Development of Land Information System as Basis of Spatial Planning:
Critical Review on Cadastre 2014, content and context
Case Study of Indonesia

THESIS
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Abstract

This research discusses the policy transfer of Cadastre 2014 into planning practice in Indonesia context; where the six statements of Cadastre 2014 become main evaluation criteria analysis due to the development of Land Information System as basis of Spatial Planning. At the first, this research presents a conceptual understanding in the areas of sustainable land management, spatial planning, land information system and cadastre 2014 as basis of theoretical framework. Land Management concept as an umbrella to interrelate the other concept such as spatial planning that need land related information system as supplier information to this subject and then Cadastre 2014, a modern cadastre reform concept as subsequent LIS, that contains the six statements, can become an element for developing LIS and extend to spatial planning. Technological development of surveying and mapping, especially GIS is used as a tool to help in managing spatial data and non-spatial data. Implementation of the policy into planning practice will consider resources, possibilities, and constraints in institutional and cultural planning characteristic of Indonesia as a study case.

This research aim is to explore policy transfer of Cadastre 2014, to what extend it can be integrated into spatial planning and to obtain recommendation for best approach in Development Land Information System as basis of Spatial Planning in Indonesia. Four methods to approach are data collection, structuring theoretical framework, case study, and exploratory and qualitative analysis. Theoretical review to provide foundation for analyzing the case study and get clear insight of the problem planning practices against concept

Some remark depict in conclusion. That cadastre 2014 can integrated into spatial planning. By means of policy transfer Indonesia can use this concept and it require adjustment appropriate with Indonesia planning culture. Cadastre 2014 can be used to support development of Land Information System as basis of spatial planning. For implementation to Indonesia context, it considers resources, possibilities and constraints. Recommendations for better integration cadastre 2014 into spatial planning such as setting up legal framework, formal institutional organization, and technical capability besides improvement human resources for continuity and successful the integration

This opportunity will enrich the decision making process within spatial planning in Indonesia. Back to policy transfer it is depended on institutional and cultural planning of the country.

Keyword: spatial planning, land information system, Cadastre 2014, the Six Statements, policy transfer, implementation, Indonesia

Preface and Acknowledgements

Spatial planning as a mindset to manage especially land resources needs land information system. In line with those problems, the emergence of a new Cadastre 2014 can become guiding criteria via the six statements to be integrated into spatial planning. As a concept, Cadastre 2014 carries out a new 'soul' of cadastre reformation. This research intent to put Cadastre 2014 into spatial planning main frame context, via development of Land Information System as basis of spatial planning enriched with critical review to the six statements. This concept considers technology development of surveying and mapping, computerization and automation, especially GIS that can be main tools to sustain the cadastre reform besides institutional framework that need to be paid attention due to the successful implementation to planning practices.

As the concept that aims to contribute to spatial planning this research give figure of some reflective critical review that reveal the six statements content to develop land information system and for benefit to spatial planning. Implementation related to institutional and cultural as the parts of uniqueness of the country is one aspect that needs to be explored. This research did across conceptual matters to the possibilities and constraints of the implementation into planning practices. For this research the recommendation of the concept expectantly will become the consideration for improving spatial planning.

Finally, I would like to acknowledge some people that express my gratefulness to my first supervisor Prof. Dr. Gerald Linden for his supervision and help throughout this study, and for second supervisor Ir. Roos Akbar, M.Sc., PhD., and Dr. Ir. Paul Ike that give critical point and encouraging author to do the right analysis. Also, I would like to show my appreciation for Prof. Dr. Gerald Linden as Dean of Faculty of Spatial Science (RUG), Dr. Ir. Paul Ike as Director of Technische Planologie (RUG), Ir. Haryo Winarso, M.Eng, Ph.D. (ITB), and all staff lecturers in RUG and ITB. Thanks to Bappenas and NEC-StuNed for the financial supporting so this research thesis can be done in collaboration of Double Degree Master programme of ITB Indonesia and RUG The Netherlands.

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Chapter 1
Introduction

This research intends to study Cadastre 2014 as an element of Land Information System as basis of Spatial Planning. The explanation initiate with the spatial planning problem that needs supply of data and information for spatial development, then it will elaborate development of Land Information System. In line with those problems, currently the emergence of a new concept of Cadastre 2014 can become resources to contribute Land Information System consequently extend to spatial planning. Then this research will critically review the six statements, which contained in The Cadastre 2014 as guidance and rules of modern cadastre reform. After that the implementation related to institutional framework into planning practice will be elaborated, the possibilities and constraint of policy transfer into planning practices in Indonesia context, as a case study. This chapter is structured into several sub chapters: background, objectives, methodology, and structure report.

1.1 Background

This part will describe the importance of this research to solve the problem that related with land. Begin from spatial planning context as a mainframe that deals with land problem and land management via planning tools, it requires supply of data and information related land. Then land information system and the development is an answer to that requirement, considering development of information technology. In line with the importance to develop LIS, the emergence of a new Cadastre 2014 as modern cadastre reform concept can become benchmark for evaluating the development of LIS based on the Six Statements in Indonesia context. The six Statements as importance point to guide the Cadastre 2014 achieve the vision and mission.

Spatial planning refers to the methods used by the public sector to influence the future distribution of activities in space (European Commission, 1997). Land as one aspect in space is basis of most activities. To spatial planning, land has essential and importance value besides its physic-geographical, it has multidimensional characteristic such as socio-cultural, economic, and political. Land is part of the social and political fabric that sustains all communities (Bathurst, 1999). It has fundamental role to the human kind as place to do activity that relates to use of land.

Tension of the overpopulation growth in opposition to the limit of land resources can trigger serious problems such as conflict interest of using land. Therefore, it needs to be managed via spatial planning. Spatial planning is a process to manage land and develop it for of all activities of citizens, private and public sector and concerns to sustainable development for the future generation. It can become tool to approach the spatial problem, tool for solving guidance of land conflict or different interest of land through land use, land zoning, growth management[1], and etcetera. To do this task, it requests data and information due to the land and its property rights. The lack of data and information of land can give negative impact of the process of spatial planning. Data and information is prerequisite for the better policy making of spatial development.

[1] Growth management has been used in The USA as a tool for management urban sprawl

Akbar, 2003, studied the importance of database for spatial planning, especially in developing country. He emphasized that spatial planning need data and information to fulfill its function such as for operational, management, strategic and communication (Haris, 1989 in Akbar, 2003). For instance, the availability of a new land use data for urban planning sometime is difficult to be assessed, lack of updating, and bad of maintenance. Building digital database is prerequisite for spatial planning, especially land related information system as basis for further analysis. System for management land related data and information is answer to supply data and information of land to spatial planning

Land information system, so called LIS as a subsequence of spatial planning can support land management by providing data and information about land resources. It can process raw data to information for further analysis. Through Land information system, as Binns, (1953) in Dale and McLaughlin, (1989) the wastage of land resources can be minimized. But it need some resources such as human brain ware, technical, and skill resources, appropriate and responsible land management system, supported by institutional framework include legal aspect, regulations, institution organization, for guiding implementation. Due to support LIS, land unit-based information or cadastre can give significant influence to the problem.

Cadastre concept is shifting from time to time to anticipate the dynamism of human needs to manage land and its property rights. The importance milestone carried out by UNECE (United Nations Economics Commission on Europe) that triggered attention to land administration and produced "Guidelines for Land Administration". Some remarks described the significance of land administration to be effectively managed, provide land-related information, involving broader stakeholders, and attention to the economic asset of land (UNECE, 1996). Others meeting was held by United Nations on Interregional Meeting of Experts on the Cadastre, in Bogor, Indonesia on 1996, emerged The Bogor Declaration. On 1999 The Bathurst Declaration, workshop in Australia emphasizes on the important land administration system, the need of improving land administration institutions and infrastructures and using information technology as prerequisite for the successful of land administration.

Currently, the emergence of Cadastre 2014 becomes a critical concept to develop LIS**.** Begin in 1994, Working Group 7.1, Commission 7 of FIG (International Federation of Surveyors) developed a vision for a modern cadastre, which called by Cadastre 2014. There are ongoing cadastral reforms and efforts in the world (*Kaufmann, 2001).* This concept becomes a benchmark against which cadastral systems worldwide will measure their development (Steudler et all, 1997), as in this research especially will explore the impact to Indonesia country as a case study. Cadastre 2014 become important matter and it has broader influence to international planning practices around the world through the policy transfer that depended on the institutional and planning cultural of every country (Dolowitz and Marsh, 1996).

The emergence of Cadastre 2014 to answer broader stakeholders needs, considering globalization, technological development, liberalization and privatization. This concept comes up from developed country. Cadastre 2014 as the milestone of the developed concept of land information system in this decade needs to be understood in the context of spatial planning. The Cadastre 2014 is need to be studied as basis of development LIS extended to spatial planning, as the new concept it may has influence

neither positive nor negative depended on the institutional and planning culture of the country. For developing country it may need adjustment to special condition.

There are the six statements as the content of Cadastre 2014 that come from the analysis trend cadastre reform for over the world and including vision and mission for future modern cadastre. These six statements will be elaborated as criteria analysis against the condition of land information development extended to spatial planning to Indonesia context. The reason using these criteria because it can give improvement to cadastral system of Indonesia and in broader context for development LIS as basis of spatial planning

How Cadastre 2014 and the six statements as its contents become sources of criteria to compare, measure and analyze the condition of Indonesia will be elaborated in this research thesis. The mainframe is Cadastre 2014 as subset of LIS and LIS as subset of spatial planning. Land becomes "bridge" to link among them, and as the vital asset for over the world especially in Indonesia context.

The government of Indonesia (GOI) put land as natural resources for people welfare (Indonesia Constitution, 1945) and National Land Agency in short NLA (BPN) have task to manage and coordinate the use of land through law and regulations comprehensively and integrated. BPN have responsibility to develop SIMTANAS (National Land Management and Information System) based on President Decree 34/2003. In Indonesia, some of land conflict happened, before talking about the implementation of land information system. Moreover, if the solution to manage is not taken into account by government and interrelated stakeholders so it can trigger more problem. Especially to the Indonesia case, through spatial panning as the mainframe concept, Cadastre 2014 will be explored. This research wants to study the policy transfer and the implementation into practice of Cadastre 2014 in Indonesia context. To what extend Cadastre 2014 can be integrated into spatial planning. In addition, How are to implement this concept to Indonesia context due to the possibilities and constraints.

1.2 Objectives

The growing population causes tension and increasing consumption of earth's resources especially land. It can trigger the conflict interest of land between different groups of people over land occupation on land resources. The problems occur when the demand and supply of space, place, and land for activity is imbalance. According to Kaufmann, (2001) land-related information is important because globalization, the pressure of overpopulation growth to land, and arising sustainable development can trigger land problem to people. Land as basis of human activity, has multifunctional capacities (physical, social, economic, and political). Especially, in spatial planning perspective, land is a prime asset for spatial development, through zoning, or use of land. Coping land as vital resources, it need to develop LIS as basis of spatial planning based on guiding of Cadastre 2014 via the six statements criteria.

Because land has vital value for all the people, and it can trigger problem related with its limited availability especially in Indonesia context that has huge and fast growing population. Therefore this research will explore to possibilities and constrain of policy transfer of Cadastre 2014 via the six statements criteria to develop LIS extend to be integrated with spatial planning. This research will deliver recommendation for better implementation of Cadastre 2014 into planning practice.

Some objectives for this research thesis are:

1. **To what extend Cadastre 2014 can be integrated into spatial planning.**

   Based on land as vital asset for spatial planning, this part is to find to what extend Cadastre 2014 can be integrated within broader spatial planning issue. It will discuss vision, mission, and the content of Cadastre 2014 and using the six statements as basis criteria to evaluate the policy transfer of Cadastre 2014 in Indonesia.

2. **To obtain recommendation for best approach in Development Land Information System as basis of Spatial Planning in Indonesia**

   Based on the evaluation of policy transfer of Cadastre 2014 via the Six Statements criteria analysis in Indonesia, considering possibilities, constraints and potential resources, the recommendation shall be delivered to develop Land Information System as basis of Spatial Planning in Indonesia.

Furthermore, to accomplish objectives, this research shall elaborate the following research question:

- What is kind of concept of theoretical framework to approach possibilities integration of cadastre 2014 into spatial planning?
- What is Cadastre 2014?
- What are The Six Statements in Cadastre 2014?
- How the policy transfer of Cadastre 2014 delivered in Indonesia context?
- How spatial planning cope land problem in Indonesia?
- How is the development of Land Information System in Indonesia?
- How is the evaluation of the Six Statements in Indonesia?
- How are the policy transfer, lesson learned, and implementations to develop Land Information System, considering resources, possibilities and constraint?

1.3 Research Methodology

The main framework of this research is the development of LIS to provide land related data and information as basis of spatial planning. In line with those problems, the emergence of a new concept of Cadastre 2014 with The Six Statements can be used as basis criteria analysis to strengthen spatial planning. The implementation into planning practice shall be delivered via study case analysis in Indonesia context.

This research use exploratory and qualitative analysis for approaching the objectives. There are four steps to do this research as follows, at the end, the conclusion and recommendation.

The first step is data collection that comes from National Land Agency (BPN), National Planning and Development Agency (Bappenas), Land Office Computerization project, through websites and digital file such as journal, scientific paper, report, electronic news, from internet. This data is prepared for explaining the real condition of

the effort to develop LIS, and for further analysis. This is to get clear insight due to the background and the development to the recent stage.

The second is literature study to understand the concept for building theoretical framework such as land management, spatial planning, LIS, Cadastre 2014, and the Six Statements. Theoretical review is to have big picture of the position of all concept and the interrelation among them and as foundation to approach the main question and objectives.

The third is the case study of development LIS in Indonesia from the point of view from The Six Statements criteria for evaluation. It will discuss critical review of The Six Statements in the process of policy transfer to Indonesia context on developing LIS extend to spatial planning. It will be elaborated the influence of the Six Statements into planning practice in Indonesia, through study case analysis of the project.

The fourth is using exploratory and qualitative analysis for answering the main question and objectives. It will explore the possibilities and constraint of the implementation of Cadastre 2014 in the context of Indonesia via development LIS as case study with considering all resources to support better implementation.

Finally, at the end of the research, some general concluding remarks and recommendation about how to integrate Cadastre 2014 into spatial planning within Indonesia Context shall be delivered.

The diagram flow for the research methodology as described previously is in Figure 1.1 on the next page. It depicts a framework from which the research is based on. The main point is a land as a resource and the problems that needs to be managed by Land Management via tools that embedded in spatial planning such as land use, land zoning and land consolidation. Land Management needs data and information that divided in spatial and non-spatial data. Using Survey and Mapping 'map cadastre' combined with land registration 'Fiscal cadastre' via LIS, In Cadastre 2014 both function of cadastre be integrated. For developing LIS, spatial planning has development project such as National Land Management and Information System (*SIMTANAS*) and Land Office Computerization (LOC) against the evaluation criteria of The Six Statement, In the implementation, it consider resources, possibilities and constraint. The last is conclusion and recommendation for better spatial planning.

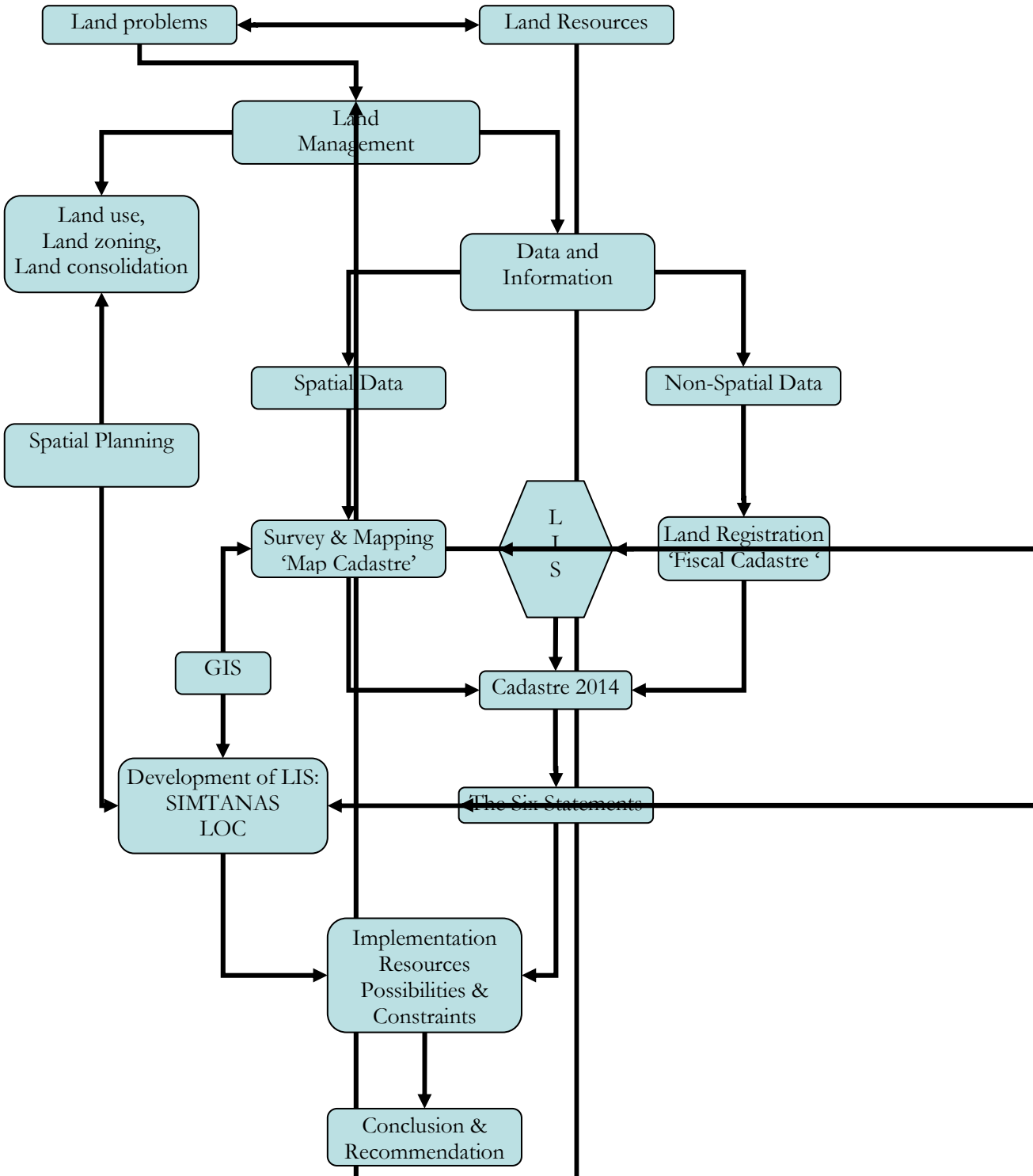


Figure 1.1 Research Frameworks

1.4 Structure of Research

Chapter 1: **Introduction**
This chapter elaborates the background of the research, research objectives, research methodology, and research report structure

Chapter 2: **Spatial Planning, Land Information System and Cadastre 2014**
This chapter elaborates concepts for basis of theoretical framework such as land management, spatial planning, and land information system. Then it will explore the cadastre 2014 context and content; historical background, the cadastre 2014, The Six Statements. After that the integration cadastre 2014 into spatial planning, using GIS as supporting tools; handling spatial information and non spatial data, and the implementation

Chapter 3: **Case Study: Spatial Planning and Developing Land Information System in Indonesia**
This chapter will discuss How the cadastre 2014 diffuse to spatial planning context via development of Land Information system. Several point to discuss are spatial planning and land management in Indonesia, development LIS as an example case study; SIMTANAS, LOC against The Six Statements evaluation criteria, and the implementation; resources, possibilities and constraints.

Chapter 4: **Evaluation of Cadastre 2014 and The Six Statements within Spatial Planning Perspective**
This chapter will evaluate Cadastre 2014 in general, The Six Statements, and The development LIS as The Integration of Cadastre 2014 into Spatial Planning framework, Policy Transfer, Lesson Drawing and Implementation, Resources, Possibilities, Constraints.

Chapter 5: **Conclusion and Recommendation**
Some general concluding remarks and recommendations shall be delivered.

Figure 1.2 depict report structure

In the next, Chapter 2 discusses theoretical framework for development LIS as basis of spatial planning, through the evaluation criteria of The Six Statements in Cadastre 2014 concept. It includes interrelationship of spatial planning, land information system, cadastre 2014; the shifting from traditional to modern cadastre 2014, Cadastre within spatial planning perspective, GIS as supporting tools; Handling spatial information, and the implementation Challenges

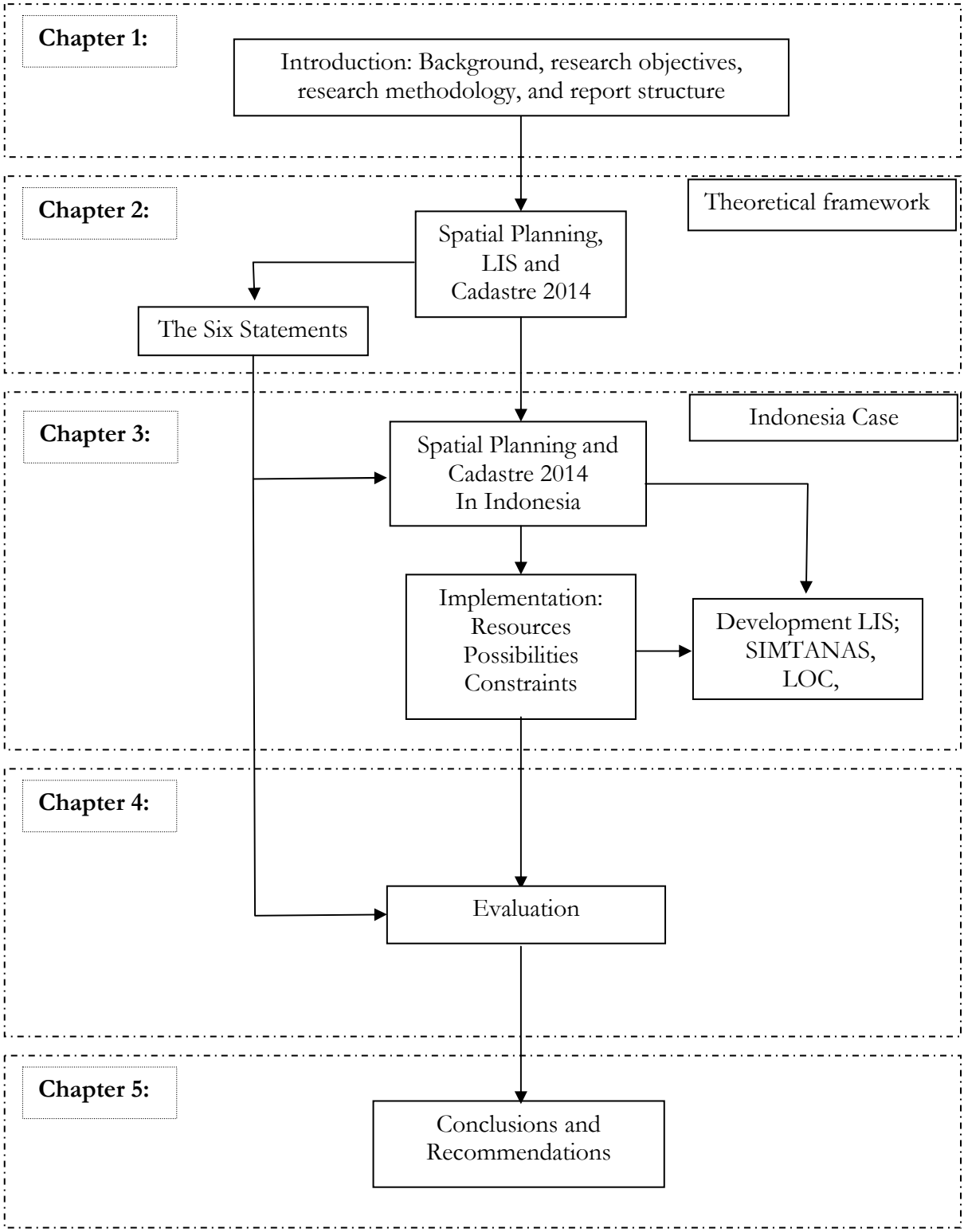


Figure 1.2 Report Structure

Chapter 2
Spatial Planning, Land Information System and Cadastre 2014

In order to understand Cadastre 2014 position, in advance, this research shall present the overview of land management, spatial planning and land information system, and will show the interrelation among the entire concepts and then focused to Cadastre 2014 context and content. This chapter will describe theoretical framework as basis to approach the main question and objectives.

The structure of this **chapter 2** will be delivered to subchapters such as Land Management, Spatial Planning, Land Information System, The Cadastre 2014 context and content including historical background, The Cadastre 2014, and The Six Statements. Then Multipurpose Cadastre 2014, The Integration Cadastre 2014 into Spatial Planning describe interrelation concept of sustainable land management, spatial planning, Land information system, and Cadastre 2014. It will be continued with GIS as supporting tools for handling spatial information, and Policy Transfer, Lesson Drawing and Implementation.

2.1 Land Management

Started from the issue of sustainability of land management, International Framework for the Evaluation of Sustainable Land Management (FESLM) [2] has paid attention to evaluate, use and management of land resources due to the limited of fertile land against to fast growing of population. It needs to use land in effective and efficient way so called as sustainable land management. The concept of sustainability includes notions of the scarcity of land resource availability and the use (Dumanski *et al.*, 1991; Harmsen and Kelly, 1992)[3]. Enemark (2004) presents the Land Management Paradigm in figure 2.1, where to achieve sustainable development require land administration, land policy framework, land information infrastructure and depend on institutional on country context.

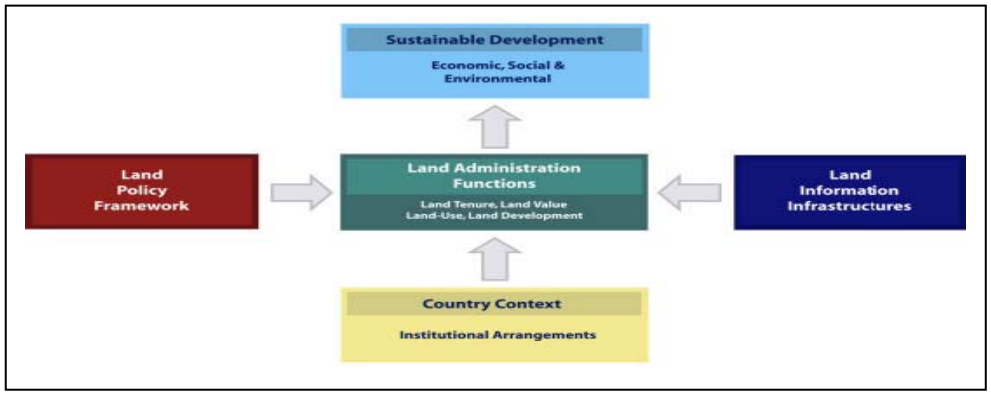


Figure 2.1 Land Management Paradigms (Enemark, 2004)

[2] http://www.ciat.cgiar.org/planificacion_rural/Taller_Territorio/FAO/AGLL/pdfdocs/feslm.pdf accessed at 8 august 2006
[3] Ibid

Land management is described as the process by which the resources of land are put into good effect (UN-ECE, 1996 in Enemark, 2004). He emphasizes the broad aspect of land management such as land policies, land rights, property economics, land-use control, regulation, implementation, and development. Land management encompasses all those activities associated with the management of land as an asset and a resource to achieve sustainable development. FESLM defined *"…Sustainable land management combines technologies, policies and activities aimed at integrating socio-economic principles with environmental concerns…"* for achieving the aim it need involvement of all resources and stakeholders.

Enemark (2004) discuss the operational component of the land management paradigm that has broad range of land administration functions for ensuring proper management of rights, restrictions and responsibilities in relation to property, land and natural resources. It embraces all components such as spatial planning, land information system and cadastre concept. He proposed a concept for an integrated approach to land management is depicted in figure 2.2

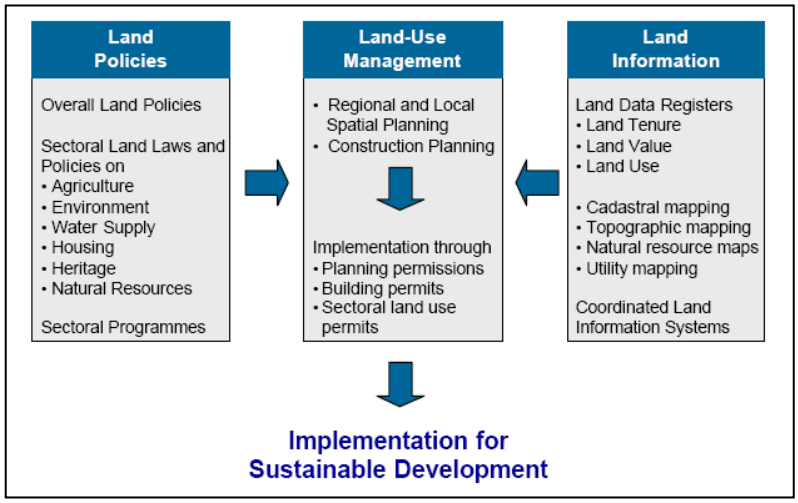


Figure 2.2 *Integrated Land Use Management for Sustainable Development (Enemark, 2004)*

2.2 Spatial Planning

Spatial planning is as a function requirement for sustainable land management, as both concepts deal with land resources and the problem related land. The linkages are how to manage and to solve the problem of land for sustainable development via operational tools that crossing from both side for instances land use, land zoning, environmental protection zone, etc. One of the functions of land management is channeled to the areas of spatial planning for planning and control of the use of land and natural resources; and land development where implementing utilities, infrastructure, and construction planning (Enemark, 2004). The concept of land management so called sustainable land management reflects a perspective where spatial planning can support the sustainability via spatial planning tools.

Spatial planning as a significant system that guides the spatial development narrow down to land space in the 'right' direction has complexity in its nature, besides considering physically, also socio cultural, economic and political context of the land resources. Referring to Linden, Ike, and Voogd, (2004), ELC concept represent to

spatial-environmental system that consist of three different layers, the *ground layer,* the *infrastructure layer* and the *occupancy layer,* whilst the spatial planning can give significant contribution on that entire layer.

Spatial planning refers to the methods used largely by the public sector to influence the future distribution of activities in space. The challenge for all spatial planning system is to manage competing interest for land use, whilst contributing to the prosperity of the community (European commission, 1997). There are problem of land and management that needs spatial planning to handle it, for instance the scarcity of land resources, tension of overpopulation that need land, various interest on land, tension from private market, unbalance demand and supply of land resources, location for infrastructures, for considering future sustainable land use. Several spatial planning activities can approach those problems such as defining the function of land, the zoning, land use, growth management.

Spatial planning deal with macro scale of national, regions, local, urban, and rural for operate the task it requires supply land related data and information. Therefore, Land information system so called LIS as one tool to support data and information regarding land is as interface to spatial planning.

2.3 Land Information System

LIS give support to land management by providing information about land, the resources upon it and the improvements made to it. (Dale and McLaughlin, 1989) besides technical resources, human resources as a brain ware is importance. The operation of a LIS includes the acquisition and assembly of data; inputting data, processing, outputting information, and using information. See figure 2.3.

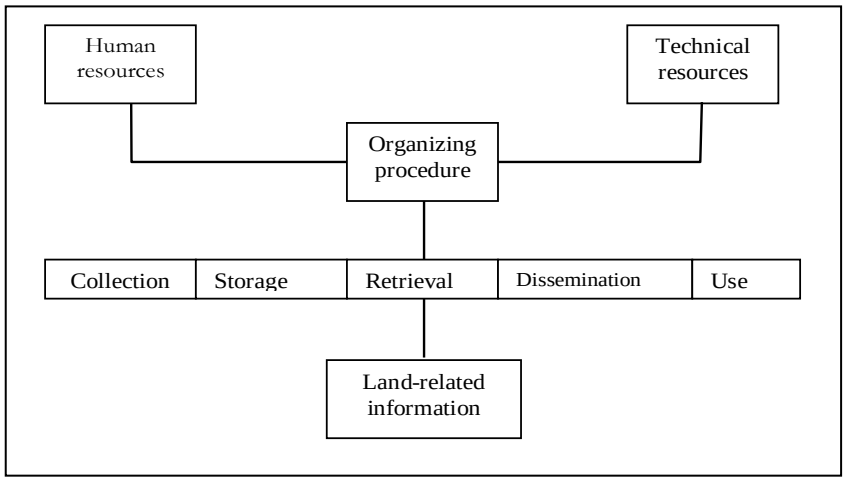


Figure 2.3 Land Information System (Dale, and McLaughlin, 1989)

The global approach to land management depicts position of land information that contains cadastral and topographic dataset to provide access to land related data and information. Figure 2.4 show Land information (system) facilities land administration

functions by means of range of systems and processes such as land tenure, land value, land use and land development (Enemark, 2004)[4].

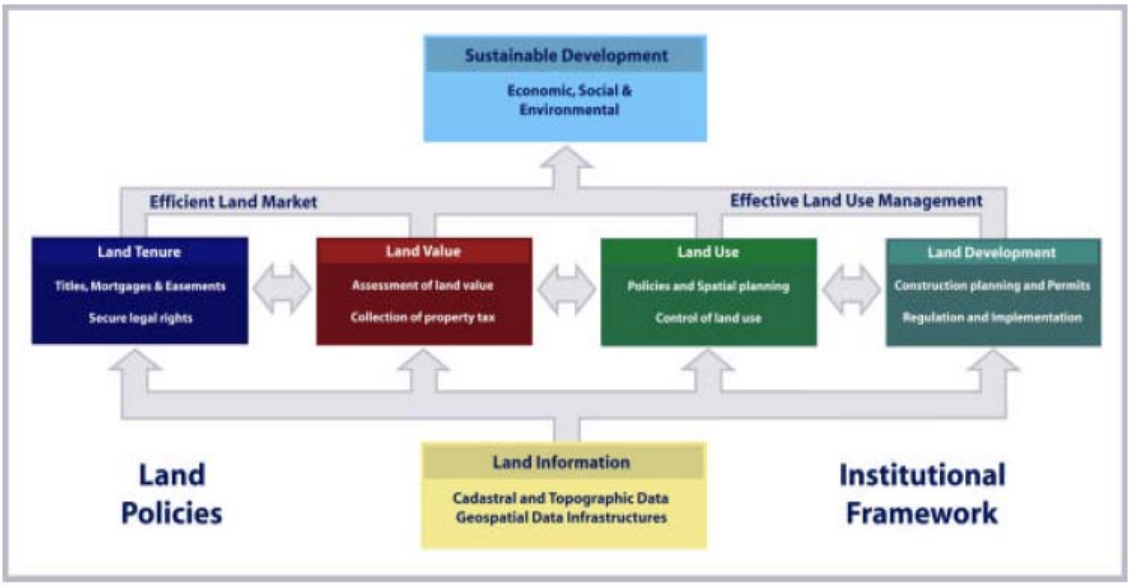
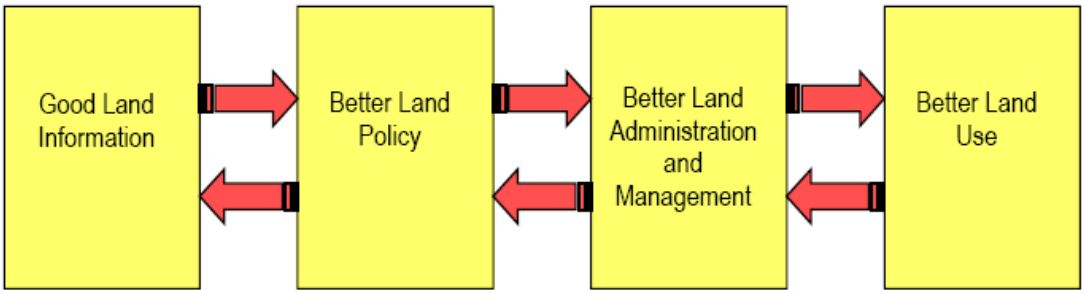


Figure 2.4 A Global Land Management Perspective (Enemark, 2004)

Sustainable development is not attainable without sound land administration[5]. The figure 2.5 below depicts clear position of Land information system among land policy, land administration and management and land use (spatial) planning. There are inter linkages of the entire concept as foundation concept to discuss the development of LIS as basis of spatial planning, according to the emergence cadastre 2014 concept.

Figure 2.5 Sustainable Development



Sources: Bathurst Declaration, 1999

[4] http://www.land.aau.dk/~enemark/Kursusmateriale/Mexico%20KeynotePaper%20SEFinalVersion.pdf accessed at 30 may 2006
[5] http://www.sli.unimelb.edu.au/UNConf99/sessions/session1/bathurstdec.pdf accessed at 10 June 2006

2.4 The Cadastre context and content

This part shall discuss historical background of the emergence of Cadastre 2014, the differences of traditional Cadastre and cadastre 2014, the overview and evaluation of existing cadastre and the cadastre reforms trend.

Definition of Cadastre by the International Federation of Surveyors, (FIG, 1995)

"A Cadastre is normally a parcel based, and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities). It usually includes a geometric description of land parcels linked to 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. It may be established for fiscal purposes (e.g. valuation and equitable taxation), legal purposes (conveyance), to assist in the management of land and land use (e.g. for planning and other administrative purposes), and enables sustainable development and environmental protection."[6]

There are shifting from basic cadastre that just record and identifies the individual land parcels/properties and separation of taxation purpose and security of land rights to comprehensive cadastre that link both the land value/taxation area and the area of securing legal rights in land.

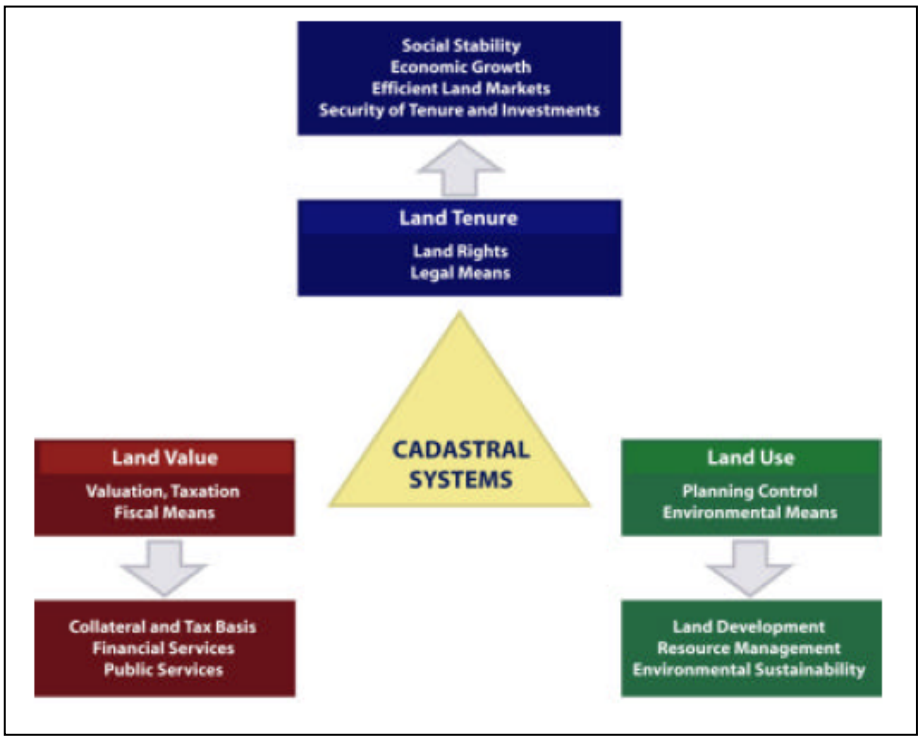


Figure 2.6 Cadastral systems provide a basic land information system for running the interrelated systems within the areas of Land Tenure, Land Value, and Land Use (Enemark, 2004)

Enemark (2004) developed cadastre system concept that include the interaction among the identification of land parcels, the registration of land rights, the valuation and

[6] In http://www.fig.net/ accessed at 9 June 2006

taxation of land and property, and the control of present and possible future use of land. See in figure 2.6. This concept embraces interrelation of cadastre system to spatial planning on land use and land development.

2.4.1 The shifting from traditional Cadastre to Modern Cadastre 2014

Cadastre evolved from traditional to modern Cadastre 2014 is through the long process until now it will have an impact on cadastral reform worldwide and it can be a benchmark[7] of cadastre system. Started at 1994, FIG did congress of XX at Australia. The work group in short WG 7.1 of Commission 7 on Cadastre and Land Management began to study cadastral reform projects that consider two elements of the on-going automation of the cadastres and the increasing importance of the cadastre as part of a larger land information system. The WG 7.1 produced vision Cadastre 2014[8], the changes, the means, and the technology by the use of questionnaire to get a trend analysis, and the six statements in relation with Cadastre 2014.

The main reason of the cadastral reforms is based on the willingness to achieve better Cadastre system that can serve the needs of broader users in the future[9] (Kaufmann, and Steudler 1998). According to Österberg (1998), there are several reasons of the shifting of cadastral concept from traditional to modern such as:

1. *to promote political stability and social justice*
2. *to improve management of natural resources*
3. *to protect land use rights and to establish security of tenure for land users*
4. *to protect rights of land based on customary tenure*
5. *to promote land markets, to make them more efficient, and to promote economic investments, the use of land as collateral for loan.*
6. *to improve the revenue by the state or other communities from the use of land*
7. *To do with the methodology and technology applied organization and responsibilities.*
8. *To introduce more efficient modern information technology, more efficient methods for surveying and mapping, improved and more appropriate legislation and organizational reforms, including less duplication of work, decentralization and other measures to make the information more accessible*

For the modern cadastre, Kaufmann and Steudler (1998) had elaborated traditional definition made by Henssen (1995) about land, cadastre, land registration and land recording. See on Table.2.1

The differences are in the view point of land, in traditional cadastre, land seen as parcel based included its properties related to more concern on individual or private rights whilst in modern cadastre land seen as an object with all legal land object that guarantee a security of private sector, individual person and public sector, laws have a significant role to define phenomena of land object.

[7] http://www.landnetamericas.org/docs/Benchmarking%20land%20administration.pdf accessed at 9 June 2006
[8] http://www2.swisstopo.ch/fig-wg71/index-old.htm accessed at 10 June 2006
[9] http://www.fig.net/ accessed at 9 June 2006

Table 2.1 Different Definition of Traditional and Modern Cadastre

No	Definition	Traditional[10]	Modern
1	Land	Land as parcel: **A land parcel** is a piece of land with defined boundaries, on which a property right of an individual person or a legal entity applies	Land as a land object land is defined as **a land object,** a piece of land in which homogeneous conditions exists within its outlines
2	Cadastre	Cadastre is a methodically arranged public inventory of data concerning **properties** within a certain country or district, based on a survey of their boundaries. It gives an answer to the question where and how much.	Cadastre 2014 is a methodically arranged public inventory of data concerning **all legal land objects** in a certain country or district, based on a survey of their boundaries. Cadastre 2014 contains the official records of rights on the legal land objects. Cadastre 2014 can give the answers to the questions of where and how much and who and how.
3	Land registration	Land registration is a process of official recording of rights in land through deeds or as title on properties. It gives an answer to the questions who and how.	Within Cadastre 2014, It represents a comprehensive land recording system
4	Land recording	Land registration and cadastre that complement each other, they operate as interactive systems, land registration puts in principle the accent on the relation subject-right, and cadastre puts the accent on the relation right-object	Within Cadastre 2014, It represents a comprehensive land recording system

Source: Kaufmann and Steudler 1998; Kaufmann, 2001; Henssen, 1995

Other aspects are in the traditional cadastre there was the separation on cadastre function and land registration, whilst in modern cadastre, that both functions of cadastre and land registration become one in compressive land recording system. It is clear that definition from Henssen (1995) only emphasized on the private property law aspect, and in cadastre reform it need to be adapted to take into account public and traditional law aspects as well (Kaufmann and Steudler, 1998) due to that a new concept of cadastre it shall give impact for instances in determining land use zones, land zoning, and environmental protection zone

Overview Existing Cadastral System

Kaufmann and Steudler (1998) did overview of the existing cadastre system to understand the current system and analyzed it to describe the entire cadastre problem. They made the questionnaire using four basic aspects of cadastral systems such as legal and organizational characteristics, levels of planning and control, aspects of multipurpose cadastres, and responsibilities of the public and the private sectors. Moreover, they

[10] http://www.fig7.org.uk/events/Delft_seminar_95/paper2.html accessed at 9 June 2006

evaluated the strengths and weaknesses of the existing system. They analyzed and produced some conclusion as follow (for tabulation of the result see on appendices 1)

Legal and organizational characteristics included the basic elements of cadastral system, basic legal aspects and link to topographic mapping and completeness of cadastre. For basic elements of cadastral system , they conclude that the most condition of existing cadastre are titles as basis of registration, parcel as unit of cadastre, civil laws as legal basis, compulsory of registration of property rights, and registration is not basis of adjudication process. For basic legal aspects, it was concluded legal force of registration has both neither negative effect nor positive effect, registration can give protection to persons rights, the state give legal responsibility for damaged caused by faulty registration, cadastre extend to land registration and cadastral mapping, most of cadastre map is part of land registers. Then rights, restriction and responsibilities are included interest in land, used fix boundary concept, and monument as legal value of boundaries besides measurement, coordinates, and cadastral map. In addition, for link to topographic mapping and completeness of cadastre, it was link between cadastral and topographical mapping in technical, legal and organization linkage. Most of the cadastre covered the whole territory of the jurisdictions and most of cadastre in systematic way than sporadic.

On level of planning and control, discuss the three levels of strategic planning, management control and operational control for both land registration and cadastral mapping. They conclude that public sector has dominant role of all levels within one organization. Most of strategic planning and management control on public sector and small role of private sector on operational control.

For aspects of multipurpose cadastre, mostly cadastral systems were established to serve both a legal and a fiscal purpose[11]. The cadastral systems are used for many purposes for instances facilities management, base mapping, value assessment, land use planning, and environmental impact assessment. Nevertheless, not all the purpose is supported by a legal basis.

A responsibility of Public and Private Sectors has taken into account in the globalization, liberalism and privatization era. Originally, the state still has big roles in the cadastral systems. Moreover, little roles for private sectors are only for financing part of land registration and cadastral system.

Besides four basic aspects of cadastral system, Kaufmann and Steudler (1998) analyzed the strengths and the weakness of the existing system. The strengths are for instances state guarantee of title, or legal security, fast service for users, computerized and automated system (digital data); system serves other purposes (basis for LIS); integration of different system. And The weakness to do the cadastre reform such as limited of computerization; link land registration and mapping are not efficient, administrative control over land by different organization; low budget fund; uncompleted legal framework, low-level integration with other purposes.

[11] Due to Larsson [1991], p.15: … as 'fiscal' records, primarily for the public sector, they have served as the basis for the full and accurate taxation of land, and as 'legal' records, primarily for the private sector, they have served as registers of ownership and other land rights

Cadastral Reforms and Trends

Kaufmann and Steudler (1998) analyze the cadastral reforms and the trends (see on appendices 2). Most of the countries did the cadastral reforms, through different step, via planned, still in progress or already finished. Respondent stressed the importance of cadastre reforms.

Purposes of the reforms are various for instances for customer service, then for improving the quality of data (timeliness and accuracy), improving the efficiency, and the aspect of a multipurpose cadastre seem to confirm the will to provide better and more efficient service to the clients. The economical aspect and the involvement of the private sector were less important.

There were three subjects of trends changes. The first is technical trend that concerns with automation of system, networking, setting up database, using Global Positioning System (GPS) or Differential GPS for better accuracy, setting standard for data exchange and using orthophoto. The second is the legal trend that concerns with setting up of multipurpose cadastre or Land Information System, and defining new legislation. The third is organizational trend that concerns integration of land administration organization, give more role to private sector, reduction of personnel, cost recovery, link with environmental data, decentralization of system, and better support for decision –making. The trends are important to know in what direction and in what level of the progress of trend.

In the globalization era, where liberalism and private land market play the role, economical aspect is an important to be considered like cost recovery analysis. However, it is difficult to measure cost benefit ratio because cadastre system itself involved as well as social, political, and ethical realities that can influence the cadastral system.

According to Kaufmann and Steudler (1998) in short, there were the common aspects of cadastral reform such as

- *To improve customer services with increased efficiency and an improved cost/benefit ratio;*
- *To involve more of the private sector;*
- *To provide more data in better quality;*
- *To provide data that are sufficiently accurate;*
- *To have data available at the right time*

The development trends of the cadastral systems are the:

- *introduction of digital cadastral maps based on national reference systems;*
- *transformation of land registry information into digital form;*
- *introduction of title registration systems instead of deed registration systems;*
- *embedding of the cadastre into land information systems by linking different data bases;*
- *unification of real property and land property registration systems;*
- *reduction of staff in the cadastral organizations and land management;*
- *regionalization of and increased involvement by the private sector;*
- *Introduction of cost recovery mechanisms to at least cover the processing costs or to recoup the investment costs*

2.4.2 The Cadastre 2014

In cadastre 2014, land is seen as an object, a piece of land in which homogeneous conditions exist within its outlines. Laws became agreement via rules, rights, duties and restriction for secure legal basis aspect where private sector, individual or communal, and public sector can understand their positions, as describe below;

"A law defines phenomena, rights, or restrictions which are related to a fixed area or point of the surface of the earth, it defines a land object. A legal land object is a piece of land, where either a private or a public law imposes identical juridical parameters. The laws define the outlines of a right or a restriction. The legal land objects normally are described by boundaries which demarcate where a right or a restriction ends and where the next begins and the contents of that right." (Kaufmann and Steudler, 1998)

Besides legal land objects give consideration to private rights in private property parcel, it stressed the public rights through land use planning, land zoning, zone for protection environmental, areas of resources exploitation for forestry, for mining, for plantation, where spatial planning can play the role here, and also acknowledge areas where traditional rights still exist.

Definition of Cadastre 2014 adapted from Henssen (1995) in Kaufmann and Steudler, (1998) as follow,

"Cadastre 2014 is a methodically arranged public inventory of data concerning all legal land objects in a certain country or district, based on a survey of their boundaries. Such legal land objects are systematically identified by means of some separate designation. They are defined either by private or by public law. The outlines of the property, the identifier together with descriptive data, may show for each separate land object the nature, size, value and legal rights or restrictions associated with the land object"

The definition shows that besides private property rights, Cadastre 2014 concerns to public and traditional rights. It contains the official records of rights on the legal land objects and It can give the answers to the questions of where and how much and who and how (Kaufman and Steudler, 1998). There are different point of view land as parcel and land as legal object.

The Cadastre 2014 as the result of the cadastre reforms has several important issue such as the aim is to improve services of the cadastral systems, and to improve the performance of cadastral systems through automation. This cadastral system tend to be embedded in land information systems as one input data of land and its property rights, and their relation will be strengthened. Considering impact of globalization era, liberalism and privatization, it stresses to do cost benefit analysis. It is hope that Cadastre 2014 will be a complete documentation of public and private rights and restrictions for landowners and land users that fully coordinated, automated, without separation of land registration, and cadastral mapping. (Kaufmann, and Steudler 1998).

2.4.3 The Six Statements;

Kaufmann and Steudler (1998) with working group 7.1 summarized the six statements on Cadastre 2014 that dealt with the mission and content, the organization, the technical development, the privatization, and the cost recovery of cadastral systems. These statements turn into the guidelines for the definition of Cadastre 2014. The Six Statements as a 'soul' of The Cadastre 2014, represents the new paradigm of modern cadastre, become guidance to the modern cadastre. These statements depict the vision future modern cadastre based on the analysis of existing, on going reforms and trend of cadastre system. This research use The Six Statements as criteria to evaluate possibilities and constraint to what extend Cadastre 2014 can be integrated into spatial planning.

The six statements on cadastre 2014 are such as:

1. **Cadastre 2014 will show the complete legal situation of land including public rights and restrictions**
   This statement explains mission and content of Cadastre 2014 that important to provide security of land tenure. Cadastre 2014 documented public and private laws, and restriction. The growing public laws have impact on boundary definition by political decision and not by agreement of private sector only.

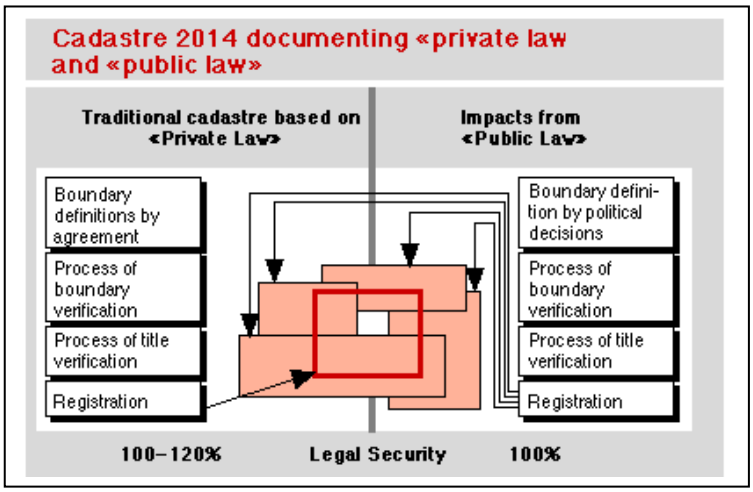


Figure 2.7 Cadastre 2014 documenting private Law and public law
(Kaufman and Steudler, 1998)

2. **The separation between 'maps' and 'registers' will be abolished**
   This statement explains organization of Cadastre 2014. The unification of cadastral map and land registration is good idea for efficient and effective system. The fact most countries have a land recording system consisting of cadastre and land registration components that handled by two different organizational units. Although an advantage to this type of organization is a certain cross-control that can help to eliminate errors, the disadvantages of such solutions are obvious such as the system is irritating, the risk of redundant information, besides inconsistencies, and costly for maintenance of the system.

3. **'Cadastral mapping' will be dead, long live modeling**
   This statement discusses the changing role of maps as result of technological development. It trigger redefinition of map from conventional to digital format Progress of survey and mapping technology can make better system of map making such as increasing flexibility of model in various scale and format that can be

derived from digital database. Considering the development technology of Global Positioning System (GPS)/Differential GPS (DGPS), remote sensing and GIS can do this part. Especially GIS has capability to data transfer or exchange of data supported by internet connection and its ability to facilitate worldwide data networks via metadata format

The influence of information technology development in Cadastre 2014 resulted extensive synergetic administration and technology to provide basic data model. Efficient and effective procedure in land recording through advanced software solutions can process both spatial data and their attribute data.

4. **Paper and pencil-cadastre will have gone**

In line with statement three, this statement four put big impact of information technology in Cadastre 2014. Computerized land recording combined with administrative procedure will have great result, and more efficient. Advanced computer based technology as a solution such as GIS can process both spatial data and the bookkeeping information and it give possibilities for further analysis, through queries or using mathematic-statistical operational. This statement shows that the information technology can become main backbone of the land registration.

5. **Cadastre 2014 will be highly privatized**

This statement is stressing on liberalism and privatization in Cadastre 2014 because of the orientation to serve citizens in *flexibility and consumer-oriented way*. Private sector will have more roles such as on the operational management; operational, installing and maintenance, and the role of public sector for security, supervision and control. It can be done through public private partnership. These trends will be impacted to the cadastral organizations.

6. **The cost of Cadastre 2014 will be recoverable.**

This statement contains the consideration view according to cost recovery in Cadastre 2014. Although this new cadastre system needs huge investment, for install the computerized system, hardware and software, implementation, operation and maintenance, and human resources, but using cost benefit analysis, it can be evaluated the starting and continuity of this system and cope the business sense. The concept is the system can support by itself through cost recovery. It needs to be seen as the long-term context and 'big picture' of influence from external factors. This approach is to difficult for many countries to calculate the cost benefit ratio, because of many qualitative variables involved, and benefit in long term. It needs a controlling mechanism that separates the real costs and benefits of the system, separates fees and taxes, and reflects the cost recovery of the system by sufficient fees. It is need good control on mechanism, and legal aspects for the standard fees.

2.4.4 Multipurpose Cadastre 2014

Multipurpose cadastre is to which cadastre extend to land information system as an input for other purpose for economist, planners, environmentalist, politicians, or the purpose of some organizations. "*The multipurpose cadastre defined as a large scale, community-oriented land information system designed to serve both public and private organizations and individual citizens"* (Dale, and McLaughlin, 1989). Therefore, all stakeholders or organizations can

use this information from land information based on parcel unit, or based on land object.

For sharing the information, it need 'hub system' that linkage among cadastral system that contains unique parcel identifier with other systems that can access land information parcel based via series of enquiries that appropriate to special organization' purpose. The advantages of this operation system, technically the system can generate own special system by cross-referenced by means of unique parcel identifier, and administratively can be operated by specialist in other system (Dale, and McLaughlin, 1989)

It is recognized that cadastral systems are not ends in themselves. It serve a multi-purpose use and is taken into account the challenge of a modern GIS, Global Positioning System surveying, digital mapping technology, and computerization in hardware and software development (Enemark and Sevatdal, 1999). In this point is GIS that become usefulness tools for combining all layers of multi thematic map for further analysis to fulfill special requirements of various purposes of organizations. For multipurpose analysis, GIS can operate the overlaying analysis, queries and data extraction. Cadastre actually can become basis of spatial planning and managing development of land. See the figure 2.8 Linkages Mechanism.

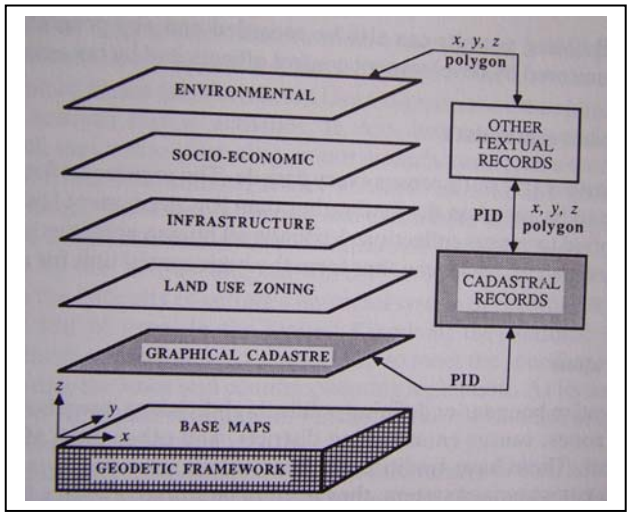


Figure 2.8 Linkages Mechanism
(Dale, and McLaughlin, 1989)

2.5 The Integration Cadastre 2014 into Spatial Planning

This part shall discuss the interrelation of Land Management, Spatial planning, land information system and Cadastre 2014 as basis of the analysis to what extend cadastre 2014 can be integrated into spatial planning. It will depict 'big picture' of the position each concept to structure foundation for the analysis based on the Six Statements criteria that explained at previous page. That is clear from the previous sub chapter, the storyline depict the interrelation of the entire concept and at the end focusing on Cadastre 2014

"Land resources are allocated over space and time according to the needs, aspirations and desires of man within the framework of his technological inventiveness, his political and social institutions, and his legal and administrative arrangement" O'Riordan, T (1971) in Dale, and McLaughlin (1989). Land resources got tension from human being to fulfill their needs, so it must be managed in sustainable way so called sustainable land management because land is limited but human population is increasingly growing fast.

Sustainable Land management become the main goal and the basis to understand why spatial planning need to concern Cadastre 2014 concept, and through what channel Cadastre 2014 can be integrated. In what parts the entire factor overlaid and chained so it has sound for spatial planning. Sustainable land management is as a foundation to achieve balance of the land and people need for now and considering future generation. It is prerequisite to achieve welfare for the people, through the policy, plan, program, and range from strategic level to operational activity level. "*Land management is the process whereby the resources of land are put to good effect, land management entails decision-making and the implementation of decision about land."* Dale, and McLaughlin (1989) positioned land management in broader context that is included the formulations of land policy, the preparation of land development, land use plans, and the administration of a variety of land-related programs. *"Land policy consists of a whole complex of socio economic and legal prescriptions that dictate how the land and the benefits from the land are to be allocated"* Dale, and McLaughlin (1989).

To go down to the earth the concept into practice, it requires tools to deliver into planning practice. Therefore, it needs spatial planning as tools to approach the land management and land problem via planning tools. Spatial planning embraces planning tools to support sustainable land management. For doing the task, it requires data and information related land from such system. Therefore, Land information system as pre requisite to operated land-planning tools.

To understand the broader scope of research subject, it needs to know the nature of information system where LIS exist surrounding by other information systems. Dale and McLaughlin (1989) have proposed illustration in broader context of information system taxonomy. See figure 2.9, the diagram shows the interrelation of information system, and for understanding the context of land information system, cadastre, GIS, spatial information system and the management that factually can benefit spatial planning.

According to Dale and McLaughlin (1989) Land information includes

1. *Environmental information, focus on delineating environmental zones, associated with some unique physical, chemical, or biotic phenomena.*
2. *infrastructure information, focus on engineering and utility structures*
3. *and cadastral information, related with zone where specific land rights, responsibilities, restriction, are recognized such as areas subjects to particular planning restriction*
4. *Socio-economic information, which includes statistical and census type data*

The first three out of four are included on land information, and the fourth is the extended to geographic information system

Land information system is an umbrella for Cadastre (Sumiyoto, 1999). LIS is not merely technical matter and institutional framework that address only the mechanics of setting out, surveying and recording land parcels but also the legal, financial, administrative, social and political issues that are associated with the management of land. LIS integrate a wider range of records, including those relating to the infrastructure on land and underground utilities on the one hand and to land use and land resources on the other (Dale and McLaughlin 1989).

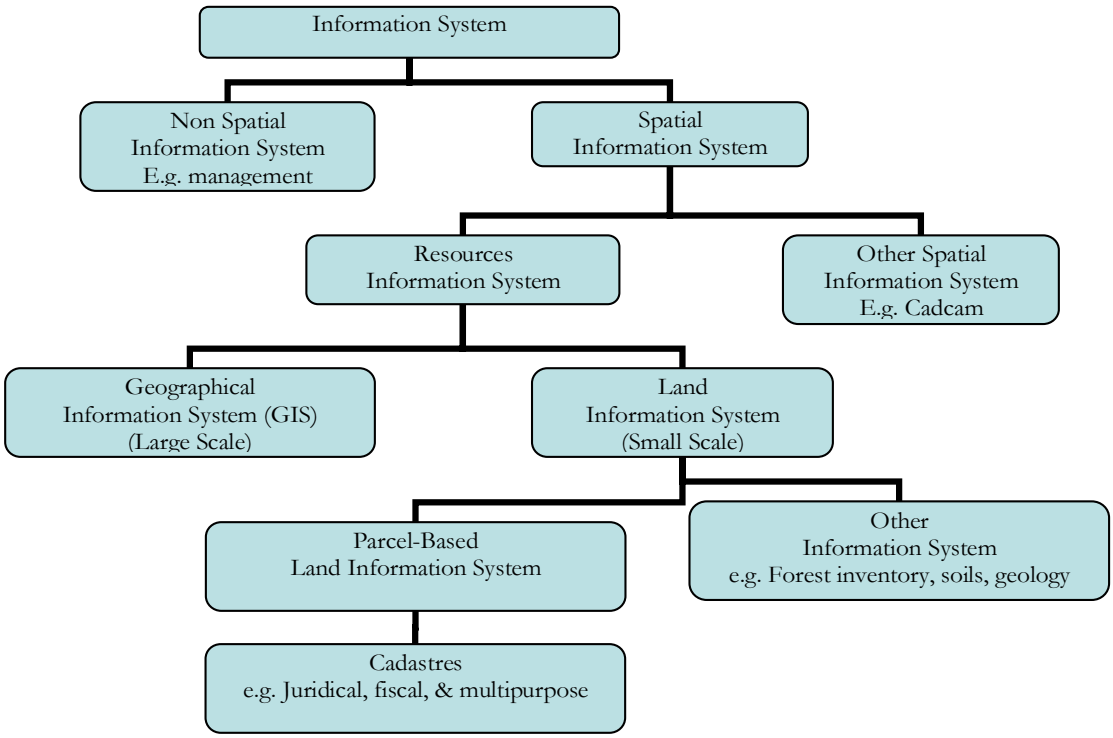


Figure 2.9 Information System Taxonomy
(Dale, and McLaughlin, 1989)

There are relation definitions and scope of cadastre and Land information system (LIS), FIG[12] has seen cadastre as an element of LIS. According to Dale, and McLaughlin (1989) land information is a prime requisite for making decision related to land investment, development, and management. It has vital function to support decision-making related land. Land information is a strategic data that have broader impact to economic, social and political context. Every users, such as private sector; public sector, individual citizens, and others that related with their profession such as policy makers, planners, and land administrator, need land information that different each other appropriate with their needs and their purpose.

The function of land information described by The UN Ad Hoc Group of Expert on Cadastral Surveying and Mapping (1974) in Dale and McLaughlin (1989) that "… *Systematic records of land and rights in land have a great importance for public administration, land planning, and land development, and private transaction in land."* This statement emphasize on the broader impact of land information due to the multifunction capacity of land especially to support land planning and land development that can be handled within spatial planning such as land use, land zoning, and spatial master plan. Even there has

[12] International federation of surveyors in http://www.fig.net/ accessed at 9 June 2006

different scope and scale of LIS and cadastre but they have same object on land related information to support spatial planning. Land information can be considered and can be integrated within spatial planning context.

According to Dale, and McLaughlin (1989) information is as the basic of all decision making. "*Land information system is defined as a combination of human and technical resources, together with a set of organizing procedures that produce land information in support of some managerial requirement"*. It shows the collaboration of advanced technology and human capability can be realized to support land management by providing information about land.

Cadastral systems should be perceived as a core component of land Information systems. Further, appropriate land information systems then provide the basis for land management towards broader goals of economic, social and environmental sustainability (Enemark, 2004). FIG considers the increasing importance of the cadastre as part of a larger land information system in their conference that produced Cadastre 2014.

Cadastre 2014 as an international policy has vision and mission to anticipate future modern cadastre. It can play an important role to spatial planning. There are interrelations in concept and in operational level. In addition, it has broader perspective of other information such as social, economic and political. Through regulation of land via land use planning, cadastre as one element of spatial planning can be used to support decision making in micro scale.

Cadastre plays in small micro scale than spatial planning that play from messo to macro scale, but some elements of cadastre has relation and impact to spatial planning by means of bigger scope of land information system. They can fulfill the particular function each other to do collaboration through the policy and implementation of the system. This will explain cadastre position within spatial planning concept, context, and process.

Cadastre as land related information supplier concerns to support spatial planning that considering the allocation of resources, particularly land, to obtain maximum efficiency of use of land. Planning is a reconciliation of social, economic, and political aims that respect to land resources, where land also has multifunctional dimension of socio-cultural, economical and political. Planning is the art of anticipating change, and arbitrating between social, economic, political and physical forces that determine the location (Dale, 1989, p6)

2.6 GIS as supporting tools; Handling Spatial Information

According to Burrough (1998) Geographical Information System or GIS has been evolving in concept and technological hardware and software platform in digital mapping technology, in using quantitative mathematical statistical analysis, and spatial analysis. GIS becomes means to fulfill broader sense of human needs, especially to manage spatial data especially land and the information through the advance capability of its toolbox. GIS with its capacity and its capability can be a main tool for developing land-related information system according to spatial planning perspective.

The function of GIS are as tools for collecting, storing, retrieving, transforming and displaying spatial data from the real world for a particular set of purpose. It handles spatial data combined with attribute data and produces spatial information for better

decision-making process. The spatial data represent phenomena in term of (a) their position in coordinate system, (b) their attribute that are unrelated to position (such as landowner, price, property rights, etcetera) and (c) their spatial interrelations with each other (topology, spatial properties, connectivity etcetera.) (Burrough, 1998)

GIS as a means not as an end[13], it can be used to aid policymaking process. It is very helpful in relation with planning; especially spatial planning that manages all form of spatial data and information. As a means, GIS can be collaborated with another system such as land information system that manage of land information due to land location as geo-referenced data, and land attribute data related with descriptive of its content or condition such as land value, land rights, and land property. The integration of land surveys, cartography, and mapping analysis can be possible with using tools namely GIS for handling spatial data, combined attribute data, to produce land information (Burrough, 1998).

Spatial planning use GIS for spatial analysis and interface to exchange data with other system such as land information system. LIS can be put on GIS. GIS has bigger scale, scope, and role than LIS. Therefore, GIS has importance role in the development of land information system, and integration to broader users. Spatial planning has broader theme and at macro scale, compared to land information system that is narrower scope and in messo and cadastre on micro scale. It is possible for GIS to be bridge of the communication among those systems. GIS can handle complexity of spatial information of land and its attribute data.

GIS can handle huge raster and vector data format, analyzing it, produce information and sharing or exchange data to other format. GIS can do communication and transferring the data flow in and between organizations. Data exchange through GIS is possible using conversion format data among organizations that extract land related information. Standardization of format data and understanding other classification and term of particular system is important. Every user has their special requirements to access data via queries based on their purpose. According to Roos Akbar (2003), GIS can aid in building database for spatial planning. GIS can exchange information to other system via networking, or with GIS, it can be developed particular modules appropriate with user needs such as land information system.

Spatial planning need GIS to process enormous data, integrate spatial and non-spatial data, manage data in different format and scale. Because of much task of spatial planning, the effect and impact, and complexity of problem itself therefore GIS need to be explored more in-depth the capability and the capacity to cope spatial planning problem on spatial data management.

2.7 Policy Transfer, Lesson Drawing and Implementation

Dolowitz and Marsh (1996) defined policy transfer as:
"a process in which knowledge about policies, administrative arrangements, institutions etc. in one time and or place is used in the development of policies, administrative arrangements and institutions in another time and or place" and lesson drawing as *"activities of political actors or decision makers in one country to draw lesson from other country, and then implement to its own country"*

[13] From speech made by Bruce Babbit, 21 may 1996 in Burrough, 1998.

Such as in this research, the transfer of cadastre 2014 policies as a result of commitment of government actors in country to get lesson learned and implement it considering resources, possibilities and constraint into planning practices. The Cadastre 2014 as international concept that comes from developed countries will give impact to other countries that has willingness to do policy transfers. The policy transfer will face the institutional and planning culture of every country that adopts Cadastre 2014 (Dolowitz and Marsh, 1996). How the national planning system can integrate the concept of Cadastre 2014 depended on their particular planning culture.

The international organizations such as the UN, FAO, and Habitat, and The World Bank recognized the importance of Cadastral system for supporting land information system as a basis for generating economic development, social coherence and environmental sustainability (Enemark, 2004). They do spread the concept to other countries for development of the cadastre concept via to International networks of experts, International networks of governments, International Benchmarking, or via Internet connection across the world.

To the national planning cultures, the Cadastre 2014 shall give impact for developing appropriate institutional, legal and technical processes to integrate within the context of a wider national land policy, spatial planning, and development LIS. As in planning practice, Williamson (2001) emphasized that what is "best practice" of one country is not necessarily "best practice" for another. It depends on institutional and cultural planning of that country.

For instances, Teffelen (1992) did research the adoption (policy transfer) of GIS technology to aid spatial planning in developing countries that faced some problems such as the lack of sufficient and well-organized information, limited financial, lack of human resources. He proposed that the determinant of effective use of GIS were such as the need for organized information, the provision of an organized context for data collection as well as the training and maintenance of skilled staff. It is clear that policy and organizational or institutional framework will influenced the process of implementation and shape the role of GIS.

Cadastre systems mostly are embedded in the historical, institutional, and cultural setting of the particular country. However, in spite of the different origins, the transfer of policy by copying or adopting from international policy should be adjusted to particular condition of country. The difference of institutional and planning culture among countries and regions throughout the world reflect the cultural and judicial setting of the country. The institutional arrangements may be changing over time to better support the implementation of land policies and good governance (Enemark, 2004) and to respond dynamically social economic and political conditions. It is necessary to formulate land information policies, to build institutional arrangements for implementing these policies, and to develop effective and efficient system for their implementation (Dale and McLaughlin 1989).

The operation of Cadastre 2014 entails both technical and institutional matters. Institutional term refers to the establish law and customs and the administrative structure (Dale and McLaughlin, 1989). It includes various organizations that differ among countries. The success of Cadastre 2014 policy is supported by institutional framework to do the systematic and structured implementation processes.

Examining Institutional is importance. According to UN Ad Hoc Group of experts on cadastral Surveying and Mapping (1973) in Dale and McLaughlin (1989) " *Institutional problems are among the most difficult to resolve in the establishment and maintenance of a cadastre; the lack of recognition and adequate resolution of such problems are probably the most common causes for the ineffective functioning of a cadastre. The effective implementation of a cadastre is a complex operation involving the establishing of a functional system of relationship among several institution for its establishment, maintenance, effective use and continuing development*"

According to land, Österberg, (1998) divided under four main headings, land policy, land legislation, institutional issues and technical options. The cadastre can support land policies by providing a legal framework for administering land rights, which can support structural change, environmental protection, sustainable management, control of natural resources, land markets, information for planning and monitoring of land use and provides tools for the implementation of land policies.

Land policy is a part of the national policy of countries. Such policies generally relate to economic development, social justice and equity, and political stability. The land policy may for instance include or facilitate land use and physical planning, real property taxation, measures to prevent land speculation and land disputes. The national efforts are to establish a coherent national land policy to guide policies within different sectors (Bogor Declaration, 1996).

The framework of land policies includes several policy areas including the physical environment, the economic, fiscal and political social areas (Österberg, 1998). "*The physical framework connected to the decision-making regarding the use of land for various purposes. The planning in principle will determine the allowed and restrictions for land use and thus define land values*"

The economic and fiscal framework dealt with economic systems. The policy will have fundamental importance for land administration, for instance Österberg, 1998 due to ownership of land versus buildings and other constructions, which in turn will determine the administrative structure for land, buildings and spatial planning.

The political and social framework dealt with fundamental questions, such as democratic decision-making and protection of human rights. The relation between the state and the individual in decision-making regarding rights and obligations for land use is always a major political issue. Social issues are connected to access land for landless people, for housing, agriculture production or other needs. (Österberg, 1998)

These criteria may be different according to the direction a state and influenced by institutional and planning culture of state to follow and according to the area of policy under consideration. It depends on the states to set up the institutional framework, the content and organization. This framework needs to be carried out into practice including the legislation process and the implementation of the legislation. Institutional framework is one important aspect, because this process will involve different parties, expertise and experiences, and they have access to relevant information and have the capacity to make use of the information for relevant implementation of the policy (Österberg, 1998). Many

such systems are increasingly making use of computer technology but the fundamental problems are of an institutional rather than a technical nature [Sumiyoto[14]]

On the next **Chapter 3** discussion about how Indonesia cope to benefit of the Cadastre 2014 policy paper within spatial planning perspective will be explored. It includes general approach of the elements to some extent.

[14] http://www.bpn.go.id/engine/contentmajor/artikel/dataartikel/artikel2.pdf accessed on 2 June 2006

Chapter 3
Case Study:
Spatial Planning and Developing Land Information System in Indonesia

According to policy transfer, Indonesia has particular institutional and cultural planning that differs from other counties. Based on theoretical framework, this chapter will stress to explore the planning practice in Indonesia context due to the policy paper of Cadastre 2014, that as subsystem of Land Information System and consider extend contribution into spatial planning. It discusses how such policies on land related information system within spatial planning perspective are established in Indonesia.

This chapter will tell about how spatial planning in Indonesia cope the Cadastre 2014 policy paper, and benefit this relationships. How Government of Indonesia diffuses and implement this Cadastre 2014 within broader national institutional framework that deal with land-related information system. The structure describe into several sub chapter such as Land Management, Land Policy, Spatial Planning, Development LIS as National Land Management and Information System (*SIMTANAS*) and Land Office Cadastre (*LOC*) project, as an issue of Cadastre 2014 in Indonesia, Policy transfer, lesson drawing and implementation, and Resources considerations.

3.1 Land Management in Indonesia

For understanding the position of Cadastre 2014 policy paper to Indonesia context, there is in figure 3.1 depict the framework of this research thesis that is important to know position, influence factor from international to national context, directly or indirectly. The globalization trends give significant impact to the modernization cadastre and give significant influence to the implementation in Indonesia.

According to Sastrowihardjo, 2001, land resource management in Indonesia concerns with the use of land resources for national unity, as vital asset for all citizens and as national property for national equality. Land as one vital capital for development[15] is controlled by the state for the maximum prosperity of the people. Indonesia concerns to sustainable land use management, a system, which covers planning, implementing, and controlling the utilization of land to establish a sustainable development related to land for the maximum prosperity of the people at present and in the future time.

Legal framework of land management is set up. Based on Autonomy Act Number 22/1999, and Financial Balancing Act Number 25/1999, and Government Regulation PP No 25/2000, land management become local responsibility such as (1) land use; (2) land reform; (3) land administration; and (4) land services. Land use management pursues what is called "four orders of land management", they are: legal order, administration order, use order, and order of maintenance and conservation of environment. Land use management will establish a land use arrangement such as all types of land use are accommodated according to the spatial plan.

[15] The Indonesia 1945 Constitution at Article 33 paragraph 3

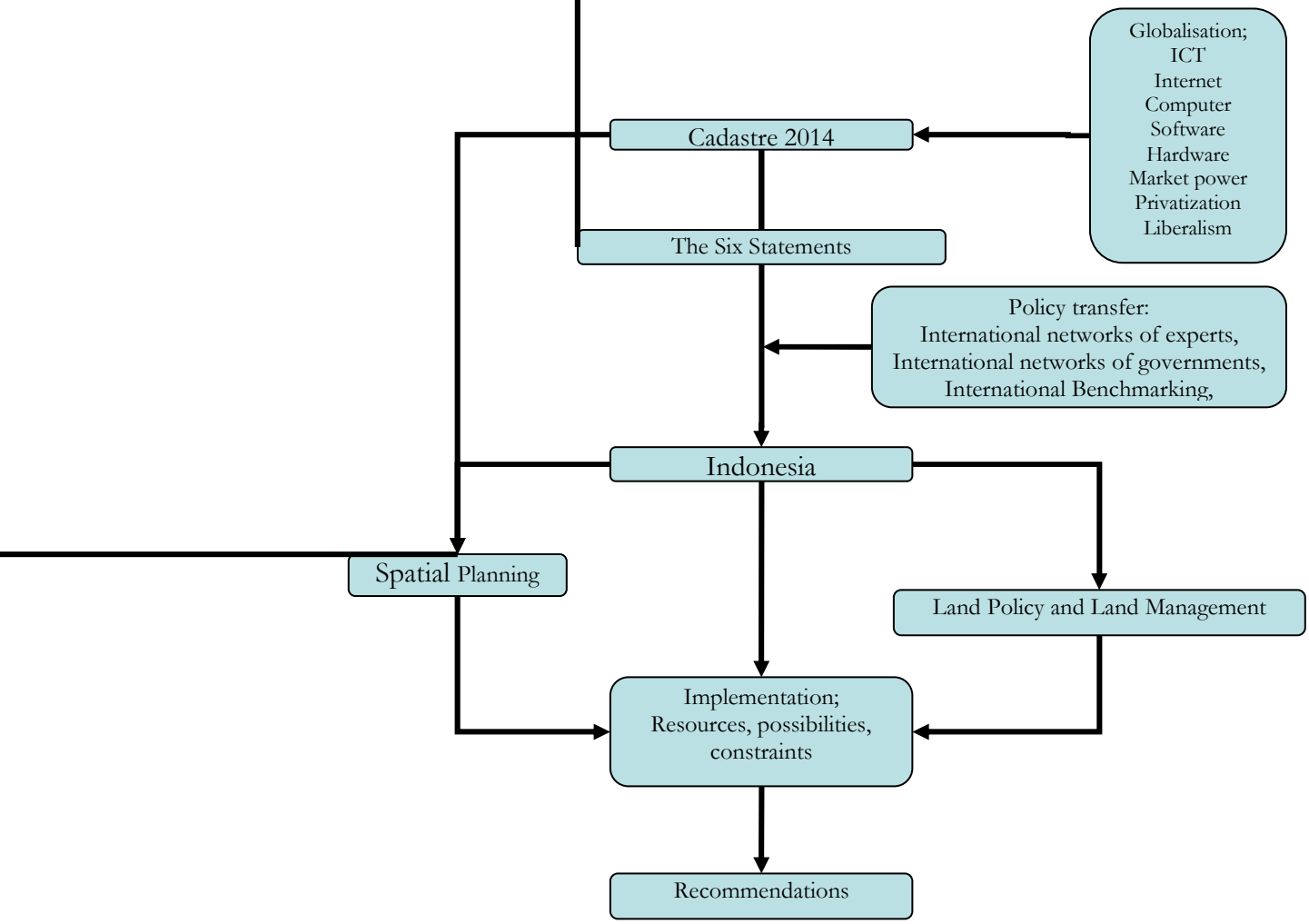


Figure 3.1 Policy transfer of Cadastre 2014 into Indonesia

3.2 Land policy in Indonesia

Indonesia constitution year 1945 article 33 paragraph (3) give a legal basis of National Land laws that put "Earth, Water, and Natural Resources become authority of State, and be used prior to citizen welfare". Indonesia set land on strategic position, besides physical aspect, the other aspects is socio-cultural, economic, defense, security, and laws. Land resources have six values as follows production, location, environmental, social, politics, and legal laws. Therefore, role of government is to manage land resources, improve mechanism of land resources allocation, and formal institution. Land resources management as process how land distributed, used, protected.

The Act number 5/1960 Basic Agrarian Laws so called BAL (*Undang Undang Pokok Agraria*) contains National Land Policy considering land tenure and land rights, formal institution, and legal security. Land policy is as principal statement for foundation of regulation to make good land management system, the principal are land for equity, transparent and productive. And to operate land in order framework covering (a) land

law, (b) land administration, (c) land use, and (d) environmental and land maintenance. There are two policy for urban land policy and rural/agricultural land policy. The basic land policy that set in the Basic Agrarian Law (1960) are the national unity concept, communal' land rights can be acknowledged, social functions embedded in the land rights, the principle of nationality, equality, obligations of right holders, and especially land use planning as a key instrument to give maximum prosperity to the people and the state (Sastrowihardjo, 2001)

Role of state is dominant to land management. The land policy in Indonesia should strive for optimal utilization of national land resources to equally distribute and enhance national prosperity. Since the establishment of Basic Agrarian Law (BAL) in 1960, a fundamental change in land ownership and land tenure structure has occurred. The BAL 1960 is respectively to use customary laws ("adat" law)[16] that the state is the only authoritative body responsible for controlling the national land. In this context, the communal land rights are appreciated as long as they serve the national interest and are not in conflict with the BAL and other regulations on land matters

Some key points mentioned in BAL 1960 are emphasizing the role of The State, as the authoritative organization, with authority to

- Regulate and implement the designation, utilization, preservation and conservation of the national land
- Determine and regulate legal rights on land
- Determine and regulate legal relationships among individuals and legal actions that concern national land.

Land consolidation

Land consolidation is the methods of restructure of land use and land ownership. The form and size of parcels of ownership are restructured to be more regular and each parcel must have access to the road, with the objective to obtain an efficient land use practices. The implementation has to be in line with the spatial plan. With the rapid of development, land consolidation in Indonesia has become a very powerful instrument to implement land use plan. Land consolidation is carried out mostly in urban areas for settlement, housing, services, trade and business, road network, etc and in rural areas for regional development, agricultural, fishery, plantation, natural resources, conservation, etc. According to Deni, 2001, land consolidation is mostly in urban or city area, because tension of population and scarce of land space. The problems are land use not in good order as sources of slum area, difficult to put public infrastructure. The purpose of land consolidation is improving without removing for citizens, and principle "from, by, and for the participants", still based on Local Spatial Planning, to guarantee suitable with land use and land zoning

Function of Land Consolidation

Land consolidation is used as the tools to acquire land by the government for public uses without removing landowners. Besides, land consolidation also gives more opportunity to speed up land registration all over the country, where until now it only covered about 17 million parcels or 30 % of the total number of parcels in Indonesia.

[16] all land was controlled by adat communities, known as communal land right or "Hak Ulayat" in outside Java

Land consolidation strengthens value and function of land in a new good order structure of land space to support land use in effective and efficient appropriate with its potency. Law and regulation concerning land consolidation need to be established to improve and strengthen the existing provisions. In spatial planning perspective, land consolidation as an alternative to achieve efficiency in land use based on Local Spatial Plan. In line with land use and function, considering Act no 24/1992 about spatial planning that consist of three main policy areas, especially on spatial development control (*pengendalian pemanfaatan ruang*)

3.3 Spatial Planning in Indonesia

> Based on Act 24/ 1992 Spatial planning "as processes of spatial planning process (*perencanaan tata ruang*), spatial development promotion (*pemanfaatan ruang*), and spatial development control (*pengendalian pemanfaatan ruang*) is an integrated system that is not separated each other".

The changes of land use as result of dynamic development from social economic activity sometime do not match with the spatial planning. So it need spatial planning policy for coping the problems on how to treat existing land use, which does not fit the spatial plans, how to revise the spatial plan, what kind compensation for transferring land rights for spatial development, etc.

Spatial planning hierarchy

Indonesia has hierarchical system of spatial planning. From the highest is National Spatial Plan called RTRWN (*Rencana Tata Ruang Wilayah Nasional*), then Provincial Spatial Plan called RTRWP (*Rencana Tata Ruang Wilayah Propinsi*), then Municipal Spatial Plan called RTRW Kota (*Rencana Tata Ruang Wilayah Kota*) and Regional Spatial Plan called RTRW Kabupan. At the local plan, more detail spatial plan is derived such as Detail Spatial Plan called RDTR (*rencana detail tata ruang*) for such important location area of the city. And for the lowest scale, government make Detail Engineering Design or RTRK (*Rencana Teknik Ruang Kota*) that is very detailed in parcel with big scale describing the border of land use and parcel.

The three tier hierarchy of spatial planning such national, province and local level significantly represent the role of authority. The means that higher tier of spatial planning should become as guideline for the lower tiers. The lower category translates and elaborates the guidance of spatial plan that on the higher level. It is legally allowed to prepare district spatial plan in the absence of the provincial, and that is also do for provincial plan although the national level has not yet been established. The content of spatial planning are such structure plan (*rencana struktur ruang*), land use plan (*pola pemanfaatan ruang*), and development control guideline (*pedoman pengendalian pemanfaatan ruang*).

At the local government RTRW (municipality and regency) is used for issuing permits for development locations. This local spatial plan can be guide of land development, and protect the land from mistreatment that used for different purpose against the blueprint of plan. At this level, spatial planning touch the basic need of citizens, that deal with the land for sustain their activity for private use considering public rights that restrict their rights respect to sustainable development.

Controlling Spatial Development by means of Location Permit

The implementation of land use plan such Local Spatial Plan (RTRW) is used to the issuance of location permit, the granting land rights and the building or construction approval from several program proposed by sectors. Land use monitoring can be undertaken on project basis or through systematic land use mapping by helping using remote sensing technique. The result of land use monitoring is input back to review the spatial plan.

The government will issue location permit based on spatial plan, that hierarchically the higher spatial plan level has significant authority to be considered by the lower spatial plan level. Based on the location permit, and land rights owned by private developer or individual citizens, the government shall monitor, and evaluate the progress of land acquisition and land use practices. Here spatial planning has legal laws to guide the land use in practices. The progress of development, the permit released based on land use should be in line with the plan.

The Head of the District Land Office based on the Local Spatial Plan (RTRW) issue location permit. The procedures are acquiring lands, and then making application for land rights to do the activity on land. Any change of land use can be controlled through the mechanism of giving location permit for development.

3.4 Development LIS as Cadastre 2014 issue in Indonesia

The policy transfer of Cadastre 2014 can be trace from the experience of the on going planning practices in Indonesia. That deal with aspects that touch the Six Statements of Cadastre 2014. Several discussions based on development Land Information system project that directly or indirectly involving cadastre system in Indonesia experience.

On Going Development of Land Information System

In the transition era to modern cadastre system, in Indonesia experience, land information in general is incomplete, fragmented between numbers of institutions, and generally inaccessible to the public. Some problems related to develop land information system such as,

1. Collection data and information is project based rather than policy, plan, and program based,
2. The data and information is end pipe product and it cannot be used for other purpose, discrete and have no continuity to other project, fragmented information to project owners.
3. Private sectors, individual persons (broker) or third party play the role to be agent for sale data and information
4. Technical problems with networking, protocols and standards are not standard in digital environment, difficult in conversion or exchange data.
5. The duplication of data on between project standards rather than national standards
6. Need standardization data and information, legal laws is requirement
7. Not efficient to do both processes of acquisition data and maintenance is in between manual and digital, (legal laws)

8. A lack of human resource capacity; training required
9. Insufficient budgets for routine maintenance of the system, hardware and software
10. Lack of public access, or access by other government institutions, because of issues related to copyright abuse, cost of production of information collection, private sales (legal framework)
11. Have no clear career for this job on information systems.

Spatial planning has responsibility to get information of land resources through cadastre as subsystem of Land Information system, as a basis for spatial development. Indonesia has done Land Administration Project for Support for Long Term Development of Land Management Policies at 1997 focused on land administration policy.

According to Topic Cycle 10 (2000) at present Indonesia does not have sufficiently complete data sets to supply land information for the purposes of land administration and economic development. This is especially true in relation to cadastral system. The cadastral map covered less than 10 percent[17] of the country (the figure might be as low as1.3 percent of the country (4.3 percent of BPN area). For developing land information system, it requires the cadastral as the fundamental layer. Indonesia is largely missing these fundamental layers compared to developed country (see Table 3.1)

Table 3.1 Typical data sets supporting a Land Administration System

Record/data set	Developed country[1]	Indonesia
Geodetic	Complete and publicly accessible	0-2 order complete/ rest incomplete[2]
Topographic/base map	Complete and publicly Accessible	Partially complete and largely manual [3]
Hydrological	Complete and publicly accessible	Incomplete/fragmented [4]
Cadastral/property	Largely complete and publicly accessible	Minimal and manual[5]
Addresses	Complete and publicly accessible	Largely complete urban areas, minimal rural and forest areas [6]
Road network	Largely complete and publicly accessible	Incomplete/fragmented[7]
Administrative boundaries	Complete and publicly accessible	Complete and digital but not legal[8]
Geographic names	Complete and publicly accessible	Complete computerized text[9]
Image data base	Largely complete/updated and publicly accessible	Largely complete but fragmented and not always available [10]
Fiscal map (tax parcels)	Complete (if cadastral information poor)	Largely complete[11]

Sources: *Topic Cycle 10 – Institutional Framework Reforms for Land Administration – Indonesia*

Indonesia has to start land information system as soon as possible, although the condition is incomplete, inaccessible, and unavailable data for land administration. Instead, alternative and incremental approaches need to be developed. These approaches need to be based on the existing data sets in the country. Indonesia has no sufficient information at certain scale for the entire country. Land information can support decision makers with adequate land data for land reform, spatial physical planning, aid conflict management and the integrated administration of land resources, including environmental and socio-economic aspects.

[17] Less than 10% of Indonesia is parceled, certificated and linked to a cadastral map (Source: BPN documents).

Land Information Management[18] (LIM) system approach acknowledges linkage a range of data and information, paper and digital for improving land administration and facilitates integrated land management. Usually, land information is based on a geo-referenced cadastral parcel and all other land information uses the cadastral information as its foundation. Therefore, LIS are built on the cadastral system.

National Land Management and Information System (SIMTANAS)

The project of SIMTANAS is based on Article 33 paragraph 3 Indonesian Constitution year 1945 and Act Number 5 year 1960 article 1 regarding Basic Agrarian Law so called BAL *(Undang Undang Pokok Agraria)* issued at 24 September 1960. National Land Agency so called NLA (*BPN*) is appointed as formal institutional that manage land in national scale that regulate physical aspect of land; availability, use, and maintains land, and legal aspect between citizen and land, and citizen action to land. For achieving integrated and comprehensive national land management it request management and information system to can support on protection from exceeding exploitation, as Binns wrote in Dale and McLaughlin, 1989 avoidance of the wastage and destruction of land resources.

Based on Decision of President Number 34 year 2003 (*Keppres 34/2003*) paragraph 1 (b), BPN has to develop National Land Management and Information System (*SIMTANAS*) with tasks as follow;

1. Build database land assets of state and government through inventory
2. Prepare land registration and build database of land tenure and land rights based on textual and spatial data related to e-government, e-commerce and e-payment; It has been done:
   a. Building digital land database; spatial and textual data
   b. Building application spatial and textual in land registration; surveying, mapping and land recording, registration rights and maintenance data, bookkeeping and delivery legal rights documents, early warning system of land problems, and building simulation of land acquisition in spatial planning context
3. Build land information application by means of BPN portal (http://www.bpn.go.id) and Land information Service online (http://loc.bpn.go.id),
4. Do cadastral mapping for inventory and registration of landowners (*penguasaan*), land rights (*pemilikan*), land using (*penggunaan dan pemanfaatan tanah*) so called P4T by using aerial photography, satellite imagery technology, and information technology. Several activities are measuring ground control point with GPS, provide complete registration map with code identifier and information, government administration boundary, and land use boundary.
5. Building and developing management using GIS, prior to zoning irrigation field rice, define productive land for support national food security. Here GIS is for supporting land use planning, and monitoring, develop early warning system for controlling land use changes, and monitoring rice field zone.

[18] LIM (land Information Management) is broader than LIS, but it has same purpose regarding to manage land systematically

Land Office Computerization

Indonesia did Land Administration Project and Land Office Computerization in second step on second year using unique ID (*Nomor Induk Bangunan*) to develop system, software, testing or pilot project in local agency, before distribute extensively in national scale. Pay attention is needed to the continuity of project such supported by internal experts for the independence. Land Office Computerization (LOC) is a project that attempting to provide digital data of land property. To date they have managed to computerize 12 of the 314 local land offices, 8 provincial offices, and the national office. See table 3.2

Table 3.2 Land Office Computerization Targets

	LOC Phase	Number of Computerized Offices
I	1997-2000	21
II	2000-2001	33
III	2001-2003	65
	Total	119

Sources: *Topic Cycle 10 – Institutional Framework Reforms for Land Administration – Indonesia*

Land Office Computerization[19] (LOC) is the cooperation activity between The Government of Indonesia and The Government of the Kingdom of Spain in information technology at 1997.

BPN initiate program namely the administering public services environment spatially. Then land offices put on spatial information technology, and integrate spatial data management into workflow of public services. The initiation has started since 1997 by launching the phase 1 of the LOC project and continued to the phase 2A in 1999, implemented in a total of 14 Provincial Offices and 38 Land Offices all over the country of Indonesia.

Now, LOC Project steps forward to phase 2B involving all Jakarta Land Offices and its Provincial Office. The model introduced by the Central Office of BPN called *Hamburger* (see Figure 3.2). The implementation of an IT in modernizing cadastral systems like in the case of the LOC project requires many resources. The brain ware of the project is the Hamburger model, which builds the spirit of towards the development of modern cadastral systems and at the same time the basis for further development of a Spatial Data Infrastructure that shall support spatial planning.

The background of the emergence of LOC is as follow,

1. *A little coverage area of land registration, that is only 27 millions from 86 millions land, exclude forest land has been registered*
2. *To achieve increasing numbers of land registered. It was predicted 2 millions per year will be registered via sporadic and systematic way (but factually 1 millions per 8 years at 2004)*
3. *Conventional, manual and traditional storage land data and information that is still in paper material, need big room, high risk to damage*
4. *It need to increase capacity and quality land service, fast, affordable, and accurate*
5. *It is need to build standardization of information and service*
6. *Lack of human resources that understand computer technology*

[19] http://www.bpn.go.id/engine/sideicon/loc/loc.aspx accessed at 12 June 2006

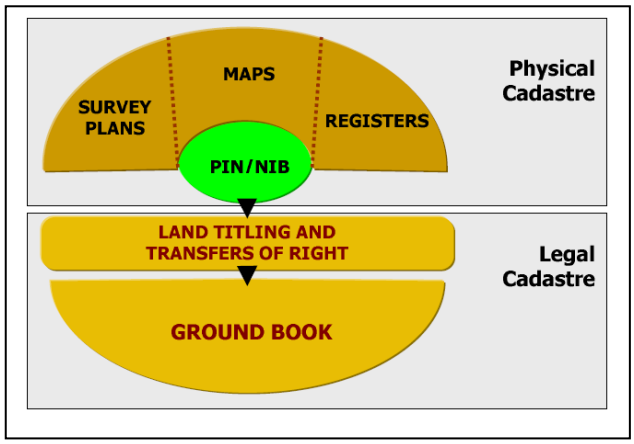


Figure 3.2 Hamburger model

The vision of LOC is to improve the service of land information, land secure, legal land rights, and fast. To realize the vision, there are target on the mission are as follow,

1. *To develop Information technology-based Land Information System*
2. *To build environment that support implementation of computerization in central and local*
3. *To build National Land Agency (BPN) as Land information centre that complete, accurate, transparent, within integrated network and multifunction.*

The goals of LOC are as follows,

1. *to build good land administration*
2. *to improve and speed up land service*
3. *to improve land information quality*
4. *to build Land information system*
5. *to have good method for maintain land data and information in digital file*

The problems of LOC are as follows,

1. *lack of technical capability such as have no standard of data structure, lack of conversion format to LOC system because of various software application*
2. *lack of budget for maintenance, have no routine budget to maintenance hardware and software*
3. *have no reward system, for career and incentive for operator*
4. *lack attention of continuity or improvement of human resources, the skill and the position is not match, and mutation to other job*

LOC in Pilot Project

Haroen, et. all., 2004, exercised cadastral systems in the Land Office Computerization (LOC) Project all over the city of Jakarta especially for the pilot project in West Jakarta and Central Jakarta Land Offices in promoting the integration of spatial data management into daily workflow of the public services. This effort is to contribute for the development for future Spatial Data Infrastructure so called SDI. The aim is towards the development of modern cadastral systems and at the same time the basis for further development of an SDI. He is sure that the completeness datasets can sustain the decision making process and aid the courts in a case of land disputes. The latest issue is

the development of an SDI as expand of cadastral system has a potential role in facilitating such land markets.

The reason backgrounds of his research are the rapid growth in economic development, fast growing population, and migration into Jakarta. That indicates the rapid and increase demand to the immediate land availability for the people living space that in turn, indicates how the degree of cadastral complicatedness in the region is getting excessive periodically. If more appropriate cadastral services are not examined from time to time while the urban sprawl continues, the city will undoubtedly be faced with higher infrastructure costs and worse socio-economic issues in the future development.

Political will of government to do this LOC and commitments to improve land management and administration including cadastral systems is as importance aspects. For strengthening cadastral systems, the Government of Indonesia so called GOI issued legal regulation such as the Decree of the House Representatives number IX/MPR/2001, regarding the Agrarian Renewal and Natural Resources Management, and the Decision of the President number 34 year 2003 regarding the National Land Policy. The main issue of these two regulations is the development of a National Land Management and Information System. BPN as an official authority paid attention to cadastral systems towards the development of an SDI in national and local levels. These efforts show linkage of Cadastre system, LIS, SDI and spatial planning and the decentralization.

For this pilot project case study, resources aspect and legal law can support the realization of LOC. Jakarta city has resources such the Land and Mapping Agency *(Dinas Pemetaan dan Pertanahan)* that produces spatial datasets. Moreover, it is strengthen on its utilization by legal laws from the Governor Instruction number 32 year 2004 that all institutions within the city of Jakarta are authorized to utilize the DPP spatial data sets. Moreover, The five Land Offices in Jakarta is as the most comprehensive in terms of cadastral challenges that undertakes two authorities of land registration and cadastral survey within one organization managed under the Deputy for Land Information, unlike in province or local level.

3.5 Policy Transfer, Lesson Drawing and Implementation

Such as in this research, the transfer of cadastre 2014 policies as a result of commitment of government actors in Indonesia country to get lesson learned and can implement it considering resources, possibilities and constraint into planning practices. The Cadastre 2014 as international concept that come from developed countries will give impact to other countries that has willingness to do policy transfers, especially in Indonesia as developing country that has differences in planning cultures. The policy transfer will face the institutional and planning culture of every country that adopts Cadastre 2014. How the national planning system can integrate the concept of Cadastre 2014 depended on their particular planning culture.

Linking Spatial Planning To Cadastre 2014

Indonesia presently is in transition progress to adopt cadastre 2014 into the planning system, but many problems occur according to budget, legal framework, formal institutional organization, etc. Up to now, land recording including cadastre and registration and spatial planning is not linked yet formally. Indonesia should link land

recording to spatial planning for the long term formal and should be strengthen by legal framework.

According to Act No. 24/1992, land is an integral part of space. Therefore, spatial plan and land use plan are interrelated. Land use plan is a subsystem of spatial plan, besides land development. In other words, land use planning is essentially a land space planning. Land use plan should be able to accommodate various development activities on the proper location based on their designation and function. Land use planning in the framework of spatial planning is one of the bases of land management.

In general, term spatial planning generally known as land use planning can be linked to Cadastre 2014 in a number of ways. The cadastral map and registration system can be main supplier for some information such as 'who' the landowners, that holds 'what' kind of land rights on 'where' the location. This land related information will give the planner and decision makers a description about land resources, about what already exists on the ground and what the trend for the future according to spatial development plan. It can approach the availability of private land, public land, and custom land.

Cadastre system produces data and information land and legal land rights as an input for spatial planning and spatial development. Planning agency and land agency can share and use this data to prevent unacceptable land development, means for land protection from overlapping function. That can guard or secure the spatial plan on that area. Such as in RTRW (local spatial plan) as basis for issuing land development permit. The spatial planning system sometime based on the quality of the land administration system included cadastre and land information. The relations can be symbiosis mutualism, give benefit each other, and has significant input for spatial planning.

Based on the data, the cadastral map only covered less than 10 percent of the country (see Table 3.3) may be as low as 1.3 percent of the country, which cadastre map is commonly used for the micro level implementation. In addition, spatial planning on macro level to detailed level. A strategy needs to linkage land use with land registration in the long term. These linkages of spatial planning and cadastre may be for long-term in the implementation because of huge coverage area in Indonesia. But in concept, it is possible. Beside the systematic registration, linking land use controls to sporadically registered parcels should be realized through guidelines from central government. It requires supportive political will from government by producing policy and laws to spread on local government.

In the land use planning process, cadastre as one element that providing land information to better decision making. The data needed include present land use, land capability and other physical land characteristics, land status and social economic condition, and other supporting data. A multiple land use plan is prepared based on land availability and the land database and as the basis to prepare the spatial plan. The land use plan describes essentially the spatial dimensions of development. Based on spatial plan and the five-year development plan, which contains sectoral and regional development plan, land allocation for every land use activity is indicated (Sastrowihardjo, 2001)

Table 3.3 Statistics on land registration

No	Fiscal Year	Number of Certificate						Total certificate issue p.a	Cumulative Total certificate issue
		Project							
		Sporadic	%	Systematic/ adjudication	%	Other	%		
1	to 1989	7.576.058	69,1		0,0	3.383.113	30,9	10.959.171	10.959.171
2	1990/1991	398.921	64,6		0,0	218.947	35,4	617.868	11.577.039
3	1991/1992	566.461	67,7		0,0	270.293	32,3	836.754	12.413.793
4	1992/1993	604.297	69,1		0,0	270.457	30,9	874.754	13.288.547
5	1993/1994	672.209	74,2		0,0	233.175	25,8	905.384	14.193.931
6	1994/1995	819.559	80,4	1.022	0,1	198.570	19,5	1.019.151	15.213.082
7	1995/1996	875.062	76,5	4.236	0,4	264.649	23,1	1.143.947	16.357.029
8	1996/1997	1.015.522	69,2	224.370	15,3	228.543	15,6	1.468.435	17.825.464
9	1997/1998	964.128	57,0	460.924	27,2	266.670	15,8	1.691.722	19.517.186
10	1998/1999	2.342.382	74,2	635.214	20,1	179.137	5,7	3.156.733	22.673.919
	Total	**15.834.599**	**69,8**	**1.325.766**	**5,8**	**5.513.554**	**24,3**	**22.673.919**	**22.673.919**

Sources: Topic Cycle 10 – Institutional Framework Reforms for Land Administration – Indonesia

The availability of information concerning land resources is a pre-requisite for comprehensive spatial planning development. Improving the quantity and quality of the information supply for planners, policy and decision-makers will improve the quality of planning and implementation of spatial development-oriented activities.

3.5.1 Resources Considerations

For implementation the cadastre 2014 policy, it need to consider resources that can understand the potential point as represent the capability and capacity of Indonesia to deliver Cadastre 2014 into planning practice. Three resources shall be elaborate for this research for instances legal aspects, formal institutional and technical aspects.

Legal aspect

Legal framework is important to support policy by means of constitution, laws, and regulations for secure the implementation. Several regulations become basis of legal framework of the cadastre system activity to develop Land Information System project.

Legal frameworks of land are as follow,

- Constitution of Indonesia article 33 paragraph 3 year 1945 regarding land, as resources that is prior to citizen welfare.
- Act Number 5 year 1960 regarding Basic Agrarian Law
- Act Number 5 year 1960, Article 15, regarding to maintains land for environmental sustainable
- Act Number 5 year 1960, Article 52, regarding legal sanction for environmental degradation
- Act number 24 year 1992 regarding Spatial Planning policy
- Act number 22 year 1999 regarding Autonomy of Local Government and Decentralization
- Act Number 25 year 1999 regarding Financial Balancing
- Government regulations (*Peraturan Pemerintah*) PP number 46 year 2002 regarding tariff of National Income non-Tax in BPN, for approaching cost recovery of the cadastral system
- Government regulations (*Peraturan Pemerintah*) PP number 25 year 2000 regarding Land services
- Decree of the House Representatives number IX/MPR/2001, regarding the Agrarian Renewal and Natural Resources Management
- Decision of President Number 34 year 2003 regarding National Land Policy

- Decision of President Number 34 year 2003 paragraph 1 (b) regarding to build National Land Management and Information System (*SIMTANAS*) by BPN
- Decision of President Number 75 year 1993 regarding National Spatial Coordination Board amended by Decision of President Number 62 year 2000 regarding National Spatial Coordination Board (BKTRN)
- Regulation of President Number 69 year 1996 regarding participation of citizens in Spatial Planning
- Regulation of President Number 36 year 2005 regarding Land acquisition for Development implementation for public infrastructure/facilities

Formal Institutional organization

This part describe formal institutional organization that deal with land in Indonesia. Land administration covers such functions and spread on many authorities (see Figure 3.3). These agencies undertake these functions on below[20];

1. BPN (National Land Agency) handle surveying, registration, information from the cadastre, geodetic reference point, aerial photography, imagery satellite
2. Bakosurtanal (National Surveying and Mapping Coordination Agency) handle land information, for land administration namely, geodetic reference point, topographical (base map), geographic names, administrative boundaries, hydrological, imagery (aerial and satellite);
3. Ministry of Finance, Directorate of Taxes handle 'fiscal' cadastre (tax object maps) and responsible for land valuation;
4. Ministry of Forestry, and Minister of Estate Crops and Ministry of Mining and Energy have responsibility for about 70 percent of the land in the country and BPN for about 30 percent;
5. BKTRN (National Spatial Coordinating Board) and KIMPRASWIL (Ministry of Settlement and Redevelopment) have responsibility for coordinating spatial planning. Zoning such land use regulation is not presently linked to the land registration system;

Indonesia use two organizations for handling land related information. There are two categories of activities such as land registration and cadastre mapping. Land registration handled by Ministry of Finance, Directorate of Taxes, has relation with fiscal cadastre merely for collecting land tax, for now lack of more effort to operate progressive tax that can recognize landowner who occupies several location of land

[20] Topic Cycle 10 – Institutional Framework Reforms for Land Administration – Indonesia

1. Juridical	*Allocation of rights to land* (such as sovereign grants, sales, donations, inheritances, prescription, expropriation, reversion, easements, leases, mortgages) *Delimitation of the parcel* (these typically include definition of the parcel, demarcation of boundaries on the ground, delimitation of the parcel on a plan) *Adjudication* (e.g., resolving doubt and dispute regarding rights and boundaries) *Registration* (e.g., official recording of information of rights and parcels)
2. Regulatory	*Land use controls* (such as zoning, environmental regulations, etc. that restrict rights)
3. Fiscal	*Property assessment* (e.g., valuation of the parcel land and improvements) *Property taxation* (e.g., computation and collection of taxes)
4. Information management	e.g., collection, storage, retrieval, dissemination and use of land information
5. Enforcement	e.g., defence of person's rights against other parties, enforcement of land use controls

Figure 3.3 Conventional land administration functions
Sources: *Topic Cycle 10 – Institutional Framework Reforms for Land Administration – Indonesia*

There are different scopes of work, such *BPN* work in sector mainly regarding land and property rights, where cadastre focus on micro scale of area, otherwise the other sector regulate land according to sector purpose such as Forestry, Mining and Energy, Agriculture, Plantation, as sectors that use land for their need. In addition, other sector that regulate data and information about land such *BPN, BAKOSURTANAL*. National Planning Agency (*BAPPENAS*) or in province and local level (*BAPPEDA*) do coordinate all sector activity through policy, plan and program, and integrated in spatial development that related to land space and location. They work in messo to macro scale of area.

Based on Decision of President Number 62 year 2000 regarding National Spatial Coordination Board (*BKTRN*). Several government stakeholders involve in the National Spatial Coordination Board, that describe spatial planning as concerns of the broader stakeholders. Therefore, the structure of the BKTRN as follow:

The Head is State Ministry Coordinator of Economic, Finance and Industry as minister to coordinated spatial planning due to article 29 Act number 24 year 1992 about spatial planning. The Vice Head is Ministry of Settlement and Redevelopment, and secretary is the Head of National Planning and Development Agency that has task to coordinate RTRWN (National Spatial Plan) across all level, Province Spatial Plan and Local/ Regency Spatial Plan. Synchronize land use and natural resources use with spatial planning. The members are:

1) Ministry of Home affairs;
2) Ministry of Defense;
3) Ministry of Agriculture;
4) State Ministry of Public Work;
5) State Ministry of Environmental;
6) State Ministry of Local Autonomy;
7) The Head of National Land Agency;

Technical aspects

Indonesia that has huge land area to manage land data needs very sophisticated tools in terms of both the software and the hardware. With the rapid development of surveying, mapping technology, remote sensing and computerization, these data are easier handled and processed through a geographic information system (GIS). The preparation and implementation of land use plan embraces development of GIS.

Development technology of surveying and mapping is so fast with the Global Positioning System (GPS) and Differential Global Positioning System that can give accuracy on centimeter level. This tools use satellite navigation to calculate the position of land in longitude, latitude and height dimension (Z) or altimeter measurement. Accuracy and speed of acquisition data can be improved to cover broader area; this is very important where Indonesia has big coverage area.

Besides that, technology of remote sensing and aerial photography can aid for medium to small-scale coverage area. Using remote sensing that produce satellite imagery in digital format or hardcopy material, it is possible to do visual analysis /interpretation and describe 'big picture' of the area, before it processed calibration of scale or make on *orthophotomap*. Another using aerial photography, it is possible to do *photogrametry* analysis, three dimensional view, and measure distance and height of the object, via overlapping area that covered by two aerial photo. They are used for accelerate land registration In Indonesia.

For inputting data to computer, digitizing is the most popular way to convert conventional map data to digital data through digitizer electronic table. Or for the recent development it can using screen digitizing mode, after the conventional map transferred to computer using scanning technology. The last decade has seen moves towards establishment of fully digitized cadastral systems throughout the world.(enemark, 2004)

All the technological can do the automation and computerization for all land related data. GIS as the core for integrating all geographical data and attribute data can be very useful for building land information management. This information is the primary sources for decision-making process for land use planning policy, including its implementation and control. These activities have been taken care for coordination purposes among sectors development both at the national and local level. The collaboration of GIS and LIS can service all levels of decision-makers cross sector, and enable decision- makers to visualize spatial information, both the framework and the information outputs

In Indonesia both paper and digital systems still be utilized because of lack of computerization on land local agency and lack of digital data, it is still useful to link paper maps and cadastral using GIS data sets of varying accuracies. Some land administration units at local government level might only move fully to digital by 2020. Digitizing of manual map is time consuming, for improvement the speed it can use big scanner to make digital file available during this transformation period.

It is need to setting up linkages to improve the cadastre through Land information System interface among department for exchange data and information. A more effort should be made to bring sporadic parcels onto the cadastral map, given the need to link the topographical and cadastral data. The integration data and information

from both BPN and PBB Tax Agency has to become priority. The crosscheck system of cadastre map 'legal cadastre' and land registration 'fiscal cadastre' can improve security of land. This should begin as soon as possible with the creation of one unique parcel identifier for instance Tax Object Value (TOV) and Building Number (BN) can be shared by both organizations.

One of the major problems in the information field in general has been the integration of different data from different sources, which was captured using different methods, at varying accuracies and resolutions, and stored in different formats, using diverse referencing mechanisms

In the next **chapter 4** it shall discuss the evaluation based on theoretical framework on **chapter 2** to analyze to planning practice in Indonesia context on **chapter 3.** The evaluations are in general Cadastre 2014, and The special on The Six Statements and The development of LIS project, and the process of Policy transfers.

Chapter 4
Evaluation of Cadastre 2014 and the Six Statements within Spatial Planning Perspective

The discussion of theoretical framework at **chapter 2** as foundation to assess the planning practice has depicted 'big picture' of the entire concept range from land management, spatial planning, and land information system to Cadastre 2014. It gives basic knowledge and clear insight to analyze the concept and in the planning practice delivered in **chapter 3** especially the case study of Indonesia. It shows linkage, interrelation, interconnection among the concepts and analysis phenomena in Indonesia planning culture. This chapter will deliver explanations to approach and to evaluate policy transfer of Cadastre 2014 and the integration into spatial planning.

This chapter will evaluate policy transfer of Cadastre 2014 by means of evaluation criteria on The Six Statements in Indonesia. The evaluation is to get clear insight of the policy transfer and the integration of those concepts into spatial planning through development of LIS. The evaluation of implementation process is to on going LIS project in Indonesia such as SIMTANAS, and LOC considering resources, possibilities and constraints that occur in planning practice. The evaluation divide into several subchapter such as general evaluation on Cadastre 2014, evaluation of The Six Statements, Development LIS, and policy transfer, lesson learned, and implementation that considering resources, possibilities, and constraints.

Indonesia has decided to adopt the concept of Cadastre 2014 and adjusted it appropriate with its institutional and cultural planning condition and considering resources, possibilities and constraints in implementation into planning practices. The criteria of The Six Statements will be evaluated in the context of Indonesia planning culture. In addition, the Integration of Cadastre 2014 into spatial planning will be elaborated to support comprehensive integrative spatial planning.

4.1. General Evaluation on Cadastre 2014

Land and its problem has close relation to spatial planning, where has planning tools such as land use and land development as supporting activities to achieve sustainable land management. For developing country like Indonesia, there are many problems according to land, and spatial planning via their policy, plan and program should be contributed on the macro scale for approaching the problem. Moreover, it requires supply of data and information related land. Therefore, especially through Land Information System it can help decision-making process to manage land. LIS has subsequent important system that deal with land data at micro scale called Cadastre. The modern concept of cadastre is Cadastre 2014 that has vision and mission to achieve vision and mission of future cadastre. Cadastre 2014 contains The Six Statements, which is for in this research will be used as criteria to evaluate Cadastre and Development of LIS in Indonesia. Cadastre 2014 has broader meaning and scope and it suppose to strengthen the spatial planning via providing data, and information related land on micro scale.

Cadastre systems originally are embedded in the historical, institutional, and cultural setting of the particular country. Like in Indonesia, it is shifting from Dutch colonialism era to Basic Agriculture Laws 1960 and evolving until now. The Cadastre 2014 need to be adjusted to the condition of Indonesia. Because the organizational structures for land management differ widely among countries across the world, and reflect the cultural and legal setting of the each country. The institutional arrangements may change over time to better support the implementation of land policies (Enemark, 2004)

Cadastre 2014 is sectoral concept, merely close to land survey and mapping location or land registration. It should be shifting to comprehensive approach, through sustainable land management, and spatial planning, extend to multipurpose cadastre on Land Information System. Concept of cadastre come up from land sector, narrower than spatial planning, that also regards with the land as the main aspect of regulation through land use plan for support the spatial development and has broader and extended influence to economic, social and political. The system of cadastre shall be integrated into spatial planning system using geographical information system as the interface system.

Cadastre 2014 use technical and sector approach, such as computerization, re-engineering, automation, using advanced technology surveying and mapping so called technology driven than user need driven (Akbar, 2003; Enemark, 2004). It is not ends in themselves. On one hand, it has broader impact to many users and other sectors, complex in social-cultural, economic and political context. It supports effective land markets, increased agricultural productivity, sustainable economic development, environmental management, political stability and social justice." (UN-FIG, 1996) but in the other hand it give little considerations to spatial planning where it has broader impact across sectors, has higher role to influence others land-related sector and it has role from strategic planning level to operational level that can bring cadastre 2014 more collaborative with other sector that also handle land related information.

This situation and condition can hamper successful of implementation cadastre 2014 into practices, because sector cannot stand alone without collaboration and understanding other policy. Collaborative planning[21] is more preferable than rational planning in this matter, but here it can be combined, besides technical side, Cadastre 2014 has impact to technical, social, economic, and political. Alternatively, may it shift from rational planning to collaborative planning at the end or follow up, or they mix up together build policy and practice this system. For implementing policy it need cooperation and coordination from others sector. It means that BPN or National Land Agency (NLA) cannot deliver this policy into practice by itself, because land related information involve many actors and agencies. It needs openness system to exchange data from other department.

The previous aim is mostly to serve private sector or individual rights then with cadastre 2014 put public sector laws and considering custom laws to improve services for users. The motivation firstly emphasized to the need of private sector for providing land data and information for land market in effective, efficient, and fast model. as a result, other aspect such as spatial planning as side effect, that factually very important to other land rights protection especially for development. Here, these research expore

[21] Healey, 1997, proposed collaborative planning, through institutionalization

prospective of the integration of Cadastre 2014 into spatial planning system as an alternative approach. Started from this point, factually this policy should be paid attention from other sectors, and it has potency to carryout up to strategic level, not only in operational level, so it can achieve broad influence and a sound to the land importance information. Therefore, it can elevate the aim to support (spatial) planning by means of Cadastre 2014 extends to develop land information system. The innovation of cadastral systems tends to be in the direction that cadastral systems will be implanted into land information systems.

As paper policy, cadastre 2014 is subsets of Land information system. It become main supplier for land data and information, and for the extend and future vision, some point may have significant relation with Land information system extend to spatial planning, such as multipurpose function, that can be basis input for other sector systems.

The cadastre 2014 is also considering the influence of development information and communication technology included computerization to Cadastre 2014. Automation as main requisite to re-engineering should be done for efficiency, effectiveness, for fast updating and retrieving data. For technical side of computerization and automation, it is need huge investment. To do this private sector can be involved on building the system and maintenance, but security and supervisory is still on government hand. Cost benefit analysis can be tools for assessment the continuity of this system, although is very difficult because of the other aspects out of physical-technical matter involved, social-cultural, institutional, political, and usually this project is in long-term period. However, this policy is predicted to achieve the benefit via cost return.

There are two elements had to be considered in Cadastre 2014: the on-going automation of the cadastres and the increasing importance of the cadastre as part of a larger land information system. The expectation to Cadastre 2014 as a part of land information system is higher to be integrated into spatial planning. So comprehensive system, coordination, cooperation and automation, without separation land registration and cadastral mapping is as prerequisite. Nevertheless, it cannot be done yet in Indonesia planning culture, where there are two organizations that deal with land registration via land registration on Taxation agency by Financial Department (*Departement Keuangan*) and land surveying and mapping via National Land Agency (*BPN*). It is still on-going process in pilot project at Jakarta Province and municipality. Each department has specialization on their functional task. For carrying out the unification of both system and department, Technical approach is required for networking, more openness system to exchange data and information, besides legal and institutional framework. Moreover, legalization or regulations for realize this policy is needed that arrange function of each department.

If so cadastre 2014 can have higher role and influence broader level organization from national, provincial to local municipality, and put in strategic level.

4.2. Evaluation of The Six Statements

The Six statements can become evaluation criteria to measure cadastre reform in every country. Bevin (1999) has done research the Cadastre 2014 reform in New Zealand based on The Six Statements.

The emerging of Cadastre 2014 policy paper is to predict the future modern cadastre. Using questionnaires with several questions, the effort is to know the existing

condition of cadastre system of participant country, and finding reason for on-going cadastre reform and trends. The result is Vision Cadastre 2014 that delivered in The Six Statements. These are the critical review of the six statements of cadastre 2014.

Due to statement 1 mission and content of Cadastre 2014, Cadastre 2014 will show the complete legal situation of land including public rights and restrictions. The security of land put in the first importance thing to guarantee the status of land through complete legalization, all information regarded rights and restriction. The vision and mission of Cadastre 2014 include public authority to set rights and restriction of land use. It try to move out from merely private or individual matters to government authority considerations. Cadastre 2014 can give broader impact. It is shifting from sectoral to deal with comprehensive integrated information for spatial planning.

Here, spatial planning can support of legal institution of land through spatial plan hierarchy from national, provincial and local/municipal level. The hierarchy is also on the scope and scale level with the different scale from small scale to large scale, from general to detail-engineering scale. To Municipal Spatial Plan or RTRW Kota (*Rencana Tata Ruang Wilayah Kota*) or Regency Spatial Plan or RTRW Kabupaten (*Rencana Tata Ruang Wilayah Kabupaten*) is used for basis in issuing permits location for spatial development. At the lowest level of detail and engineering scale there is Detail Spatial Plan or RDTR (*rencana detail tata ruang*) and biggest scale of 1:1000 to 1:500 municipality government in special city area make Detail Engineering Spatial Plan or RTRK (*Rencana Teknik Ruang*) but this is lack of updating, because it is in the project scale at the moment.

This concept come up from land sector, it need to carry our on Strategic planning level, for getting attention from broader sense of planning across department related land, coordination and cooperation in vertical, and horizontal way. The concept should bring comprehensive planning across sectors. To get for clear boundary, no overlapping rights of private, public and traditional on the same land location. This is challenges for Indonesia, because of the problems such as huge land areas, hundreds local agencies, budget, and complexity of the land problem, include social, economic and political environment of land.

Spatial planning as the public sector policy has task to manage space for all the citizens, considering all stakeholders. It can play the role. By that, state can do intervention through land use, or land zoning where restrictions can be in effect to all stakeholders, that in Cadastre 2014 called legal land objects, which considers traditional, private and public law that the distinguish boundary definition. The complete legal of land can influence to better the security of land tenure, protecting land use, and land resource management.

On Statement 2, organization of Cadastre 2014, the separation between 'maps' and 'registers' will be abolished. Most of the country has two-separated organization that deal with cadastre and registration. There are advantages and disadvantages in both choices one organization or still in two organizations. For Indonesia, it is still in fact that there are two organizations, which deal with cadastre in National Land Agency (BPN) ranging from national, provincial, local level and for registration on Taxation Agency in local level to collect the land taxes. This is challenges for Indonesia to merge into one system. It is still in concept not yet in operational. Need some an organizational structure that can handle this issue, maybe mix public and private partnerships. This statement is

challenging the ego-sectors where they have particular function and specialization. However, with legal framework it can be realized. Recently the pilot project of development LIS is on going process in Jakarta Province involved five regions, will be explored on developing land information system on next sections.

These statements will be impacted to the cadastral organizations. Groot (1997) proposed some question such as the regulatory or ownership status of such a center database of land information development, by government owned and operated, or government owned and privately operated, or privately owned and operated. The set up of legal aspect to operate the center database should be clear. He advised kind of ownership shall be a partnership, or an incorporated company, or a special agency directed by government at arms length. These constructions of organization need to be analyzed for advantages and disadvantages and all be considered resources, possibilities and constraints.

On statement 3, the changing role of maps as result of technological development, 'Cadastral mapping' will be dead, long live modeling. Conventional mapping will be changed to digital mapping supporting by surveying and mapping development technology. This effort is for efficiency and productivity of survey and mapping activity to fast, effective process of cadastre map. Besides new installing new equipments/hardware and software, it need brain ware of human resources, to operate and maintenance database of survey and digital map. For the first installation of this technology it is need huge investment for initial stage, but at the end the benefit promised for accelerate the service of producers to users

In Indonesia, cadastre mapping should be on National Land Agency (BPN) but BAKOSURTANAL as public sector agency also responsible for national coordination for survey and mapping. Other maps should support for spatial planning and on center national database, but even in government area it did by public sector across various institutions through their sectoral project that factually private sector did it according to narrow purpose of the project. The database of surveys and maps is spread out anywhere; it is still uncoordinated, different purpose, difficult to standardize the format. Akbar (2003) analyzed the eight problems of different map perception for point of view of producers and users such as map produced by sector project not in term serve spatial planning, lack of budget to maintenance and updating map, and merely end pipe product. He emphasized that GIS is not only for mapping but also for further spatial analysis and data sharing, unsynchronized accuracy and availability map, coverage scope of map in macro versus micro, different scale and the content of information in terminology and classification, and the legal laws of PP10/2000 about Map did not support map for further analysis, too general.

Kaufman (1998) have seen benefit of the new system as follow,

- *The representation of information of the data model is more flexibility, with graphic, and diagram, table, etc.*
- *Good storing information and the products are various in scale and size of hardcopy*
- *Easy handle the digital data model and safe physically, for backup on CD/DVD or other permanent storage or servers.*

- *Possibilities the exchange of digital data models[22] to Autocad, MapInfo, ArcView, ArcGIS, ArcInfo, or other mapping platform programs.*

Considering the development technology of Global Positioning System (GPS) or Differential GPS for highest accuracy, the acquisition coordinate data can be done by navigation satellite, faster and efficient for many point coordinate location. Remote sensing, and aerial photography can provide general picture of certain area through visualization of the earth surface in small scale with certain spatial resolution. GIS can aid this part, not merely for mapping; by means of converting coordinate to geographic coverage such as point, line or polygon area but also GIS has capability to data transfer or exchange of data supported by local area network or internet connection and its ability to facilitate worldwide data networks via metadata format. The influence of information technology development in Cadastre 2014 resulted extensive synergetic surveying and mapping technology to provide basic data model. Efficient and effective procedure in map producing can be realized to cover the entire administrative area.

On Statement 4, there is the influence of information technology development in Cadastre 2014, the paper and pencil cadastre will be gone. Like as statement 3 that technology influence on surveys and mapping techniques, in statement 4, influences on the administrative of inputting data coordinate, land owner, land property rights, etc. that using computer based. They can do faster, systematic and structured with computer help. Computerization and automation is as prerequisite for Cadastre 2014 implementation but mainly on national and provincial government, and few in local or regency level. This is because lack of budget, lack of human skilful, to operate, and maintain the system. Indonesia most in its local land office is still using paper, and pencil, and in National and province national land agency, they combine it with computerization and automation.

On statement 5, there are the influences of globalization, liberalism, privatization and market power in Cadastre 2014, Cadastre 2014 will be highly privatized! Public sectors do not need to handle all task of land registration or cadastre mapping. Transfer of task is possible to private sector or public and private sectors can work together through partnerships. This statement gives room for private more roles to participate on Cadastre 2014. Some technical parts can be transferred to private sector, but the security is still on public sector or governments.

Like in Indonesia, private sector has role on technical and maintenance of the system, but the main authority is still on government. Government is not ready to give more roles to private sector; because of some data restricted for security and public cannot access. Here it need clear setup of legalization and regulation that divide authority of private sector versus authority of public sector, security to access data, intellectual rights of data should be protected (Enemark, 2004)

Private sector may have role through particular sector project, not in permanent work, only in short term, merely technical consultation and technical assistances, still modest and small role of private sectors. The Government should be able to implement efficient and powerful procedures for supervision and control of the work by strict and permanently applied computer-assisted control procedures; by improving staff capacity

[22] http://www2.swisstopo.ch/fig-wg71/cad2014.htm accessed at 10 June 2006

and capability; and by the financial involvement of the public sector in mixed-economy organizations. It needs much effort to transfer and give task for private because in Indonesia land data is mostly secret or confidential. However, the positive consideration is for efficient and effective of the system can be consideration to implement this statement with strong political will from government to share the task, and build legal framework, via laws and regulations.

On statement 6, for business core, it is important to calculate cost recovery in Cadastre 2014, this statement has optimistic view that the cost of Cadastre 2014 will be recoverable. It is difficult to calculate for short term because the benefit will emerge for the long time, not instantly. However, it is hard to do that analysis because not all element of Cadastre 2014 can be quantified, such as benefit of social cultural aspects of Cadastre 2014. The regulations of cost for land become consideration of BPN by means of land service by BPN based on Minister instruction/Head of BPN number 3 year 1998 dated July 20, 1998, that it operated window system (*loket*) that deal with special services. It can become consideration input for approach cost recovery in Cadastre 2014.

4.3. The development LIS as The Integration Cadastre 2014 into Spatial Planning framework

Enemark, (2004) presented a conceptual understanding in the areas of cadastre, land administration, and land management as a basis for building adequate land information policies, whereas the entire concept linkage with spatial planning. The concept offer possibilities to what extend of cadastre 2014 can be integrated into spatial planning. For that reason, the general concept of land management, land administration and land policy need to be understood for recognizing the position of Cadastre 2014 and spatial planning.

The differences are just on the scope or scale of services, but the same aspect is related to give input for spatial planning from output of cadastre 2014 related land related data and information. Spatial planning can use planning tools such as land use policy and land development to manage and approach the land problem in macro scale but for micro scale based on parcel unit or land object that is cadastre system to support land data and rights property and for the extend to develop land information system.

In process of policy transfer of cadastre 2014 into Indonesia context, it faces such problems. Indonesia has enormous area, with disparities on capacity and capability among regions in technology, economic growth and formal institutional organization, besides hundreds land agency in local government. They all need huge investment, for setting up cadastre 2014 to entire local land office such as for computerization, automation, surveying and mapping, providing GPS and GIS, remote sensing and aerial photography, plus the brain ware as an actor in the system. For technical matter may can be solved for instances hardware and software, if money available, but for social cultural and political matter, such as legal framework, sharing role with private, change formal institutional structure in adopt Cadastre 2014 require in-depth study regarding the institutional and planning culture of Indonesia (Dolowitz and Marsh, 1996). In legal aspect, land information should be organized as a spatial data infrastructure at national,

province, local levels based on relevant policies for data sharing, cost recovery, access to data, standards, etc (Enemark, 2004)[23].

To adopt the technical matters, the most importance is human resources or brain ware to transfer technology, operate, ad maintains. For the success of policy transfer in technology on Statements 3 and 4, it requires skilful staff. For continuity those Cadastre system, it need to keep high skill staff on this job position, provide incentive, education, training, course, for stages since installment, operation and the long live cadastre system. And because some preparation on technical, administrative procedure, until implementation need much efforts

In line with Williamson (2001) success of policy transfer based on the documentation and wide acceptance of the cadastre reform. For Indonesia, the vision and mission is for the long-term policy to support sustainable land management, and other multipurpose increased agricultural productivity, better spatial planning, whilst in cadastre 2014 stress on promotion an active land market. That is true that policy transfers of cadastre 2014 depend on the institutional and planning culture of the country (Dolowitz and Marsh, 1996) such in Indonesia. Williamson, 2001, conclude that "best practice" in some countries, will be differs for "best practices' in other countries.

Williamson (2001) stressed that land information system, and particularly their core cadastral components, are an important infrastructure, which facilitates the implementation of land use policies. In fact, Indonesia considers cadastre system as an element to develop Land information system in term of SIMTANAS, and LOC project. The extent of the efforts is to build spatial data infrastructure that benefit for spatial planning. He conclude that there are shifting from the traditional land administration systems purpose for supporting the operation of land markets, and then evolving into a broader land information infrastructure which purpose to supports economic development, environmental management and social stability.

4.4. Policy Transfer, Lesson Drawing, and Implementation

The process on going policy transfer of cadastre 2014 is good enough, on progress to achieve better land information system for supporting spatial planning. Depended on the institutional and planning culture of Indonesia, there are several problems on the implementation.

Dale and McLaughlin, 1989, proposed four analysis of development LIS as part of cadastre 2014 policy transfer. The first is human resources that concerns with the availability on right level of technical and professional skills. The second is economic cost recovery that concerns with private role, efficiency of the system, and benefit for long-term period. The third is formal institutional analysis that concerns with the assessment of organizational arrangements. The current government structure, coordination, cooperation, exchange data, and policies related to land. It is about form of land policy and management of land resources, relationships and exchange information among organization those responsible for handling land data, management structures and

[23] http://www.land.aau.dk/~enemark/Kursusmateriale/Mexico%20KeynotePaper%20SE FinalVersion.pdf accessed on 30 May 2006

management information system within ministries and department. The fourth is determining requirements for Land information system, the chance and constrains of its progress. Several problems such as political influences, socio-cultural, formal institutional organization, lack of expertise and experiences, lack of infrastructure, limitation of fund and the way to solve shall be discussed in next section.

The process of policy transfer of cadastre 2014 will face institutional and planning culture of Indonesia. Role of public is too strong in handling land management especially on land information system, little role for private sector merely fro technical and consultancy, Citizens put the trustiness of secure legal land rights on government. To do success policy transfer requires political willingness from all stakeholders as producers of data and information from users to give input feedback for the better system.

The trends of cadastre 2014 is privatisation based on Liberalism concept, where land market as a main priority to be served. But In Indonesia the trend is still traditional, democratic, and central role of government to be agent serving greatly for citizens' welfare. The priority is put citizens to benefit the land use as constitution Indonesia 1945 article 33 paragraphs 3. As in Healey (1997) role of government is still as provider state, and it shall evolving become technical regulations and extend to collaborative planning where all stakeholders can participate on the planning process.

The coordination among departments is lack; it can hamper operation of networking in broader sense, technical, and institutional framework. The dynamism of institutional to accelerate the system is not good enough, the mode of work is reactive than proactive to put land information system as priority program because of problems in legal, institutional and technical framework in Indonesia.

4.4.1. Resources

Formal Institutional

In many countries, however, there is a tendency to separate land tenure rights from land-use rights like Indonesia. Enermark, 2004 argued that the important is improving services based on clear procedure of administrative and management. Investment in new technology is important, but it requires broader sense all stakeholder especially formal institutional organization towards solving a much deeper problem that is the failure to treat land and its resources as a coherent and comprehensive whole.

Each department or sector has rule by itself to deal with land. Indonesia has created national board that will coordinate spatial planning. It shows all stakeholders that has linkage to spatial planning and land has to concern together. Even sectors spread on agriculture, forestry, mining, spatial planning, transportation, etc. to develop LIS, coordination and cooperation cross sectors is needed. Partnership model can be set up among government institutions, or with public private partnerships, or by others who felt that they could benefit from the system in new management form. Such as BAKOSURTANAL as national organization surveying and mapping shall define the foundation and framework data that are produced and maintained to appropriate Land Information System standards and coordination with BPN as a supplier on cadastral map and information related property rights.

Therefore, the broad institutional environment is crucial for developing GIS, but administrative, organizational and institutional structure and procedure are relatively weak and inadequate, thus constitution can be a hindrance to the necessary integration. Other problems is lack of GIS facilities, incompatibility of data may hamper the use of GIS in spatial planning procedure. Organized spatial information is essential for good management, and GIS can support it (Teffelen, 1992).

Legal aspect laws and regulations

Based on Groot[24] the legislation may be in conflict. For example, a balance needs to be found between free access to government data and the need to protect state information concerning the protection of the realm, the safety of citizens, relationship to other governments, etc. Furthermore, the legislation governing the privacy of the individual and corporations may conflict with that dealing with the commercialization of government information.

For the development Land information system at the national, provincial or municipal level, it need clear regulation and policy at these levels systems from the fact that producers and users of data must know the conditions for access to, use of and prices of the data. The transparency and predictability of these rules is essential for the integrity and smooth operation of the spatial data infrastructure, and the success of the geo-information market place

The policy framework to assess and access the data in affordable price is administered, transparent, which ensure that all users know and understand the conditions for access to and use of the data, how much it costs, how their own data will be protected through the Spatial Data center, etc. deals with the associated policies. There are hierarchy structure from building National Spatial Data Infrastructure, Land information system, Cadastre in concept and system in the spatial planning framework.

Legal framework is so important as basis of legal operation of cadastre system. Such in 1989, the Commission of the European Communities (CEC) issued its guidelines for improving the synergy between the public and private sectors in the information market. These guidelines, which are only advisory, "were considered essential to help the public sector in decision making related to making information available for external use and supporting the development of the information market; and to establish ground rules for avoiding possible unfair competition"[25].

Groot[26] proposed several legal aspects such as *Facilitate access* means letting the user know what information is available and where, what the conditions of access and use are, and how much it will cost. The reference to *responsible use* implies an obligation on the part of the data suppliers to include qualitative information about the data, which lets the user determine how fit the data are for use in his/her application. The reference *affordable price* signifies that a degree of price differentiation is possible depending on what the user is prepared to pay for the information or the associated information service. The

[24] http://ces.iisc.ernet.in/energy/HC270799/LM/SUSLUP/KeySpeakers/AGroot.pdf accessed at 7 August 2006
[25] http://www.geom.unimelb.edu.au/fig7/Brighton98/Comm7Papers/TS65-Harcombe.html accessed at 1 May 2006
[26] Ibid.

economic characteristics of government-owned geo-information as an "imperfect public good" strongly influence this process.

Technology development

The need of spatial data integration of the data is based on consistent geometric referencing systems and on reasonable compatibility in the resolution of the different datasets. Need interface 'hub system' that can convert/understood other language system. Networking of computer and automation of administrative work in Land information system can reduce in duplication, harmonizing and standardizing data for applications[27]. For cross checking, networking can be operated by means of modules in each sector, which is to serve a certain sector of applications. The system of networking need legal policy data connectivity and harmonization in vertical and horizontal coordination among sectors and in the level of municipal, provincial or national, where the system can be connected.

Human resources in Indonesia have capability to adopt technological development in surveying, mapping, automation and computerization and operation. However, the career of staff to operate the system is not become main attention. Technology development should be harmonized with human resources development that can handle the system and maintain for the continuity.

To cope with data with different resolution or scale, it needs standardization. That it has consequences for the relationship of the data definitions and terminology semantics from the larger-scale level to the smaller-scale level. Share data internal among government institution and external to users or citizens can be delivered. But, the fact that government departments or different levels of government can share data effectively does not guarantee that better public services are being provided to the citizens[28] because some data is secret, and the rule is strict and cannot be access by public

4.4.2. Possibilities

The possibility is ratio between the plan and the implementation of policy transfer considering readiness of resources or the potential condition for successful future development.

For policy transfer there are several different types of learning. The procedure are the first understanding the concept, content and context, then considering potential resources, how the possibilities according to resources. Then learning process from the policy is to find the benefit of policy transfer for Indonesia country. Cadastre 2014 policy as a guidance to achieve future cadastre, with special context and content that is in Indonesia context will different. Indonesia learn its own situation and not to strict to adopt all the content but in the process try to adjusted for the better performance of planning.

Indonesia should be critical on the context cadastre 2014 from developed country whilst Indonesia is in transitional country. Successful practice in one country

[27] http://ces.iisc.ernet.in/energy/HC270799/LM/SUSLUP/KeySpeakers/AGroot.pdf accessed at 7 August 2006
[28] Ibid.

cannot be compared to other country because they have particular planning culture that diverges among countries. It has to learn the situation itself to transfer the policy.

Especially globalization of information and communication technology (ICT) narrowly in computer hardware and the software, and its development give influence to the spatial planning and development and can enrich the strategies to cope the complexity of spatial data and the dynamic of the spatial development problem. It is certainly important to analyze the strengths, weaknesses, opportunity, and thread and to obtain better understand of concept and practices in spatial planning and its development

Considering information technology that deal with computerization, Groot (1997) presented the concept of spatial data infrastructure (SDI) as a tool to support sustainable land management. See figure 4.1.

The purpose of SDI is:
• *To save time, effort and money in accessing spatial data and using it responsibly*
• *To avoid unnecessary duplication in the harmonization and standardization of required datasets by promoting the sharing of available data*

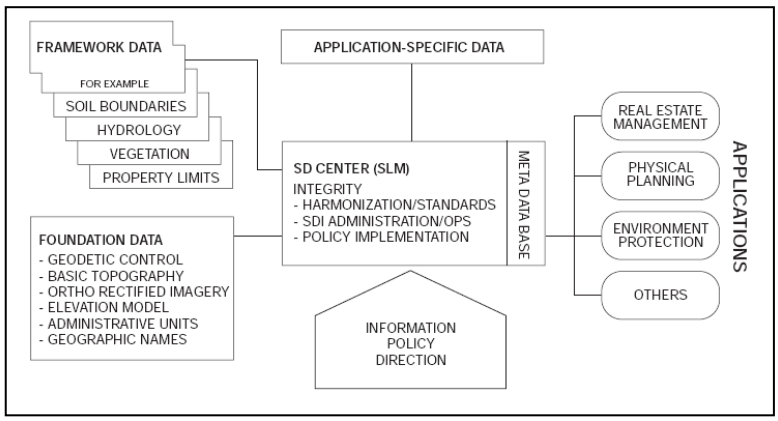


Figure 4.1 Structure of the spatial data infrastructure (SDI)

4.4.3. Constraints

There are some constraints to policy transfer of cadastre 2014, as follows. The policy is not complex enough, so it is possible to be adopted by Indonesia government, but on the increasing role of private sector is still lack, and the institutional organizations that handle map cadastre and land registration is still separated. The policy of cadastre mainly on operational approach and narrow so it need to be brought on strategic level.

With respect to ccontext matters, there are several constraints, as follows;

- Institutional constraints because of many stakeholders involved to the land management, complex structure and overlaying, uncoordinated, need legal framework to strengthen coordination and cooperation across sector. BPN versus PBB need to be combined, BPN and Bakosurtanal, need clear

function. This institutional aspect can support development of LIS and can hamper it.

- Political ideological constraints: Cadastre 2014 bring liberalism and privatisation of the land matters, whilst Indonesia has democratic concept on land management that is for serving mainly to achieve welfare for citizens of Indonesia. Land has strategic position in planning culture of Indonesia.
- Bureaucratic capacity is still lack sometimes too slow, unsystematic, ineffective and efficient to serve public, although there are regulations. It needs to do rule appropriately.
- Technological abilities are not matter, but the development of human resources for the continuity of the system more important than technological itself. It need more pay attention.
- Financial resources is as constraints, because lack of budget for new instalment and maintenances of the new system and the networking, besides building strong procedure, it need huge investment for cover the entire Indonesia local system
- Physical circumstances is as constraints because huge coverage area, the distance and disparity of regions can hamper the development LIS, it need more time to apply to the whole Indonesia area.

There several constraints in the implementation:

Regarding to availability of data

1. Lack of Availability of data, data incomplete; to be completed in all jurisdictions coverage (quantity and quality)
2. Data on sector, can be doubling/redundant, double budget to provide and maintenance, not efficient; it need center of database for land information system
3. Catalog data uncoordinated on sector; it need to build list data per sector, cross check the overlapping such data and information
4. Have map data in various scale, format, classification; it need standardization and or understanding terminology among data provider
5. Have no protocol to share data among institution; it need legal framework to regulate share data

Regarding to formal institution organization

1. Many stakeholders involve to land matters, depend on their sector purpose; it need new management, and legal regulations
2. Uncoordinated, lack of cooperation among institutional; it need change the structure of organization due to land information system
3. No efficient and no effective work mode, reactive not proactive nor progressive; need parallel work and collaboration among sectors. BPN depend on approval request from other sector agencies to do survey and mapping. The system is merely reactive not progressive where BPN can decide what they want to accelerated the process of land surveying, mapping and registering. That work is not proactive, because they wait for other requirements from private sector, public sector or individual person

Currently, many national survey organizations are expected to generate revenue in order to reduce the financial burden of survey activities on the taxpayer. However, if this means increasing the prices of data files, or becoming involved in value added information production, there may be conflicts with the legislation governing free access, commercialization, and/or competition

To involve private sector as investors to invest in providing base map, it need legal regulations: that alternative require clear rule of game: (1) guarantee for land service; (2) clear mechanism (3) guarantee cost recovery

In the last chapter, some concluding remarks are discussed about integration of how the concept of Cadastre 2014 should be implemented and should be benefit for spatial planning and its process development. These comprise understanding of Cadastre 2014 within spatial planning perspective and its process development problem. Also, based on the lessons learned from such pilot project, practices and experiences, recommendations how to achieve best concept and practice with it are delivered.

Chapter 5
Conclusion and Recommendation

Based on **chapter 2** that gives foundation of theoretical framework to understand the entire concept related to cadastre 2014 to spatial planning and **chapter 3** as a process of policy transfer into planning practices in Indonesia context. Continued to the evaluation on **chapter 4** that has given insight the important of Cadastre 2014 to be integrated into spatial planning. Finally, this **chapter 5** delivers conclusion and recommendation for better implementation to Indonesia and for the next future research**.**

Based on the main question and objectives, this chapter provide conclusion that summarize the whole research framework. As Williamson, and Ting (1999) believed that global drivers such as sustainable development, globalization, urbanization, economic reform and technology are changing the way humankind relates to land. The policy transfer of such cadastre 2014 is the way to change the way country over the world to measure and evaluate its cadastre system, as in Indonesia, cadastre 2014 extend to be integrated into spatial planning as the intention of this research is to study Cadastre 2014 as an element of Land Information System as basis of Spatial Planning.

1.5 Conclusion

As **chapter 1** put framework of this research, that intent to question to what extend cadastre 2014 can be integrated into spatial planning. The emergence of Cadastre 2014 is in line with efforts to develop land information system as basis spatial planning. This research is exploring new insight of further explanation of promise to integrate cadastre 2014 into spatial planning.

Cadastre 2014 is a reform of the traditional concept to future modern cadastre. It can be as an international benchmark to measure trend of cadastre system around the world, especially in Indonesia context, cadastre 2014 as subsystem of land information system has contribution to spatial planning with significant influences to planning practices. It has linkages with spatial planning, and it could be support land information for spatial development through development of land information system. Cadastre 2014 is as sources of information to land decision-making. That cadastre 2014 system shall give significant benefit for inventory, registration, planning and implementation, accelerate delivery of land rights, basis of land release for public facilities or infrastructure, for support national land information system (multipurpose cadastral)

Cadastre 2014 affected by globalization, liberalism and privatization on the concept on **chapter 2**. Role of private become main attention to bring cadastre 2014 efficient, effective, and dynamism to serve increasing land market. It has sector souls, stress on technical matter. It is not yet move to strategic or policy area, still in the profession matters and scope as surveyors, still technically approach: by providing skilled and officially acknowledged specialists as consultants to governments. It come up from developed country, more serve private sector, and tension of land market than concerns to spatial planning in broader context.

That Cadastre 2014 can be integrated into spatial planning, through understanding linkages the entire concept of land management, spatial planning, land information system and cadastre system on **chapter 2**. It depict the possibilities of cadastre 2014 in micro scale and its multipurpose give significant impact to better spatial planning, by means of providing data and information related land. To approach the main question and objectives, it use interrelation exist on the entire concept, where land as a subject of the management and system. Cadastral 2014 can be seen as a core component of comprehensive land information system, concerned with the processes of determining, recording and disseminating information regarding land tenure, land value and land use whilst implementing land policies. Cadastre 2014 can be used to provide the basis for sound land management towards economic, social and environmental sustainability (Enemark, 2004). Cadastre 2014 has capacity and capability to involve broader stakeholders, play role in strategic planning level and get attention from across sector.

To approach the cadastre 2014 can be delivered by means of policy transfer to Indonesia planning practices when adopt and adjust Cadastre 2014 on **chapter 3**. According to Dolowitz and Marsh (1996) the process of policy transfer factually is influenced by institutional and cultural planning characteristics of the country adopted, especially Indonesia. The best practice of cadastre 2014 shall be different for every country. The decision to transfer policy comes from actors inside government, in voluntary way as free choices of actors, to have better cadastre system. From lesson drawing can be summarized the significant positive effect of cadastre 2014 but it require readiness all resources; legal, institutional and technical aspect to implement those systems.

For Indonesia, land has strategic position, depicted on Indonesia Constitution 1945, as asset, capital modal, and prior to welfare of Indonesia citizen. Cadastre 2014 has been adopted in Land Policy of Indonesia for the long term of land administration project on **chapter 3**. After the clear concept and direction, the important thing is investment and time scale of operation. Huge investment in a new land administration system and the processes may take long time in several steps in years. Indonesia has special characteristic such as huge coverage area, growing fast population, tension to urban and rural land resources, lack of infrastructure, lack of legal framework.

The practice of development of land information system as represent on going process of diffusing cadastre 2014 into planning culture in Indonesia on **chapter 3**, although is still on pilot project, but it give clear insight the prospective of development land information system further. For successful into practice, it requires legal framework, institutional and technological support, besides political willingness of all stakeholders. The Six Statements as evaluation criteria to approach cadastre 2014, it reveals the content and context of cadastre 2014. These statements can be guidance for country that wants to develop their cadastre system to follow the trend of globalization on technology, fast service and efficient and effective system.

Indonesia on transition policy are evolving for establishing and creating of a new land policy in support of economic development and controlling efficient land, concerns with economic growth, the protection of land rights and the reduction of land and boundary disputes on **chapter 3**. Integration of cadastre 2014 into spatial planning can support decision-making to improve the effective and efficient spatial planning system.

The goals and realization of policy transfer of Cadastre 2014 will gradually be achieved but need much efforts. It requires technical, organizational and legal changes. The implementation must take place in a business sense, while recognizing economic aspect of the continuity of the system

Based on evaluation of Cadastre 2014 on **chapter 4** is lack of consideration to spatial planning in broader perspective, although in fact it has potential to influence across stakeholders and sectors and diffuse in strategic planning level. Nevertheless, it has no discuss about (spatial) planning, merely on operational level and not considering strategic planning level to the mainframe. It comes from narrow sector of land (surveying, mapping, recording of boundary of land and all land legal rights). Potential contribution to spatial planning is prospective, it need in depth study to relate cadastre 2014 and spatial planning.

For success in planning practice, it needs to consider resources, possibilities and constraints for instances legal aspect, formal institutional organizations, and technical capability, besides political willingness from all stakeholders to do this policy on **chapter 4**. In line with Cadastre 2014, Indonesia has make some progress to some point, as efforts to give better service for citizens and for efficient and effective system that can support decision makers to manage nature and land resources in sustainable way. In implementation, the continuity of the project development LIS should become attention. Because of the shifts in bureaucratic power can hamper the development of LIS. Therefore, the development process must be managed in a systematic, business sense, to improve service to users fast and affordable

Cadastre 2014 influences on institutional, legal, technical aspects of country that adopt it on **chapter 4**. Institutional framework is important to Indonesia for support implementing policy to practice. It requires coordination and cooperation among department, and between the public and the private sectors. Legal aspect for cadastre 2014 is prepared to be foundation of the implementation into planning practices. Cadastre 2014 is taken into account of technological development, in surveying and mapping, computerization and automation, networking for exchange data. It has technical, organizational and institutional implications, how they relate to users, how they are financed, etc. Formal institutional organizations responsible for land management will be affected by information technology on methods. Besides that, the Cadastre 2014 needs a significant component of human resources or brain ware with specific expertise and knowledge to develop Cadastre 2014.

These conclusions lead to a set of recommended practices.

1.6 Recommendation

Based on Evaluation, lesson learned, and implementation considering possibilities, constraints and potential resources of policy transfer of Cadastre 2014 via the Six Statements criteria analysis in Indonesia. The recommendation can be made to develop Land Information System as basis of Spatial Planning in Indonesia. The efforts need to be undertaken in strengthening institutional arrangements, reforming land law and regulation frameworks, developing technical standards and enhancing human resources development to implement cadastral 2014 to develop land information system for the better spatial planning. BPN should establish a new paradigm through the

enactment of revised Basic Agrarian Laws and revised Government Regulation number 24 of the year 1997 about land registration. Improve comprehensive integration to other sector, not merely BPN, but cross sectors. Because cadastre 2014 has broader and extended impact across sector

Increasing political will of all stakeholders at strategic planning that beneficiaries or competence the Cadastre 2014, integrated spatial planning must be well defined and actors actively involved in its development and implementation. From the beginning, all the stakeholders must be involved through coordination and cooperation. For the continuity of system, the staff and profession should keep in responsibility of the development of LIS with supported incentive; improve their skills, and their role, no mutation to other institution.

Better to involve all agency or sector that related with land data and information to integrate and comprehensively do coordination and cooperation for better spatial planning, effective and efficient in land resources management. Where the empowerment of all institution such as planning agency, land agency, forestry, agriculture & plantation, fishery, mining and energy to realize the integration of land matter to comprehensive land related information system from national, provincial and local/municipality and develops the interrelation understanding of those agency.

All stakeholders and key players should understand and follow the trend of dynamism of information and communication technology. Automation and computerization is as prerequisite to accelerated efficient and effective land related information system, to pursue the knowledge about all aspect related with public-law land object or legal land matters. For broader effect to national concerns, cadastre 2014 needs to shift from technical function sector approach to strategic planning approach and trigger political willingness to establish this policy.

The building networking partnerships amongst stakeholders are one of the most important things to set up in performing sustainable development to built modern cadastral systems. Even more importantly, it shall to involve all the stakeholders in the country to be credible and gain widespread acceptance by means of national instruments such as an House of representative (*MPR)*, Cadastre Commissions, or National strategy (*GBHN*). Land policy development should also be transparent and involve political change. BPN on its own cannot produce this process or the product. Instead, a commission or series of commissions, on which BPN is represented, shall develop new land policy

Indonesia is in on undergoing transformation so the development of land policy is critical. Land policy has to include all the agencies involved in land administration in the country. The policy of land information system should cover the entire range of Government of Indonesia agencies that involved in land administration, not exclusively focused on BPN. The BPN in coordination carries out the establishment of land use planning program with other institutions based on the level of spatial plan. All level of government institution and politicians should follow the direction of principles of Cadastre 2014 for improving availability of information about the legal situation of land for better land policies and greater legal security. Institutional setting frameworks shall do implementation based on the comprehensive land policy.

Indonesia should adjust the cadastre 2014 policy paper and its contents as subsystem Land Information System for supporting spatial planning in practices appropriate to institutional and cultural planning characteristic to Indonesia. The development need support from all stakeholders, including technology, policy, and organization framework, financial, long-term plan, commitment. Cadastre 2014 and LIS development must be managed as an innovation or technology transfer process, and policy transfer process. New set up of institutional organizational framework that deal with 'map cadastre that did by BPN and 'fiscal cadastre' that did by Taxation Agency. It needs more analysis to do integration, on positive and negative implications on land management and on effective and efficient system to serve public. There are an opportunity exists for re-thinking these processes. This opportunity could be used to create more efficient and effective technical processes, which improve registration, to prepare the paper process for computerization, and to create a unique parcel identifier by merging the two systems by merging the code of land registration by Taxation Agency and code of cadastre map by BPN in one identifier.

Improve technically, systematically, structurally of procedure of land information system such as uniformity code, create standard procedure, from national to local level. Build dynamic and *up-to-date* system that supported by principle, procedure, and mechanism, prerequisite and standard criteria in robust regulations to be able track or monitoring movement of subject and object of land. Develop land information system, fast, accurate, trustiness, openness, clearness, justifies, effective, efficient Evaluation and improvement of the on going pilot project of developing LIS is as pre requisite to achieve better supportive land data for spatial planning.

It needs building capacity in the land administration unit on local land office. It is recommended that systematic registration should take second priority to the institutional strengthening of the local government land administration unit. Some institutional strengthening at central government level will also be required to assist the agency in transforming to a smaller agency, which must supply a range of general guidelines for the land administration units of local government

For supporting spatial planning, better for Local Planning Agency (*BAPPEDA*) set up coordination and cooperation with BPN at local government level as requirement of decentralization era and other sectors. Several objects can be discussed together to know the existing situation on the ground, and what plan exist in the certain location area for the spatial development that come from many sectors. They also need to have sufficiently large-scale plans for the area, which include the existing situation on the ground. Also all the different sectors within local government should follow the planning guide from the Planning Agency as coordinator of spatial planning. This coordination is as requisite for successful spatial planning.

Improving human resources knowledge and skill to understand dynamism of technology development is prior to continuity of project by means methods of education in order to build the empowering of human resources on cadastral systems. Such in ***Enemark, 2004***, points at four key challenges to be faced by the government actors in this area are *The Educational Challenge t*o establish adequate educational programs, training, course, *The Professional Challenge t*o establish national professional associations, which accommodate interdisciplinary experts. *The Capacity Building Challenge t*o assess the capacity needs in land administration and to develop the capacity needed at societal,

institutional and personal level. *The Institutional Challenge t*o establish appropriate institutional and organizational infrastructures to manage the integration of topographic mapping and cadastral information into a coherent land administration system for sustainable development.

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