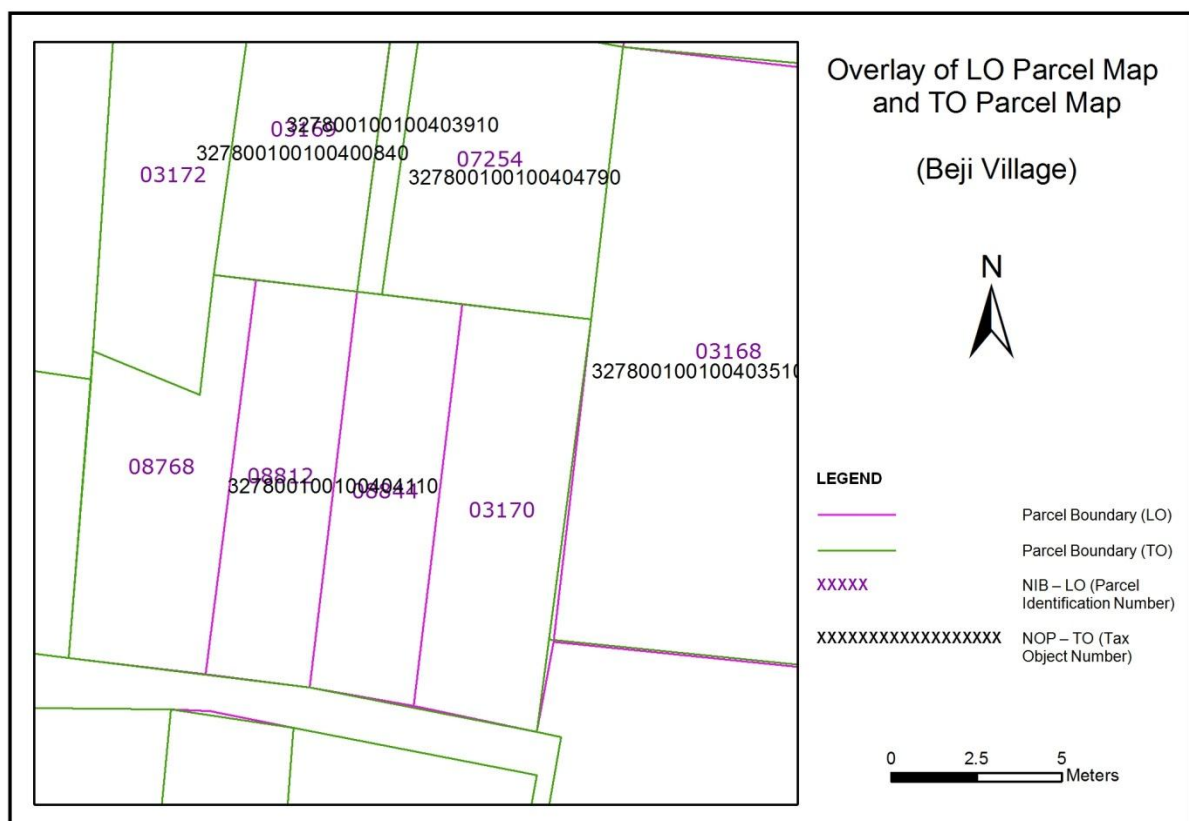


Figure 4-3. The overlay of parcel maps produced by Depok LO and TO

4.6.5. Institutional causes

Data access

As a part of vertical institutions, Depok LO follows the policies and regulations set in the national level by BPN-RI. To confirm about the issues on policies and regulations about the data access and sharing, interviews were conducted with the official in Pusdatin. The data access is differentiated by the certain access level to the contents. Contents related to parcel-based data such as the ownership and encumbrance can only be accessed by the owner, notary/person who has authorization by the owner, interested parties (buyer/seller or parties under the dispute situation) and the government authorities for investigation purpose. This differentiation is associated with the implementation of certain rules and laws in Indonesia.

President of the Republic of Indonesia through the Working Unit for Development Supervision and Control (UKP4) sets a mandate to BPN-RI regarding to the availability of basic land information. By the end of the year 2013, basic information of all registered parcels in Indonesia should be available and can be accessed by the public for free. As the first stage, on December 2012 basic information of registered parcels in DKI Jakarta Province is accessible through BPN-RI website (<http://peta.bpn.go.id>).

In addition to the responses from Pusdatin's staff, the rules and laws related to the data access were examined. The physical and juridical data on the registration maps, parcel list, survey certificate and land book according to PP No. 24 Year 1997 is accessible for the interested party while the physical and juridical data listed on the name list only accessible for certain government organizations (Republik Indonesia, 1997b). Law Number 14 Year 2008 (UU No. 14/2008) about Public Information Disclosure sets limitation into access of the land ownership information (Republik Indonesia, 2008). Conferring to UU No. 14/2008, public only have access into basic information which consists of parcel id (NIB), the size and location, and the kind of rights attached into the land. The cost for the data access and services are sets out in the Government Regulations Number 13 Year 2010 about Tariffs Applicable in BPN-RI (Republik Indonesia, 2010). The cost of information access by other government institutions is set to Rp0 but needs further regulation set by the minister.

The data exchange between DPPKA and Depok LO occurs informally. Conferring to the respondent from Depok LO and DPPKA, formal relation between both institutions is needed in order to deliver better services and carry out better administrative work.

4.7. Role of social network

The application of social network analysis as a method is intended to know the degree of interaction among actors in the study area. Three indicators as mentioned on the table 3.1 are used to measure the interaction among actors which are the applicability, interoperability and frequency. Set of question related to those indicators were raised but only few of respondents provided direct answers in relation to the questions. Furthermore they were not able to provide any documentary evidence or artefacts. Documentary evidence or any other artefacts are necessary to collect in order to derive further information in relation to the determined indicators. As a result, only evidence such as stories and suspicions confronted.

4.8. Conclusion

From the data collected on the fieldwork phase can be known who the actors are: the users and the producers of parcel based datasets in the study area. From the users it can be known from whom they obtain the data and from the producers it can be known who use their data. Producers of parcel-based datasets in Depok City are the Depok LO, the TO which since January 2012 their data of tax object and subject to tax and mandate to collect land tax has been transferred and shifted to the DPPKA, and the VOs. Each of the producers holds and manages parcel-based data for different purposes. The Depok LO manages parcel-based data for legalization purposes and DPPKA manages the data for taxation purposes. The VO manages the unregistered parcel-based data which needed in the land registration process.

Looking back to the variation types related to the issues of the extent and cause of redundancy and the role of social network, the following conclusion can be derived.

1. In the study area there are two organizations that create and manage parcel-based data for different purposes in line with their institutional mandates. Both organizations are using each other's data, one to complete the registration based map, while the other one to update their current data.

2. The data creation and maintenance involve certain processes and tasks to conduct. Certain policies and regulations are set for those processes and tasks. It can be known the repetition of tasks to create and maintain the data.
3. The result showing the awareness on the redundancy issue among the producers which related to the repetition of tasks under two different systems that lead to a duplicated data. There is also indication to utilize a single data that can be used for different purposes by different organizations.
4. Different standards are applied and based on the defined objectives in accordance with the mandates of each institution. The standard in generating data and the standard of the data itself is different. Additional treatment is needed in handling the data which provided by the other organization.
5. Data access and sharing are regulated under certain policies and regulations. The Depok LO follows the policies and regulations which are set in the national level while the DPPKA is adopting the policies and regulations used by Depok TO. The current situation shows that the data exchange between DPPKA and Depok LO occurs informally.
6. Related to the role of social network, the data were insufficient to derive any conclusions in relation to the indicators that have been developed.

The following chapter will analyse the results and evaluate the extent and the cause of redundancy.

5. DISCUSSION

5.1. Introduction

This chapter presents the discussion of the extent and the cause of redundancy aiming to answer research question 6 and 7. The results regarding to the issues as presented on Table 3-1 are discussed on this chapter. The extent of redundancy is presented on Section 5.2 and the cause of redundancy on Section 5.3. Section 5.4 discusses the views related to the role of social network. To discuss the cause and the extent of redundancy, the inference is made between the theoretical views as presented on Chapter 2 with the results of empirical data as presented on Chapter 4. Section 5.5 provides a conclusion.

5.2. The extent of redundancy

The discussion of the volume of duplicated parcel-based datasets can be started from which institution produce or manage the datasets. As stated on the Section 4.4.2 it can be known those institutions that produce and manage the data and the institutions who only manage the data. The parcel-based datasets itself are described on the Section 4.5. By looking on the Figure 4-1 and Figure 4-2, it can be known that there are two spatial data which differentiated by the institutions who responsible to generate the data. While through the Figure 4-3 it can be seen clearly that there are parcels that have two parcel identifiers which is used by two different institutions, parcel with NIB 03172 and with NOP 327800100100400840 for instance. Those parcels with different identifiers are used and produced under two different systems. It can be concluded that for the same parcels there are two datasets stored in two different systems.

The volume of duplicated data would be increased if the unregistered parcel is registered by the LO. The registration of a parcel will create a new set of data which consists of spatial and non-spatial data. The data will be stored in the SIMTANAS managed by the LO. Whereas the part of same parcel datasets, the spatial data, is also stored in the DPPKA system. It can be identified through the point that LO can obtain parcel maps, for the unregistered parcels, from the TO to complete the LO's registration based map. The volume of duplicated data also can be increased in case of DPPKA update their data using the data from the certificate of land rights submitted the tax payers. The data stated on the certificate, the name of the owner as the subject to tax and the extent of land as the tax object, is treated as valid data and used by the DPPKA to update the SISMIOP's data.

The parcel-based datasets are generated through a set of tasks with certain procedures that have been established as mentioned on the Section 4.6.2. On the land registration process, according to the regulations it requires field survey to conduct direct parcel measurement by surveyors to obtain spatial data. Later on the processing result of field survey data together with the result of examination of documents which submitted by the applicant will be processed according to the certain procedures and mechanisms. The processes to collect tax object data also consist of tasks to obtain tax object's spatial data. Although according to regulation it is possible to use remote sensing imagery, field survey to conduct direct parcel measurement also applied. The purpose of field survey is also for obtaining the data of subject to tax. After all the process is completed the data will be stored and managed under the SIMTANAS for the land registration process and in the SISMIOP for tax data collection and can be updated as needed. SISMIOP and SIMTANAS are information system that can handle both spatial and non-spatial data.

It can be known the presence of task repetition. Indeed in the two separated systems, repetition of works can be found. The processes to generate data and the process to handle the data under certain

mechanisms are shown by both institutions. These processes to generate, to obtain and to maintain the data are certainly based on the defined objectives in accordance with the mandates of each institution. The data availability and to meet the specify requirements are the reasons behind the task repetition. The unavailability of data that can be used leads to a situation where the data should be generated. On the other hand, the available data which cannot meet the requirements that have been set out must be regenerated through certain process.

The existence of two different institutions that produce and manage parcel-based datasets in fact is also tried to be complementary. One party realize that their data is incomplete, while the other side recognize that their data is outdated. Both parties are aware of this situation. The Figure 4-3 gives an overview of the current data available on one village in the study area. The data available on DPPKA is not updated. For instance DPPKA still manages NOP 327800100100404110 as one single parcel, while in the Depok LO the parcel already subdivided and registered into four parcels. In line with the view by Hicks et al. (2006), the condition in Depok City shows that two growing independent information systems can lead to a situation where the information held by two organizations is isolated, incomplete and outdated. In a decision making process, primarily related to the public interest, accurate and reliable information plays a critical role.

The availability of an accurate and up to date data is a necessity. The data accuracy, both for spatial and non-spatial data is an important concern for both parties. For the LO which has to provide legal certainty to the possession of land by individual or legal entity and give assurance regarding to the location, boundaries and the extent of the land, the term of accuracy is a vital factor. The legal certainty is expected to give tenure security and to support a well-functioning land market. On the other hand, the discrepancy of the extent or boundaries of a parcel can cause the uneasiness for the parties' related and sometimes lead to a legal action. For the DPPKA the utilization of accurate and up to date data cannot be ruled out. As a main source of local government income, the actual and accurate data for PBB and BPHTB are important things to notice. Fair land taxation is a key concern for government and citizen, local government as tax collector and citizen as taxpayer. The taxpayers pay the taxes according to their possession, and the government collect the tax according to the taxes that should be paid.

The presence of information management as an integral part on land administration is essential. The information management that can manage the process of data acquisition, preparation, exchange, dissemination, storage and retrieval of information, and link the different systems as well. Under the well-established information management regime which connects different systems and crosses institutional boundaries, the data exchange between parties can be done through a formal channel. The informal data exchange and dissemination which is based solely on personal relationships, through the direct contacts for instance, can be avoided. The repetition of tasks to generate and maintain the data would be reduced and the duplication of data can be minimized.

5.3. The cause of redundancy

From the result presented on Section 4.6, it can be known that two institutions have mandate related to the land parcel in Indonesia. BPN-RI has mandate to register land parcels and also provide recommendation to regulate the use of the land through its LOs in the city/district level. The DGT as part of Ministry of Finance has mandate to collect land tax through its local TO in the city/district level. The aggregation of mandates, where two institutions manage similar parcel-based data for different purposes would bring consequences. Each institution will work on certain policy and regulations in accordance with the mandate and objectives that have been set.

Different standards on generating spatial data as presented on Section 4.6.4 are applied by two institutions. In generating spatial data, certain process and procedure must be performed to meet the defined standards related to the spatial level of accuracy. The Figure 4-3 as the result of overlay operation of maps on Figure 4-1 and Figure 4-2 shows the application of different standards in survey and mapping applied by the Depok LO and TO. From the result in Section 4.6.4 it can be known that the Depok LO generates spatial data with higher level of accuracy compare to the data generated by the Depok TO. It may be indicated that if the available data cannot meet the set standards, the option is to not use the data and likely to generate new data.

The application of different data standards, also can lead to barriers on the data sharing. Steps will be taken to adjust the unstandardized data to meet the requirement or to comply with the standards that had been set out by other organization. If the use of resources to make an adjustment or to modify is too high, it can be considered as an hindrance conferring to Crosswell (2000). In that certain situation, party is likely to stick with existing standards rather than to adopt or modify other's standards. Interoperability and the maintainability are also the reason to apply the same standards. The establishment of a single national land database which will replace the current local database in every city/district LO requires the same protocol so that the data communication and transmission can take place without any hitch. By using the same standards, performance of the system can be relatively easy to maintain and monitor. That's why the flexibility on defining standards is important. Flexibility is in the sense that specific needs of users can be accommodated by the defined standards without overlooking the broader needs of other users.

The other users also mean other government organizations. Although separated by two different systems to manage parcel-based data, current situation shows that the Depok LO and the DPPKA have been exchanging the data but through informal channel. By regulations, the Depok LO can use the spatial data of the DPPKA to complete the registration based map meanwhile, the DPPKA needs to update their data. The use of informal channel which is not built specifically for disseminating, sharing and exchanging data among government institution is considered as a limitation. The use of informal channel requires effort to distribute, translate, interpret or modify the data to meet the specific needs. If the effort to take is considerably high compare to generate the same data, the decision would be merely to generate their own data and not to use the other's data. Moreover, one cannot rely on informal channel to exchange confidential data. In Indonesia, parcel-based data is considered as confidential data. Transparency in the term of misused of data and conflicts of interest among individuals can play a role.

When viewed from a hierarchical structure, the Depok LO lies in the bottom level under the provincial and national level. Data sharing and access, pricing policies, the defined standard and procedures, are set in the national level. With such arrangement, the Depok LO has to implement all those policies and procedures set in the national level. But on the other hand, the Depok LO must interact with local government organizations at the same level. From the result indicates that the interaction between the Depok LO and other local government organizations is likely facing complicated situation as stated by Sharon (1996). Depok LO cannot be certainly and flexibly establishing formal arrangement, in term of data access and sharing, with the other organizations who deals with parcel-based data. Sometimes to take a decision, coordination and communication with the higher levels must be conducted and it would take time. Whilst the local organization is not tied directly to the higher level organization hence it can work relatively flexible.

The current arrangement related to the land administration in Depok City is likely to happen in all city/regency in Indonesia. The LOs and provincial offices were established to conduct the duties and functions of the National Land Agency in the regency/city and provincial level (Republik Indonesia,

2006b). According to the Regulation of Head of BPN-RI number 4 year 2006, LOs which operate in the implementation level are coordinated by the provincial office (Republik Indonesia, 2006a). Meanwhile, policies, rules and regulations are made at the central level by considering the inputs and needs of the levels below it. Similar situation can be found with the TOs as part of a vertical institution under the Ministry of Finance. Formerly, to collect the PBB and BPHTB were the duties of TOs. Since the implementation of Law Number 28 Year 2009 about Local Taxes and Levies, all regency/city governments will take over the TOs' duties to collect the PBB and BPHTB.

The number of registered land or the land that has been legally determined is a problem encountered in Indonesia (Badan Pertanahan Nasional RI, 2010). That condition affects to the availability of land data and information. The availability of land data and information which continuously updated is one of the basic foundations for a nation development. The land data and information that can be used by society, governments and also the private sectors as the stakeholders. However, one should realize that no organization would have a neither complete nor up to date data. Resources are needed to generate and maintain the data. Emphasize should be on the view that all the data belongs to the state not owned by each institution. It may be a starting point to create a better access, hence enable the data and information utilization and exchange.

5.4. The role of social network

Although there is no result available related to the social network analysis, this section attempts to discuss about land as an issue. The aim of implementing social network method is to know the degree of interaction related to the land among actors in the study area. The degree of interaction itself has three indicators to look at: applicability, interoperability and the frequency.

From the experiences gained by the researcher, give an indication that land remain as a sensitive issue in Indonesia. It is also expressed by some respondents. Information related to the land is confidential therefore cannot arbitrarily to be disseminated. One can say even to obtain information of land through the official institution is not easy. This issue is in line with the findings presented by Central Information Commission (KIP). KIP received many public complaints related to the difficulties in obtaining land related information (Berindra, 2012). According to the findings, BPN offices refused to provide information due to the discretion and even secrecy of the information. The subject matter is what kind of information related to the land is accessible to the public or can only be accessed by the land owner. This is related to the legal rules and regulations that govern the access of information. Set of requirements and procedures must be followed which give impression that official information related to the land is hard to obtain.

The difficulties to access or to obtain land related information may lead to a situation where one would not be easily sharing the information they have. The information held will be treated carefully because of the efforts that have been made to obtain such information. The greater the effort is given to obtain such information, the more information will be treated as confidential information.

5.5. Conclusion

According to the literature redundancy constitutes of repetition and management, repetition of activities and management to handle replication and fault handling. The redundant data on parcel-based datasets is a result of more than one similar process to generate data. From the findings it can be known that more than one institutions according to their mandates deal with parcel-based data. The availability of data that can be used to achieve defined objectives is a factor which leads to redundancy. As a result is the existence

of redundant parcel data. The redundant data is also generated through repetition of tasks and activities which related to the data handling. Through the existing systems, it also can be known that different use of standards can cause of redundancy. Two different institutions set the standard according to their requirements. Government Regulation Number 24/1997 about land registration, allows the use of spatial data produced by other organizations to complete the registration based map as long as it meets the standard requirements (Republik Indonesia, 1997b). Regulation of Head of BPN Number 3/1997 set further requirements of the standard that must be met (Republik Indonesia, 1997a). Each of the institutions tends to generate and obtain data according to the standards that have been set out. The use of unstandardized data means extra effort to be taken and may bring unnecessary result. The illustration of the separation of mandates which leads to the repetition of tasks and a redundant data is showed on the Figure 5-1 below. Looking back to redundancy framework as showed on Figure 2-1, it can be concluded that redundancy is mostly related to the process of repeating or being repeated of tasks and processes. In addition, management as one of redundancy components shows that replication cannot be separated with the fault handling. The management to replicate the data is in order to ensure the availability of data that can be used to meet the defined objectives.

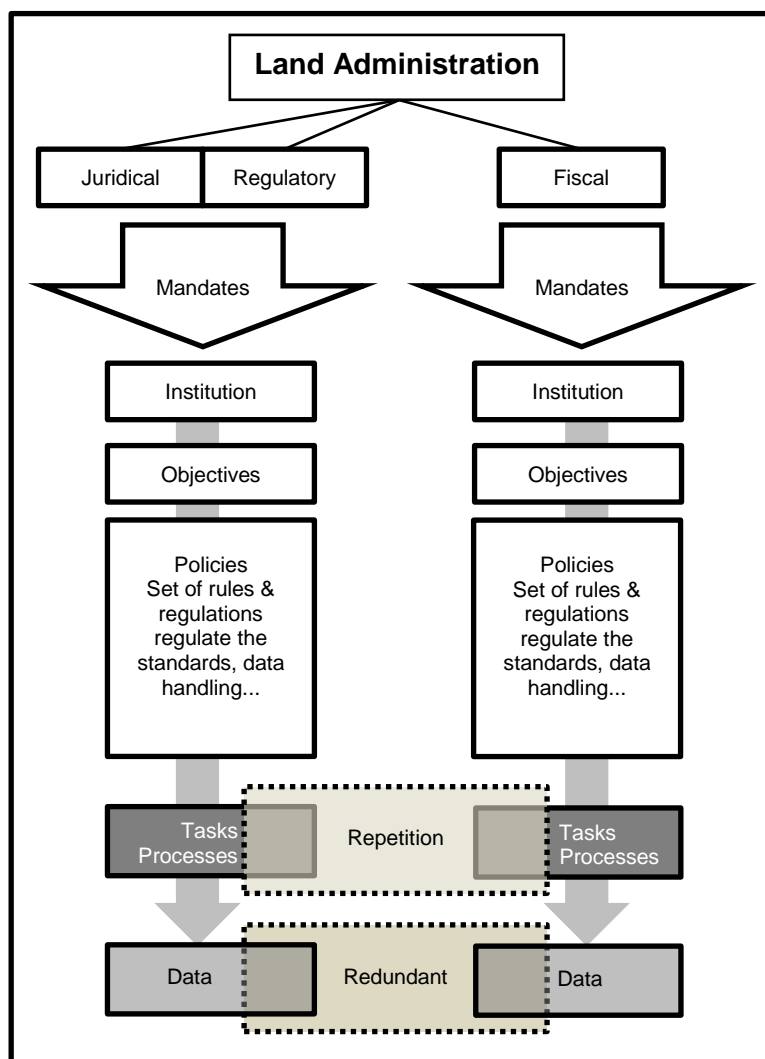


Figure 5-1. The overview of mandates separation

6. CONCLUSION AND RECOMMENDATION

6.1. Introduction

This chapter presents the conclusion of the research according to the research sub objectives and research questions. The recommendations from this research are provided on Section 6.3.

6.2. Conclusion

Sub-objective 1: To identify actors and their roles;

1) *Who are the actors' related to parcel-based datasets?*

The actors related to parcel-based datasets is the actor who provide legal certainty to the possession of land by individual or legal entity and give assurance regarding to the location, boundaries and the extent of the land, manage the use of the land and collect taxes. Moreover banks and housing finance companies which provide loans using land and property as collateral, notaries, real estate agents, land surveyors and other actors who use details information are also the actor's related to parcel-based datasets.

2) *What are actor's roles in the study area?*

The roles of the actors in the study area can be distinguished from the purpose of the use of parcel-based data. Depok LO providing service on land registration process, manage the land information and providing recommendation related to the use of the land which will be used by DISTARKIM. The DPPKA (formerly Depok TO) has a role to collect land and building tax. DISTARKIM is responsible for the city spatial planning and granting developing permit. The BIMASDA is responsible in developing and maintaining public infrastructures (road, bridge, and waterways). The village offices are providing the unregistered parcel data and information which is needed in a land registration process. Providing legal affair services are the role of notaries in the study are. Respondents related to the financial sectors have role in providing loans using land as collateral for personal and corporate sector. To develop housing are the role of housing developer. Role of surveyors are to conduct survey and mapping for Depok LO or other institutions.

3) *What are the types of actor in the study area?*

From the result it can be known who the actors are: the users and the producers of parcel based datasets in the study area. The users found in the study area are in line with the users mentioned in the literature. The users of parcel-based datasets are varied from government institutions, notaries, financial sector such as bank and also the land surveyors. Producers of parcel-based datasets in Depok City are the Land Office (LO), the Tax Office (TO) which since January 2012 their data of tax object and subject to tax and mandate to collect land tax has been transferred and shifted to the Revenue and Financial Management Office (DPPKA), and the Village Offices (VO). Each of the producers holds and manages parcel-based data for different purposes. The Depok LO manages parcel-based data for legalization purposes and the DPPKA manages the data for taxation purposes. The VO manages the unregistered parcel-based data which needed in the land registration process.

Sub-objective 2: To analyse parcel-based data flow in study area using social network analysis;

4) *How does the parcel-based dataset flow in the study area?*

5) *What are data flow characteristics among actors?*

These two research questions are unanswered on this research. The reason why these questions remain unanswered is described on Section 5.4. The recommendation regarding to this application of SNA is described on Section 6.3.

Sub-objective 2: To evaluate parcel-based datasets redundancy phenomenon.

6) *What is the extent of redundancy in the study area?*

It can be known that more than one institutions according to their mandates deal with parcel-based data. The existence of two different institutions that produce and manage parcel-based datasets in fact is also tried to be complementary. One party realize that their data is incomplete, while the other side recognize that their data is outdated. Both parties are aware of this situation. As a result is the existence of redundant parcel data. The redundant data is also generated through repetition of tasks and activities which related to the data handling. The data availability and to meet the specify requirements are the reasons behind the task repetition. The unavailability of data that can be used leads to a situation where the data should be generated. On the other hand, the available data which cannot meet the requirements that have been set out must be regenerated through certain process.

By using the redundancy conceptual framework shown in Figure 6-1 below, the findings also show the similar characteristic. The repetition, in the form of tasks and processes, and the management to replicate and to handle fault are the findings found from the case study. Different institutions do similar tasks and processes in the data handling. The use of other's data can be defined as data replication which is intended to ensure the continuity of the system. Certain process to deal with and control the replication and to handle the fault is related to the management part.

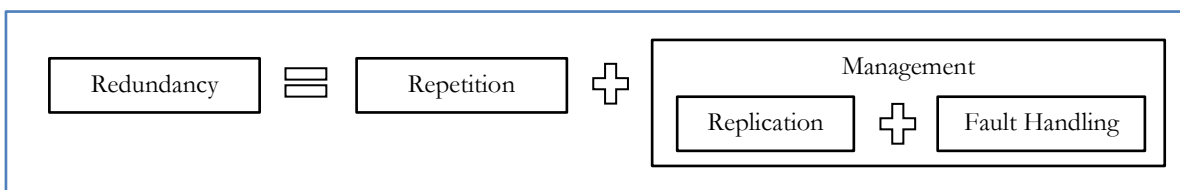


Figure 6-1. Redundancy conceptual framework by Schmidt (2006)

7) *What is the cause(s) of redundancy?*

Fiscal and legal cadastral are separated into different institutions to operate. Each institution will work on certain policy and regulations in accordance with the mandate and objectives that have been set. Different standards on generating spatial data are applied by two institutions to meet the defined objectives. It may be indicated that if the available data cannot meet the set standards, the option is to not use the data and likely to generate new data. The application of different data standards, also can lead to barriers on the data sharing. While the formal channel is not available to exchange and share the data, the informal channel will be established. The use of informal channel which is not built specifically for disseminating, sharing and exchanging data among government institution is considered as a limitation. Efforts are needed to distribute, translate, interpret or modify the data to meet the specific needs. If the effort to take is considerably high compare to generate the same data, the decision would be merely to generate their own data and not to use the other's data.

The cause of redundancy also can be related back to the redundancy constituent components as shown on Figure 6-1. To handle fault in order to ensure the continuity of the system through the set of management part is likely to be a concerning point. Attention will be given in avoiding fault to achieve the defined objectives. Therefore, the occurrence of repetitive tasks and processes could exist as long as it aims to accomplish the goals.

6.3. Recommendation

This research relied on interview results on a single case study. The intended Social Network Analysis as a method did not successfully implement. The results of SNA should be able to validate the current actors' involvement in the study area. The following are recommendations for further researches.

1. To study the parcel data flow with its characteristic using SNA in the study area are still relevant. By implementing SNA method, the analysis of spatial data flows between data user and data producer arranged and facilitated under certain arrangement can be made. Consideration should be taken carefully on the approach to involve the respondents in the study area.
2. To study about the effect and way to address of redundancy on parcel-based datasets is also important. The overall findings of this study which show who the producers are and the existence of redundant parcel-based datasets can be a reference for further examination on the impacts of redundancy. The negative or positive impacts related to the existence of the redundant parcel-based datasets and in the term of data handling for instance. Hence, there will be a comprehensive view to address redundancy.
3. For practitioners, to study about the feasibility of integrating two available land information systems is necessary. The land information management that can link the two land information systems is expected to serve a wide variety of users.

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ANNEXES

Annex I. Respondent information

No	Respondent	Name	Institution	Position	Date of Interview
1	Gov. Official	Mr. Lili Hermawan	Depok Land Office (LO)	Thematic and Land Potential Sub-Section Head	01/10/2012 05/10/2012
		Mr. Nuryanto	Revenue and Financial Management Office (DPPKA)	Intensification and Extensification of PBB and BPHTB Section Head	10/10/2012
		Mr. Antonius B. Wijanarko	Geospatial Information Agency (BIG)	Metadata Division Head	01/10/2012
		Mr. Arief Panuju	Spatial Planning and Settlement Office (DISTARKIM)	Spatial Utilization Section Head	08/10/2012
		Mr. Satria Fistriadi	Roads and Water Resources Office (BIMASDA)	General Affairs Sub-Section Head	09/10/2012
		Mr. Bambang Supoyo	Local Development Planning Office (BAPPEDA)	Urban Development Division Head	10/10/2012
		Mr. Ketut Ary Sucaya	Pusdatin BPN-RI	System and Application Standard Section Head	28/09/2012 16/10/2012
		Mrs. Ika Aulia	Directorate General of Taxes (DGT)	Worked at Data and Document Center, Directorate General of Taxes	23/10/2012
		Mrs. Tessy Haryati	Mekarsari Village	Village Head	11/10/2012
		Mr. Drajat Kar yoto	Pasir Gunung Selatan Village	Village Head	12/10/2012
2	Academia	Mr. Triarko Nurlambang	University of Indonesia Research Centre for Applied Geography	Researcher & Lecturer	01/10/2012
3	Notary, PPAT	Mrs. Pangestuti	Pangestuti Notary & PPAT	Notary & PPAT	11/10/2012
		Mr. Suparman	Mega Shinta Cahya Putri Notary & PPAT		10/10/2012
4	Banking Institution	Mr. Dian Dafid	Bank Jabar Banten	Marketing Staff at Consumer Goods	08/10/2012
		Mr. Susilo	Bank Negara Indonesia	Marketing Staff at Consumer Goods	18/10/2012
		Mr. Paulus Natigor	OCBC-NISP	Credit Department	17/10/2012
5	Appraisal	Mr. Jerry Yoestiadi	OCBC-NISP	Internal appraisal	19/10/2012
		Mr. Wayan Arca na	Bank BTPN	Internal appraisal	15/10/2012
6	Housing Developer	Mr. Bintang	PT. Lintas Sakti Pratama	Legal Staff	22/10/2012
		Mr. Richard	PT. Dinamika Alam Sejahtera (GDC)	Legal Staff	22/10/2012
7	Surveyor	Mr.S. Budi Santoso	Surveyor		23/10/2012
		Mr. Ronny K.	Surveyor		24/10/2012
8	Electrical Company	Mr. Budi Hartono	PT. PLN AJB Depok	Bagian Niaga, Pelayanan & Administrasi	15/10/2012
9	Water Company	Information gathered from Mr. Arief Panuju	PDAM Depok City, Tirta Asasta		16//10/2012

Annex II. Questionnaire

Rizki Agung Nugroho

Questionnaire Form/Formulir Kuisisioner

Master Programme of Land Administration/Program Magister Administrasi Pertanahan
Faculty of Earth Science and Geoinformation (ITC)
University of Twente, The Netherlands

Researcher/Peneliti : Rizki Agung Nugroho
Supervisors/Pembimbing : Ir. W.T. de Vries
DR. R.M. Bennett
Research Title/Judul Penelitian : Evaluating Redundancy of Parcel Based Datasets in Indonesia

(1) RESEARCH OBJECTIVES/TUJUAN RISET

To evaluate the nature and extent of parcel-based datasets redundancy.

Untuk mengevaluasi jenis serta tingkat redundansi data berbasis bidang tanah

(2) PROCEDURE/PROSEDUR

If you participate in this research, you are voluntary to answer questions more or less 15 minutes.

Jika anda berpartisipasi dalam riset ini, anda akan bersedia untuk mengisi kuisisioner ini secara sukarela selama +/- 15 MENIT

(3) BENEFITS/KEUNTUNGAN

This study does not give specific benefits for respondent. However, your participation will contribute to academic purposes especially in defining redundancy on parcel-based datasets.

(4) RISK/POTENSI RESIKO

Studi ini tidak akan memberi keuntungan yang spesifik diluar dari kesempatan untuk membagi pandangan dan opini anda. Namun demikian, partisipasi anda akan mendukung tujuan akademik khususnya dalam mendefinisikan redundansi pada data berbasis bidang tanah.

This study does not intend to provoke a physical and non-physical. However you choose to share your knowledge for filling out the questionnaire. All information will be used only for academic interest by researchers.

Studi ini tidak bermaksud untuk memprovokasi suatu ketidaknyaman secara fisik dan non-fisik. Namun demikian anda memilih untuk membagikan pengetahuan anda selama pengisian kuisisioner berlangsung. Semua informasi tersebut akan hanya akan digunakan untuk kepentingan akademik oleh peneliti.

(5) CONFIDENTIALITY/KERAHASIAAN

All sensitive information and confidential information will be destroyed by researcher after finished the research.

Seluruh data dan informasi sensitif dan rahasia hasil kuisisioner ini akan dijaga ketat oleh peneliti dan akan di rusak setelah penelitian ini selesai.

(6) RESEARCHER IDENTIFICATION/IDENTIFIKASI DARI PENELITI

If you have further questions and special interested to research please feel free send email to nugroho29101@itc.nl

Jika anda memiliki pertanyaan atau ketertarikan khusus pada penelitian ini, silahkan kontak ke peneliti melalui nugroho29101@itc.nl

(7) TABLE OF CONTENT/DAFTAR ISI

This questionnaire is divided into three sheets including introduction, personal identification, and questions

Kuisisioner ini terdiri atas tiga lembar termasuk penjelasan, data pribadi, dan pertanyaan

**PLEASE GO ON TO "PERSONAL INFORMATION" SHEET
SILAHKAN MENUJU LEMBAR "DATA PRIBADI"**

Please Put Tick Mark (✓) Inside The Box for Each Question
Harap Bubuhi Tanda Centang (✓) Untuk Setiap Pertanyaan di Dalam Kotak

1. From whom do you get parcel-based datasets?
 Darimana Anda memperoleh data berbasis bidang tanah tersebut?

	Local Land Office/Kantor Pertanahan
	Produce by ourself/Produksi sendiri
	Other source, please mention/Sumber lain, tolong sebutkan
.....	

2. Is it an official data?
 Apakah data tersebut resmi?

	Yes, it is/Ya data tersebut resmi
	No, it is not/Tidak, data tersebut tidak resmi

3. Do you use parcel-based datasets from others?
 Apakah Anda menggunakan data bidang tanah dari sumber lain?

	Yes, Please mention/Ya, tolong sebutkan

	No/Tidak

4. In what purpose do you use parcel-based datasets?
 Digunakan untuk apa data tersebut?

	Internal purpose/Kebutuhan internal
	As data supplier/Sebagai penyedia data
	For whom/Untuk siapa (Please mention/Tolong sebutkan)
.....	
	Other purpose/Tujuan lain

5. How do you acquire parcel-based datasets?
 Bagaimana Anda memperoleh data tersebut?

	It is organization's mandate/Kewajiban penyedia layanan
	Joint cooperation/Kerjasama
	Buy/Membeli

6. How often do you use the data?
 Seberapa sering Anda menggunakan data tersebut?

	Daily/Harian
	Weekly/Mingguan
	Monthly/Bulanan
	Yearly/Tahunan
	Incidental/Insidental

7. How often do you get/update the data?
 Seberapa sering Anda mendapatkan/memperbarui data tersebut?

	Daily/Harian
	Weekly/Mingguan
	Monthly/Bulanan
	Yearly/Tahunan
	Incidental/Insidental

8. Do you know which other organization produce parcel-based datasets?
 Apakah Anda tahu organisasi mana yang menghasilkan data bidang tanah?

	Yes/Ya (Please mention/Tolong sebutkan)

	No/Tidak

End of questionnaire/Akhir dari kusioner