Analysis of the Implementation of Multipurpose Cadastre in Colombia Based on International Experiences

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Key words: Evaluation Framework, Feedback, International Perspective, Mind Map Technique, Multipurpose Cadastre.

SUMMARY

The objective of this paper is to analyse the implementation of the new cadastre system from an international perspective. The analysis looks to evaluate if the government proposal to be implemented adjusts to the current needs of Colombia, taking into account the experiences and successful practices of other countries, identifying strengths and weaknesses of the current proposal. Furthermore, the research embraces the lack of an evaluation framework for assessing the new multipurpose cadastre plan, which permits the generation of feedback on legal, economic, physical, and institutional aspects. This evaluation framework includes key indicators that allow the evaluation of the proposal and serve as a monitoring framework useful for government decision makers. This research wants to demonstrate the importance of applying an evaluation framework to improve the new multipurpose cadastre implementation in Colombia, providing for the possibility of change, and to meet the varying requirements of the country through the years. As a final point, this research shows the possibility of adapting the evaluation methodology designed by Steudler 2004 to assess the CONPES 3859 policy, it also sets out recommendations to improve policy, and presents important aspects that should be taken into consideration during the implementation process.

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1. INTRODUCTION

Today in Colombia, the cadastre system is significantly underdeveloped. It is out-dated for 63.9% of the 15,768,188 identified properties in the country, and it has not yet been implemented for 28.5% of Colombian territory (IGAC, 2015). Additionally, mapping and data gathering are inefficient; there is no optimal standardized process used in order to avoid inadequate and redundant activities that can lead to higher public policy implementation costs. Historically, Colombian cadastre has been used mainly as a tool for property tax collection, but even for this function it is still not well developed as the quality of parcel-evaluation differs throughout the country. In addition, it is not used as a planning tool for environmental, territorial, agricultural, infrastructure and property rights protection policies as many of these functions use their own reference maps.
Considering these limitations, the Colombian government has proposed a new design for a multipurpose cadastre system as part of the peace process framework. The main purpose of this new design is to prioritize public investment and guarantee property rights and regulations. The design and implementation are defined in the national policy document named CONPES 3859, which will be evaluated in this research.

The objective of this paper is to analyse this new cadastre system's proposed national land policy by using international experiences. The analysis seeks to evaluate if the government proposal (CONPES 3859) that is to be implemented has been adjusted to the current needs of Colombia; it takes into consideration experiences and successful practices in other countries, and identifies strengths and weaknesses of the current national land policy document. Furthermore, the research embraces the lack of an evaluation framework to assess the new multipurpose cadastre plan. This allows for feedback to be generated on legal, economic, physical, and institutional aspects, while at the same time considering economic, social, and environmental issues.

The evaluation framework developed by Daniel Steudler in 2004, which is applied to this research, includes key indicators that allow the proposal to be evaluated, and it serves as a monitoring framework that is useful for government decision makers. Kaplan and Norton (1996) suggested that "You can't improve what you can't measure and if you cannot measure it, you cannot manage it". For that reason, this research wants to demonstrate the importance of applying an evaluation framework to improve the new multipurpose cadastre implementation in Colombia. This provides for the possibility of change, and for meeting the country's varying requirements over the years as land matters are always dynamic and subject to change. If an evaluation framework is not taken into account, in a few years the multipurpose cadastre may be out-dated and useless.

Multipurpose cadastre is a fundamental aspect of the post-conflict transition in Colombia as it allows for an inventory of vacant lots in which there can be occupation and inhabitant conditions. Moreover, the government could have a complete inventory of public properties, protected

environmental areas, and properties that belong to communities of indigenous and African descent. Additionally, this would be a fundamental tool for the land return process in order to guarantee rights to property and an organized property registry for re-appropriated land. It could also consider existing outcomes in countries in which this process has already taken place and could identify the main obstacles and advantages through these case studies to maximizing overall benefits.

It is crucial now, in Colombia, to implement a policy that meets the needs of the country and that can correct the flaws and inconsistencies that have arisen around the cadastre and land administration. As a result, this paper will present the current situation in Colombia in the first section and a summary of the current Government's proposal in the second. The third section will describe the methodology used and the fourth section will employ an evaluation framework analysis to evaluate the Government's proposal. Finally, conclusions and recommendations on future issues that are important when considering the usefulness of a multipurpose cadastre system in Colombia will be presented.

This research has been undertaken with the use of a mind map technique that helps to structure the information collected in interviews with international and national experts, and a review of specialized documents, a process which helped with the breakdown of economic, physical, legal, and institutional aspects in order to find important feedback by taking other countries experiences into account. The research was conducted based on the advice of the CSDILA group at the University of Melbourne, which provided great support during the development of this research.
As a final point, this research shows the possibility of adapting the evaluation methodology designed by Steudler 2004 to assess the CONPES 3859 policy, it also sets out recommendations to improve policy, and presents important aspects that should be taken into consideration during the implementation process.

2. CONTEXT

The Colombian cadastre originated in 1821 with the creation of the district's general cadastre. This was regulated for fiscal purposes only four years later in order to support the war of independence. Later, in 1930, with the Kemmerer mission, the Colombian cadastre was modernized and taxation was updated, with the inclusion of a legal element and a direct declaration of property owners was generated. In 1935 the Military Geographic Institute was created: an entity dependent on the General Army Staff. Subsequently, in 1940, it became an authority under the Ministry of Finance and Public Credit, and thus it changed its name to the Military Geographic and Cadastral Institute. Finally, it was replaced with the Agustín Codazzi Geographic Institute (IGAC) in 1950, and in 1999 through Resolution 1174 it was incorporated into the National Statistics Administrative Department (DANE). The IGAC is in charge of the national cadastre, except for municipalities that have decentralized cadastral entities, which are: the Antioquia Direction of Information Systems and Cadastre, Cali municipal Cadastral Sub-direction, Medellin Cadastral sub-secretary, and the District of Bogotá Special Administrative Unit of Cadastre.

In 1983, through Law 14, IGAC was awarded the responsibility to form, update, and protect the cadastre throughout all the national territory, except for the decentralized entities (Antioquia, Bogotá, Cali, and Medellin), which operate under the IGAC's technical standards, control, and

supervision. Furthermore, from that year onwards, the cadastre was declared as a multipurpose inventory. It was established that "the cadastre is the inventory or census, that is duly updated and classified, for the real property belonging to the country and its citizens, the objective of which is to achieve the correct physical, legal, fiscal, and economic identification" (Law 14, 1983). However, it has not been developed according to this specification. Currently, the cadastre in Colombia has a fiscal focus, which has not been sufficiently developed, and this has generated fallacies and problems in terms of the land, legal insecurity, deficiencies in the collection of property taxes, etc. To date, less than 9% of the total area of the country has been updated, and 28% does not have a cadastral formation (IGAC, 2015).

Moreover, there are deficiencies in the country's cartography relating to the lack of property boundary definitions, there is no robust geodesic network, and the data that available is not precise. With respect to cadastral information, the different types of land occupation are not available in the current system, there is no complete inventory of public and private property, it does not allow the participation of private entities, it is not yet completely related to the registry, some data are duplicated, there is no price policy to perform the cadastral activities required, and cadastral financing relies mainly on the national and territorial public budget. Additionally, land governance is not undertaken properly due to a lack of control and vigilance that the State has over its territories and land uses. This causes land conflicts, illegal mining, incorrect exploitation of natural resources, illegal crops, etc.

Furthermore, Law 44 of 1990, *Cadastre and real estate taxes*, eliminated money being spent on financing formation activities, updating and conservation of the cadastre; this, in turn, generated a budget deficiency in order to carry out the cadastral activities. In 2009 CONPES 3585, *Consolidation of the National Geographical Information Policy and the Colombian Spatial Data Infrastructure*, was created. CONPES 3585, sought to strengthen the production, exchange, access, and use of geographic information, and it allowed the institutional scheme to be consolidated. However, the standards for cadastral information have not been defined, and the SDI do not cooperate with other entities, such as the registry entity. In addition, in 2010, CONPES 3641 was created to consolidate the Interrelation of the Cadastre and Registry, but this has not yet been realised. There is a lack of the unification of terms, there is no adequate platform that allows interrelation, and the certificate cadastral property plan is not the basis of real estate transactions. Currently, there are many cadastral processes that do not have the necessary technology to abolish the division between maps and registry; cadastral activities drawn with paper and pencil have been found, which shows that new technologies have not been adapted.

Considering these difficulties, Law 1753 of 2015, National Development Plan 2014-2018, Article 104, orders the implementation of a multipurpose cadastre that accounts for the economic, social, and environmental functions of property. It also orders the implementation of a National Land Administration System that takes cadastral information and the registration of property through established standards into account. For this reason, and due to the multiple fallacies in the Colombian cadastre as well as the new cadastral requirements for the new peace framework in the country, CONPES 3859 was created. This document is described in the following section.

3. CONPES 3859 MULTIPURPOSE CADASTRE IN COLOMBIA

In Colombia, Law 19 of 1958, created CONPES (National Council of Economic and Social Policy), which is a government advisory organ for economic and social development cases in the country. It is the highest national planning authority, and it studies and recommends general policies to be implemented, and coordinates delegate authorities.

CONPES 3859 is the policy that sets out the adoption and implementation of a multipurpose cadastre, the objective of which is to "Implement a complete, up to date and reliable multipurpose cadastral system that is consistent with the real estate registration system and integrated with other information systems. It should improve the guarantee of property rights, contribute to fiscal strengthening, and strengthen strategic planning and land management." The document CONPES 3859 is endorsed by the President of the Republic of Colombia and all his ministries; it has the support of the National Planning Department, the Agustín Codazzi Geographic Institute, the Superintendency of Notaries and Registry, the National Land Agency, and the Department of National Statistics.

The CONPES 3859 seeks to develop different plans of action, which can be summarized as follows:

Table 1. Summary CONPES 3859

Economic • Creation of observatories for the real estate market and the normative adaptation and optimization of territory appraisal procedures. • The implementation of a financing plan, the multipurpose cadastre will cost COP $2.61 billion, approximately US$870 million, for an eight-year period:, a cost that will be approximately 63% financed by the municipalities, 16% by the departments, 18% by the national government, and 3% by international cooperation.	**Physical** • A national cartography plan will be implemented, which will generate a new basic cartography. • The geodesic network will be re-densified and consolidated. • A new National Registry of property recognizers will be created. • International standards will be adopted, such as ISO 19152:2012 LADM.
Legal • The registration-cadastre statute will be issued. • An integrating norm will be created, one that allows for unification and updating. • Technological interrelation will be generated between cadastre and registry. • Boundaries conflicts of will be resolved.	**Institutional** • The cadastre institution will be strengthened. • There will be third party participation (private, public, academic sectors), which will be in charge of formation, updating, and planning activities. • A National Land Administration System will be created. • It is proposed that the adscription of the cadastre entity is handed over to either the planning sector or the financial sector. • The technological platforms will be adjusted.

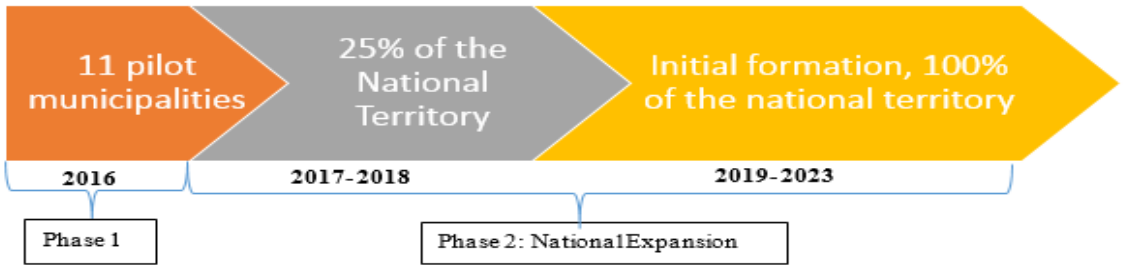

Figure 1. Implementation phases of the multipurpose cadastre. Source: CONPES 3859

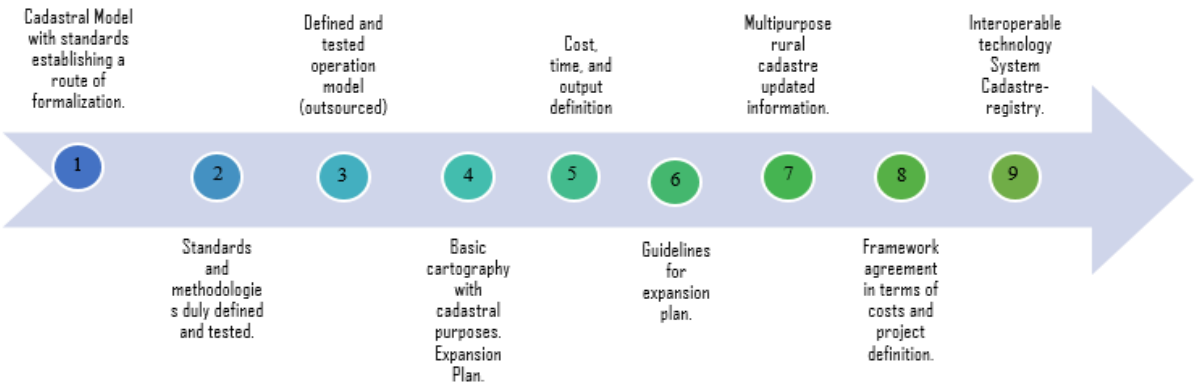

Figure 2. Summary of the implementation manual for the Multipurpose Cadastre Government Proposal. Source: DNP, 2016.

4. METHODOLOGY

This research is grounded in the methodology proposed by Steudler (2004) who uses an Evaluation Framework for Land Administration Systems. It can be adapted for any organization, project or system that requires assessment in order to keep a record of its conformation, development, and operation; therefore, its efficiency becomes improved. Accordingly, it allows for informed decisions to be made the necessary adjustments to be clarified over time due to the dynamic needs of society.
The Evaluation Framework proposed by Steudler, 2004 (Figure 3) has three indispensable levels of evaluation (Operational, Management, and Policy) as well as the external factors that include ideology, techno-structure, and support staff. Furthermore, it has a review process that must be performed constantly. The process is cyclical, which will enable strategies to be re-evaluated in short-term and the objectives in the long-term.

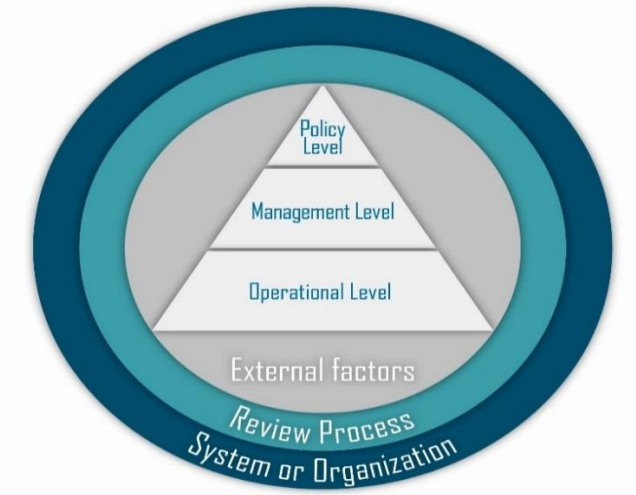

Figure 3. Evaluation Framework proposed by Steudler, 2004.

To carry out the analysis, interviews were conducted with international experts and information was collected from different forums, such as: FIG Working Week 2016, New Zealand; Esri's National GIS Executive Forum, 2016, US; Esri International User Conference 2016, US; IX Ibero-American Cadastre Symposium, Colombia (IX Simposio Iberoamericano de Catastro, Colombia); International Symposium on Smart Future Cities 2016, Australia. Additionally, specialized papers and results from various investigations on the subject were analysed. All the information collected was put into a mind map, which due to its radial structure generated from a central theme, facilitated the connection between ideas and allowed for the information to be visualized in a clear manner. In this way, the information was compiled in order to analyse the elements to be evaluated, the indicators to be used, examples of good practices, and possible gaps in the new multipurpose cadastre.

According to this, the methodology was adapted, which is represented in the following diagram:

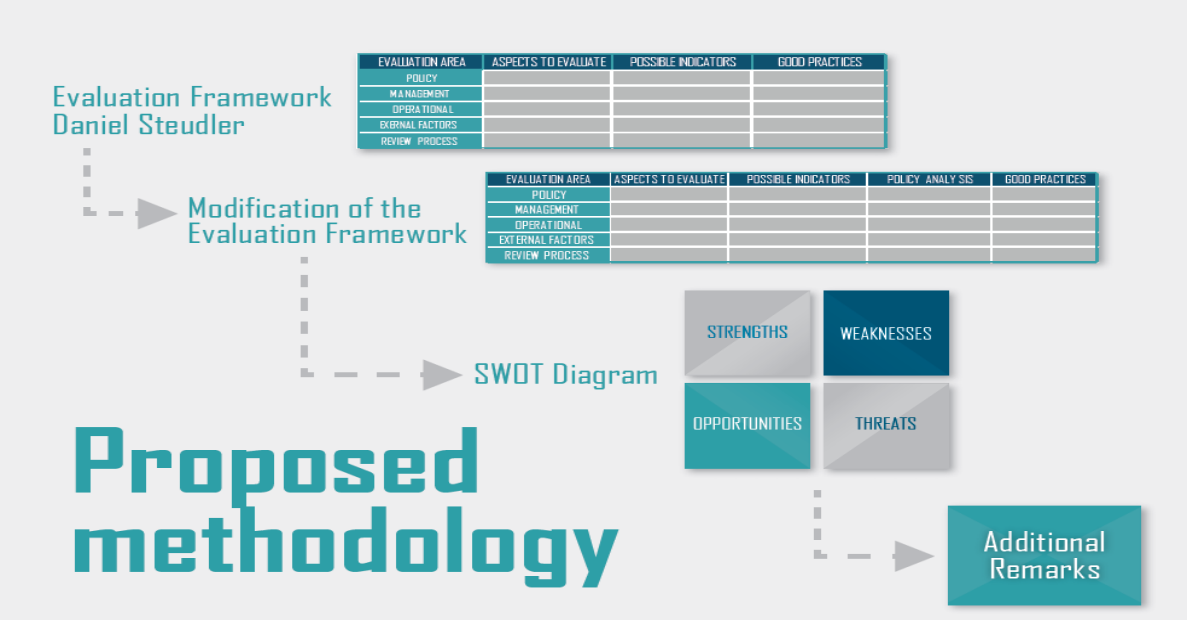

Figure 4. Proposed Methodology.

The evaluation framework is composed of the evaluation areas, aspects to evaluate, possible indicators, and good practices. The good practices are based on international experiences, insights of experts in the field, and research papers. It is important to note that the indicators are neither detailed nor exhaustive in the evaluation area since the main purpose is to give a general view of the current situation with core indicators that allow difficulties to be identified, which can then be analysed and corrected in time. Added to Daniel Steudler's methodology was a column entitled "Policy Analysis" in which it was possible to identify if the indicators showed strengths, weaknesses, threats, or opportunities for the policy described in CONPES 3859. Subsequently, possible gaps were identified, and a SWOT analysis was used to summarize the information found. Lastly, additional observations of CONPES 3859 were included regarding composition of the document, which it was important to add.

5. ANALYSIS AND RESULTS

According to the Methodology, an Evaluation Framework was developed (Table 2), which allows different areas, possible indicators, and good practices to be analysed. This also permitted the gaps in certain issues regarding the adoption and implementation of a multipurpose Cadastre in Colombia to be determined. It is important to remark that the analysis was based on CONPES 3859: *Policies for the adoption and implementation of a Rural – Urban Multipurpose Cadastre*[1] as this is the baseline document for the implementation and development of the multipurpose cadastre in the country.

This evaluation framework aims to generally assess the policies, management, operation, external factors and the revision process that revolve around the multipurpose cadastre. Hence, a variety of indicators that were part of the analysis are shown. The Evaluation Framework is designed to be used in the different stages of the multipurpose cadastre in Colombia.

It is important to note that the column "Mentioned in CONPES 3859" shows if the aspect to be evaluated in the CONPES 3859 policy document was taken into account. YES is marked when the item to be evaluated was clearly mentioned in CONPES 3859, and NO is marked when it was not clearly understood or not found in CONPES 3859. The columns have different colours, each representing information used to design the SWOT diagram.

SWOT DIAGRAM	COLOUR
Strengths	Green
Weaknesses	Red
Opportunities	Yellow
Threats	Blue

Table 2. Evaluation Framework

EVALUATION AREA	ASPECTS TO EVALUATE	POSSIBLE INDICATORS	MENTIONED IN CONPES 3859	GOOD PRACTICES

[1] CONPES 3859: Política para la Adopción e Implementación de un Catastro Multipropósito Rural- Urbano.

POLICIES	Existence of government policies regarding land administration	It exists Y/N	YES	It is well defined by the objectives and responds to the country's needs. The cadastral legal framework is coherent, unifies concepts and it is equitable for all. The policies support the financial plan, which is viable in a sustainable way. Also, it is desired that society benefits and has an efficient and transparent access to land information. In addition, responsibilities around environmental issues are taken into account (protecting natural resources), and disaster management is supported by the cadastre. (Williamson, 2001)(Steudler, 2014)
		It is clear and coherent Y/N	YES	
	Cadastral Legal Framework	It is clear Y/N	YES	
		It is Coherent Y/N	YES	
		It unifies concepts Y/N	YES	
		It has clear objectives Y/N	YES	
	Legal certainty of properties	Abandoned land; public land; fiscal and private property assets are identified Y/N	YES	
		Rights, responsibilities, and restrictions are taken into account Y/N	YES	
	Property appraisal	They reflect the economic and physical conditions of the land Y/N	YES	
		It is used as input for tax collection Y/N	YES	
		It reflects the real condition of properties Y/N	YES	
		It includes the ecosystem services Y/N	NO-ITEM 1	
		The methodology is coherent to property- appraisal according to the market dynamics Y/N	YES	
	Market dynamics	Market influencing factors are clear.	YES	
		Real estate observatories are complying with their purposes Y/N	-	
	Land ownership	Conflicts due to land ownership and land use have diminished Y/N	-	
		Formal and legal recognition regarding land ownership.	YES	
		Percentage of land given back in land restitution processes.	-	
		Rights recognition, restrictions, and responsibilities for indigenous reservations and Afro–descendant communities.	NO- ITEM 2	
		Peoples' land relations are taken into account.	NO - ITEM 3	
	Legal framework between the cadastre and registry	It is integrative Y/N	YES	
		It is clear Y/N	YES	
		Information in both sources is coherent Y/N	-	

		It allows optimum operation between the parties involved.	YES	
		Transference time of documents is acceptable. Y/N	-	
	Environmental sustainability	It protects natural resources. Y/N	YES	
		There is clear delimitation of protected areas, reserves, and natural parks.	YES	
		Illegal mining and illicit crops are being controlled.	-	
	Risk and emergency response	All the factors are being taken into account to prevent and reduce disasters.	NO- ITEM 4	
		Percentage of accidents that occurred due to risk factor exposure.	-	
	Financial and economic aspects	There is a sustainable financial scheme.	YES	
		There are adequate property-appraisal taxes.	YES	
		Funding sources are clearly defined.	YES	
MANAGEMENT	State of cadastral update and formation	Percentage of urban and rural cadastral formation.	--	The structure is clearly defined. Roles and responsibilities for all the institutions involved are well defined. There is only one complete and all-inclusive cadastral system, which is effective, efficient, and reliable. It permits the inclusion of all rights, restrictions, and responsibilities. Also, cadastral survey data are always updated, there are standardized processes and the data are suitable for as many purposes as possible, and are efficient and secure (Steudler, 2004) In addition, the private sector is involved in cadastral activities and the public institutions
		Percentage of urban and rural cadastral updating.	-	
		Updating cycle is coherent with current needs Y/N	-	
		There is an accurate area delimitation Y/N	YES	
		Mass land mapping that is cost effective Y/N	-	
		Land purpose is identified Y/N.	-	
	Academia and private institution participation	Percentage of participation.	ITEM 5	
		Number of participating institutions.	-	
		Responsibilities are clear Y/N	YES	
	Cadastral institutions	Number of institutions with direct participation.	-	
		Number of Institutions with indirect participation.	-	
		Roles and responsibilities are well defined Y/N	-	
	Institutional model	Technical standards compliance Y/N	-	
		Fulfils the functions for which it was created Y/N	-	

		Communication among decentralized institutions is effective Y/N	-	will focus on supervision and control. (Williamson, 2001) (Steudler, 2014)
		There is a consolidated institutional scheme.	YES	
	Cartography	Percentage of cadastral updating processes.	-	
		Scale and precision is adequate Y/N	-	
		Standards are being applied according to the guidelines Y/N	YES	
		Social cartography is present for indigenous reservations and others Y/N	NO- ITEM 6	
		The National Cartography Plan works properly Y/N	-	
		It is possible to identify road, railway, port, maritime, and logistics networks.	-	
OPERATION	Spatial Data Infrastructure SDI	Information is integrated Y/N	-ITEM 7	The services provided are clear, as are the users involved. Cadastral processes are carried out at reasonable times. The processes are clear, transparent, and there are defined clear actions to solve problems. The spatial data infrastructure must be interoperable between entities, and there must be standards and data modelling techniques. Also, land information records must be consistent with registry records. (Steudler, 2004) (Williamson, 2001)
		It is easy to access Y/N	-	
		There is information exchange among public and private entities. Y/N	YES	
		There is data duplication Y/N	-	
		Real time information available Y/N	-	
		Participation of each entity in terms of SDI is defined Y/N	-	
		Reliable platform, safe, is user-friendly, and data can be downloaded and shared Y/N	YES	
		Type of data to be disclosed.	-	
		Data updating is clear and reliable Y/N	-	
	Land information	Land information records are consistent with property records.	-	
		Mapping of the land is precise, and information about area delimitation and composition can be found.	-	
		Land records contain real and relevant information Y/N	YES	
		Information is updated Y/N	YES	
	Users, products, and services	Users providing and using information are properly selected.	-	
		Services offered are sufficient. Y/N	-	

		Products and services are reliable and safe Y/N	YES	
		The data are accurate. Y/N	YES	
	Multiple uses	The cadastre works for planning urban, rural, and environmental organization of the territory Y/N	YES	
		The land market has improved Y/N	-	
		The cadastre can be used as an input for the productive organization of the rural land Y/N	-	
EXTERNAL FACTORS	Capacity building, research, and education	Number of universities and students with majors related to cadastre and land management.	NO- ITEM 8	The public and private sector cooperate well with academia. The number of professionals depends on the country's circumstances. (Steudler, 2004)
		Number of professionals.	NO- ITEM 9	
		Number of congresses, workshops, and seminars.	-	
		Number of research centres in cadastre and land management.	NO- ITEM 10	
		Number of companies qualified to provide support in cadastre and land management.	-	
		Record of cadastre recognition entities works properly.	-	
		Number of professional associations on an international and national level involved in cadastre and land management.	-	
REVISION PROCESS	Indicator review	Percentage of indicators with problems.	NO-ITEM 11	There are regular reviews, objectives and strategic targets are either met or adapted. All the objectives are closely monitored and acknowledged. The system is always improving and the stakeholders are satisfied. (Steudler, 2004)
		Percentage of solved indicators.	NO- ITEM 12	
	User satisfaction	Percentage of satisfied and unsatisfied users.	NO- ITEM 13	
	Reforms	It is necessary to make reforms Y/N	NO- ITEM 14	
		Reforms are implemented accordingly and effectively Y/N	NO- ITEM 15	

Based on the previous table, and according to the analysis performed and the good practices found, the following points can be summarised:

- (Items 2,3, and 6) CONPES 3859 illustrates the importance of cartographic mapping in terms of the rural and urban area percentages that are in need of updating and conformation, based on the new established scale. However, social cartography is not mentioned, which is of vital importance for the cartographic mapping process of indigenous areas and Afro-descendant territories. The document describes the areas' delimitations, but there is no special consideration regarding the importance of their relationships with the land, which are the reasons to take into account respect

for their rights, and will generate responsibilities and duties in terms of land ownership. For instance, participatory mapping is used by The United Nations to make the sociocultural and intellectual assets of an indigenous community explicit. Furthermore, in the Philippines (2003-2006), the International Fund for Agricultural Development (IFAD) used participatory community mapping to acquire full recognition of indigenous communities' rights of and ensure ownership of their ancestral territories. This benefited approximately 12,000 indigenous people from the Caraga region in Northern Mindanao.

- (Item 3) The different relations between man and land must be taken into account since based on this policies can be developed that lead to good land administration and a good understanding of the array of behaviours throughout the country. Hence, it is possible to analyse the dynamics of the market, identify the underlying reasons for informal settlements; and manage rights, responsibilities, restrictions, and protect property rights. Also, there are various concepts that revolve around land: land as a natural resource, physical space, spiritual deity, production factor, consumer good, trading object, and as a human right. Indeed, these relations have changed over the years. During feudalism, the land was a good related to wealth. Later on in history, as a result of the industrial revolution, the land became a trading object. During the post war period, from 1950 to 1980, the land was a scarce resource; and since the information revolution, 1980 until today, land has been seen as a scarce community resource (Williamson and Ting 1999). Relations with land have changed as has the cadastre showing its dependency, which moved from a fiscal, legal, and administrative connotation to a multipurpose one.

- (Item4) Regarding risk and disaster management, the topic is mentioned in the relationship between the multipurpose cadastre's goals with the Sustainable Development Goals (SDG) section. Nonetheless, the participation of the National Unit for Risk and Disaster Management (UNGRD)[2] was not taken into account. This unit could contribute in the reformulation of the multipurpose cadastre by establishing a cadastre with the capacity to form a resilient country, in which not only natural risks are dealt with but also physical, chemical, and biological ones. For instance, the cadastre could provide data pertaining to prevalent construction materials, building heights, property conservation states, evidence of proximity to bodies of water, location of pipeline network, etc. In Colombia's National Plan for Risk and disaster management, one of the projects for the 2015-2025 period is to strengthen cartographic information related to the cadastre. This shows the importance and the connection of the cadastre as an input to develop risk management strategies and policies in the country. In countries like Australia and New Zealand, the public services network is thoroughly identified. Similarly, schools, universities, hospitals, fire departments, police stations, public buildings, parks, and constructions that need to be identified during an emergency can be easily located. In Poland, in November 2015 the K-GESUT plan was implemented; its main objective is to compile a unified and updated database of the geodetic public services network. This is available at geoportal.gov.pl.
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- (Item 1,4) Regarding natural areas, the document is clear about the absence of a methodology to assess the areas that are environmentally protected and the importance of the assessment of ecosystem services. Thus, it is necessary to include studies in which the correlation between land

[2] Unidad Nacional para la Gestión del Riesgo de Desastres (UNGRD)

value and property price is given by proximity to natural areas. Nowadays, there is an environmental surcharge that is linked to property taxes. The out-of-date cadastre affects this surcharge, which leaves the Autonomous Regional Corporations (ARC)[3] without the funds to protect and preserve the environment. As an illustration, the mangrove forests are appraised by taking into account the market value of products methodology in different countries like the Philippines, Fiji, Vietnam, and Nicaragua. These studies were used in México to adopt an economic appraisal of mangrove forests. There is a variety of literature on this subject, which could be of great use for Colombia in order to preserve natural areas: for instance, *"Valoración de Servicios Ecosistémicos, conceptos, herramientas y aplicaciones para el ordenamiento territorial".* Ediciones INTA, Buenos Aires. Laterra, P., Jobbágy, E. G. and Paruelo, J. M. (2011). Moreover, it is also important to take into account an assessment of risks related to natural areas; just as they bring benefits there may be risks affecting them.

- (Item 8,9,10) It was found that although a lack of trained technical staff is mentioned in CONPES 3859, there is no mention of developing capacity building as an essential component in the multipurpose cadastre progress. This concept is bound to social, organizational, and individual structures, which must work together in order to meet the strategies and objectives in both an effective and sustainable way. "*The Goal of education is to prepare professionals for the tasks ahead, while the Goal of capacity development is to simultaneously shake up the organization that employ them"* (Georgiadou and Groot, 2002*).* So, in developed countries, it is possible to see more than just the number of people dedicated to cadastral work; the coordination between these levels can be observed that allows the set objectives and advancement in terms of efficiency and quality to be achieved. For example, In Pakistan there are 14,000 surveyors who dedicate 100 % of their time to cadastral subjects. Whereas, in Australia there are 3,500 surveyors who dedicate 50% of their time to the same subjects (Cadastraltemplate.org). It is possible to see the difference in development and efficiency in each country.

- (Item 5, 8, 9, 10) Participation of the private sector is essential in the cadastre, so from the beginning the responsibilities in terms of collection, distribution, and data management must be defined. This sector is a great support in many countries for the development of formation activities and cadastral updating. Countries like Australia, Sweden, and Belgium, have participation from the private sector in their cadastral activities. In the same way, in the CADASTRE 2014 principles, which can be seen as a guide for the future cadastre, the participation of the private sector can be found. This provides more efficiency and process optimization so the public sector solely dedicates itself to controlling and surveying private sector activities. Turkey is a good example; before the 2000s, the public sector was not involved in cadastral functions. Nowadays, pilots are being carried in which the private sector participates. This process has been proven to be cost effective for cadastral activities. However, the private sector does not have enough experience, so private institutions hire retired government employees. As can be seen in the following table, 74% of countries studied involve the private sector in cadastral services.

[3] Corporaciones Autónomas Regionales (CAR)

Table 3. Participation of the Private and Public sector in 43 countries (Country Reports, 2003)

Involvement	Number of Countries	Percentage
Public	11	26%
Private	19	44%
Public-Private	13	30%

- (Item 7)Since CONPES aims for a multipurpose cadastre to be consolidated as an essential element for land government and spatial enablement of Colombian society, it. It is important to have a holistic approach towards cadastre, land administration, and spatial data infrastructure: an approach that integrates the varying information and uses it to improve resource management. Therefore, it is necessary to create an infrastructure of spatial data that allows the implementation of standards, policies, and an access network between people and data. A holistic approach will help improve this situation by being efficient and promote sensible resource management, while taking into account multiple users to generate multiple benefits. Therefore, it is essential to work together and generate cooperation among the public, private, and academic sectors to impact the existence of data silos. This is still a significant challenge to overcome.

- (Item 11,12,13,14,15) Ortegón et al. (2005) state, "The cycle of a project begins before the execution phase and continues after it. The monitoring and evaluation are concatenated through the different phases (…) the first steps of M. and E. are taken from the project preparation phase. In this phase, the project preparation team (including the executer) has the basic responsibility to assure that the project will have a proper M. and E. system" (p.50). Thus, it is indispensable to have a clear evaluation methodology from the beginning, and it is not possible to clearly see this methodology in the CONPES. For every target, there should be defined indicators. There is no feedback; if there is no adequate evaluation process, it is important to also include advance, execution and functioning indicators.

5.1 SWOT Diagram

Table 4. SWOT Diagram

STRENGTHS • Supports of the government. • Standard application in cadastral activities. • Support of institutions that specialize on the subject. • Seeks to improve the current state of the cadastre. • Looks for the creation of a national land administration system. • Seeks out the design of an observatory for the real estate market and the creation of a national record to recognise land plots. • Creation of a cadastre-registry board. • Takes into account the sustainable development objectives' goals.	**WEAKNESSES** • The concept of capacity building is not considered. • Social cartography is not being taken into account. • Lack of specificity in the methodology to assess ecosystem services. • Risk and disaster management is not seen as a strong subject in the cadastre • Lack of an evaluation methodology in all the stages in multipurpose cadastre implementation and functioning.
OPPORTUNITIES • Cadastral appraisals will reflect properties' physical and economic characteristics. • The differences between cadastral and commercial property appraisal will be eliminated. • Private sector participation.	**THREATS** • Established time to execute multipurpose cadastre in the country. • Data gathering cost and incorporation of new technology. • Cooperation and support among institutions.

• Creation and implementation of a spatial data infrastructure. • Articulation between the cadastre and registry. • Strengthening of the cadastral institution. • Integration and updating of cadastre and registry policies.	• Lack of unification of definitions and terminology. • Possible setbacks regarding implementation of LADM.

6. RECOMMENDATIONS

To update CONPES 3859	For the Implementation
• The document shows that currently 28% of Colombian territory does not have a cadastral formation process; however, the information provided does not allow the figure to be verified as 23.2% of the rural areas have not been formed, and in urban areas which correspond to 414,100 ha an approximate of 188 ha have not been formed (0.045%). This leaves a total of 23.245% not 28%. • It is important to combine different policies and projects for the future of the multipurpose cadastre, for example, CONPES 3819 "The National policy to consolidate the system of cities in Colombia". As stated, the importance and benefits of a multipurpose cadastre can be seen when cities develop, which will allow greater regional integration and better living conditions. Also, it is an important step to connect and disseminate cadastral information to a new spatial data infrastructure. • CONPES must be concerned about the future of its policy development; therefore, it is important to include a constant evaluation methodology that fosters improvement and feedback. This will allow informed decisions to be made and recommendations to be generated that respond to the necessities of the country • In CONPES 3859 page 22, it is necessary to take into account the fact that cadastral appraisals do not reflect the physical and economic characteristics of properties. This should not be understood as a consequence of decentralization as, if it were the case, the new institutional arrangement would not work due to the participation of other cadastral institutions and the private sector. The decentralization of cadastral activities is viable and suitable, when the parameters and standards are defined, there is adequate regulation, division of responsibilities, and the communication is clear and effective. The glitch is found in the limitations regarding regulations, budget, lack of information, and communication among institutions as well as the flaws in terms of methodology and procedures. • The fiscal aspect is fundamental and should not be neglected. This is not a limiting factor; it is one of the cadastre's cornerstones, so it is not, therefore, a reason for an out-dated cadastre or its current state in Colombia. Most countries with good cadastral practices began with fiscal cadastres, such as Poland, Holland, and Sweden. These are examples of successful fiscal development. If this had been	• To have a modern, complete, and reliable cadastre, it is necessary to ensure cooperation among institutions, to constantly monitor, to have a well-defined regulatory framework, to continue with data updating, provide standards and coherent methodologies, to have clarity in rights, restrictions and responsibilities regarding land, to have the necessary technology, and to define responsibilities among cadastral parties. • It is recommended to have meetings with organizations such as INCODER, UPRA, and UNGRD in order to disclose information and enable the use of data with different purposes. • According to CONPES, a Cadastre-registry Committee will be created. This committee will perform technical secretariat functions. It would be ideal if it were to carry out evaluation processes and delegate the corresponding corrections and recommendations to the institution in charge. Besides, it is a fundamental tool to make informed decisions and observe strengths, weaknesses, threats, and opportunities. • The proper operation of the new spatial data infrastructure must be assured to allow the information to be used in multiple processes. Furthermore, with this new infrastructure, the use of cadastral information can be promoted and it can be articulated among public and private institutions. • The implementation of a multipurpose cadastre will improve the market economy. For this to happen, rights, restrictions, and responsibilities must be

applied in Colombia, it would have been possible to expand on fundamental aspects of cadastre such as providing physical, economic, environmental, and legal certainty. The fiscal aspect would not be a reason to explain the current situation. In the regulatory decree of Law 14 of 1983, the cadastre was defined as "the inventory, duly updated and classified, of the properties belonging to the State and its individuals, which has the purpose of achieving its proper physical, legal, fiscal, and economic identification". At that time, the cadastre had many purposes, and cadastral entities had to be responsible for the compilation of the physical, legal, economic, and fiscal information. Hence, a proper inventory of the public and private assets must have been undertaken a long time ago, and now all the cadastral functions continue to develop.	clear in terms of land. "Civilized living in market economies is not simply due to greater prosperity but to the order that formalized property rights bring" (De Soto, 1993). For this reason, it is necessary to set the objective around these RRR, the limitations and opportunities that they create, where they can be applied, and when and to whom they are addressed. Being clear on these matters will not only bring legal certainty, but also a reduction in conflicts regarding land; therefore, the peace the country so longs for will be more readily achievable.
• Regarding the analysis carried out in Table 3, tax collection by the cadastral entities, 2014. (CONPES 3859), it can be observed that the unit of measurement used to carry out the analysis is not the correct one as it should have been done using square metre (m2) or hectare (ha). Since it is measured by the number of land plots, the variation per area is not included. Therefore, a municipality may have fewer land plots but larger areas. Cadastral entities are being compared, but the unit of measurement is not appropriate because the area of a land plot is not a standard size.	• It is necessary to apply social cartography in indigenous areas and afro-descendant territories. It is recommended to take the case study carried out in Vaupes, Mitu (Gómez & Páez, 2015) into account. This describes a social cartography methodology supported by technology like UAVs.
• It is fundamental to bear in mind the six statements stated in FIG's CADASTRE 2014. According to the experts, they are the future of cadastre. So, if they are being used and to what extent must be determined.	• Measures should be undertaken to enable the cadastre to be a fundamental source for risk and disaster management.

7. CONCLUSIONS

After the research was carried out, it was possible to apply the evaluation methodology developed by Steudler, 2004 to CONPES 3859. Strengths, weaknesses, opportunities, and threats were found. The research took into account social, cultural, political, economic, and environmental information. Several observations and recommendations were provided that could be useful to improve the multipurpose cadastre development in Colombia. The information collected in the congresses and in the interviews with the experts acted as the fundamental input to then be able to carry out the analysis and to adapt the methodology. The use of a mind map was suitable to correctly organise information and find the most important points that needed to be considered.

The implementation policy in CONPES 3859 appears to have sufficient strengths to generate the multipurpose cadastre in Colombia. However, this research allowed recommendations to be generated in order to improve the document and to be taken into account during the implementation process. They will help to eliminate gaps that may hinder the correct development of the multipurpose cadastre in the country. It is important to conclude that it is essential to apply an evaluation methodology at all stages (preparation, execution, and operation) since evaluating the

stages will allow feedback that will improve and facilitate the updating process. This will, in turn, reveal if the objectives are being met and the expected results are being generated.

Generally, this research provides an overview of the transformation process from a fiscal cadastre to a multipurpose cadastre., Despite not having the strong foundation of a one dimension cadastre, Colombia is now moving to a multidimensional cadastre system that will require more coordination, efficiency, communication, and better land governance to ultimately be able to participate in the advancement of what has been a global issue since 1980. The issue can be defined as the relationship between a growing population and its use of land as well as the paramount necessity for sustainable development. Finally, although adopting the methodology to evaluate the policy was satisfactory, it is necessary to do more research to find an exact model that evaluates policies regarding the cadastre and land administration.

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