

Flexible and Innovative Learning Pathways in the Context of Land Administration in Colombia: Microcredentials and Macrocredentials

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Key words: training strategy, lifelong learning, educational innovation, virtuality, microcredentials, and macrocredentials

SUMMARY

The modernization of the Land Administration System (LAS) in Colombia has evolved into an integral ecosystem where stakeholders from various sectors nationwide interact freely, due to the interdisciplinary nature of Colombia's territorial approach. In 2021, with the support of the Swiss cooperation, Colombia initiated the national training strategy to build on the skills of the human capital implementing the LAS public policy and the multipurpose cadaster, both approved in 2016.

The gradual national educational strategy in the 2020-2024 LAS aims to create new value in the programs in alignment with the national ecosystem, educational innovation, and student retention and success. Likewise, globalization and the labor dynamics derived from the modernization and evolution of productive sectors such as the LAS have forced universities to make their academic programs portfolio more flexible, promoting lifelong learning through innovative curriculum structures that align with technological mediation as a differentiating factor.

Taking advantage of the macro and microcredentials initiative at Los Andes University and its launch in 2021, the Swiss Tierras Colombia project, the Colombian Association of Cadastral and Geodetic Engineers (ACICG, as per its acronym in Spanish), Eninco S.A., and the University are working on an innovative academic initiative in terms of content, flexibility, and curricular structure that can be integrated into the graduate programs offered at the Interdisciplinary Center for Development Studies (CIDER, as per its acronym in Spanish). The joint work between the partners translates into a 100-hour continuing education course with two different tracks: one with a managerial focus that can be validated for academic credits and count towards formal graduate programs offered by CIDER, and another with a technical focus, which works towards a professional certification.

In this context, it has become clear that the labor market created by the implementation of public policies related to Land Administration in Colombia now demands new labor qualifications in the field of technical, technological, and professional performance, which are

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Orlando, Florida, USA, 28 May–1 June 2023

being defined together with the National Qualifications Framework (NQF) stakeholders. However, this is a long-term effort that leverages curricular flexibility exercises in formal education, such as the modularization of curricula into certified skills through macro and microcredentials.

This article presents the results, opportunities, and challenges in educational innovation, not only in terms of integrating aspects relevant to implementing the peace agreements (cadaster, land, and territorial planning), but also related to progress in presenting a specific experience involving academic stakeholders, non-governmental organizations, international cooperation entities, and the private sector, in order to contribute to the implementation and improvement of LAS in pursuit of stable and lasting peace in Colombia.

RESUMEN

La modernización de la Administración del Territorio (SAT) en Colombia evoluciona como un ecosistema integral, donde interactúan de manera irrestricta actores provenientes de diferentes sectores a nivel nacional, debido a la naturaleza interdisciplinaria del enfoque territorial en el país. Desde el año 2021, con el apoyo de la cooperación suiza, Colombia inició la estrategia nacional de formación para mejorar las capacidades del talento humano disponible para lograr la implementación de la política pública del SAT y el catastro multipropósito aprobada en el año 2016.

La estrategia educativa nacional gradual en el SAT 2020-2024, privilegia la creación de nuevo valor en los programas ofrecidos en alineación con el ecosistema nacional, la innovación educativa y la permanencia y éxito estudiantil. En paralelo, la globalización y la dinámica laboral derivada de la modernización y evolución de los sectores productivos como el SAT, ha obligado a las universidades a flexibilizar su portafolio de programas promoviendo la formación para toda la vida a través de estructuras novedosas consistentes con la mediación tecnológica como factor diferencial.

Aprovechando la iniciativa de macro y microcredenciales de la Universidad de Los Andes y su pilotaje en el año 2021, el proyecto SwissTierras Colombia, la Asociación Colombiana de Ingenieros Catastrales y Geodestas (ACICG), Eninco S.A. y la Universidad están trabajando en una iniciativa académica innovadora en cuanto a contenido, flexibilidad y estructura curricular integrable a los programas de postgrado del Centro Interdisciplinario de Estudios sobre Desarrollo (Cider). El trabajo conjunto entre los aliados se traduce en un curso de educación continua de 100 horas con dos rutas de titulación, una salida de enfoque gerencial que, puede ser homologable a créditos académicos y apilable para los programas formales de postgrado ofertados por el Cider; y otra salida de enfoque técnico, conducente a una certificación profesional.

En este contexto, se ha evidenciado que el mercado laboral derivado de la implementación de la política pública de administración del territorio en Colombia exige nuevas cualificaciones

laborales en el ámbito de desempeño técnico, tecnológico y profesional, las cuales, se están definiendo en conjunto con los actores del Marco Nacional de Cualificaciones (MNC). No obstante, este es un esfuerzo de largo plazo que se apalanca de ejercicios de flexibilidad curricular en educación formal como la modularización de mallas curriculares en competencias certificadas por la vía de macro y microcredencialización.

Este artículo presenta los resultados, oportunidades y desafíos en innovación educativa, no solo desde la integración de aspectos relevantes para la implementación de los acuerdos de paz (catastro, tierras y planificación territorial), sino que avanza en la presentación de una experiencia específica que involucra actores académicos, de organización no gubernamental, de cooperación internacional y del sector privado, con miras a aportar en la implementación y mejora en la administración y gestión del territorio en pro de la búsqueda de una paz estable y duradera en Colombia.

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INTRODUCTION

Colombia is gaining a deeper understanding of land administration, defining and perfecting public policy instruments that allow Colombians to make decisions conducive to the provision of "services related to the tenure, value, use, and development of land in Colombia" (DNP, 2022, p. 55). The groundwork of the 2022-2026 national development plan establishes the need for interoperable land information systems, multipurpose cadastral updates in the municipalities, improvements in agricultural production, and LAS formalization at all levels, with the participation of all social stakeholders involved in each process.

While implementing the peace agreements—which includes the cadaster, Comprehensive Rural Reform (CRR), and the land-based approach—the need for more trained human capital in Colombia's different regions has become clear. The education and training available in Colombia does not align with public policy, precisely because this initiative is still being developed. At the same time, the country is progressing with qualifications design, hand in hand with the productive sector, in order to close the gaps between the education sector and the labor market. Mobility and flexibility between levels of education and training allow institutions to explore using novel tools such as certifiable short courses and stackable microcredentials.

Collaborative work among representatives and experts in land issues has resulted in an academic initiative that contributes to closing gaps and accelerates the transfer of knowledge around land administration and management in Colombia.

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This article consists of four chapters. The first refers to the initial context regarding the partnership between the Swiss Agency for Development and Cooperation in Colombia, the education sector by way of Los Andes University, the private sector via the company Eninco S.A., and non-governmental organizations such as the Colombian Association of Cadastral and Geodesta Engineers (ACICG, as per its acronym in Spanish). The second section focuses on the vision for lifelong learning and lifelong education, as well as their similarities and differences. The third explains the scope of Los Andes University's macrocredentials and microcredentials, while presenting the case study of the online program Multipurpose Cadaster and Spatial Planning in Colombia. Finally, the fourth section focuses on the conclusions drawn during the course's implementation over the past two years, with special emphasis on an imperative need made clear in the peace agreements.

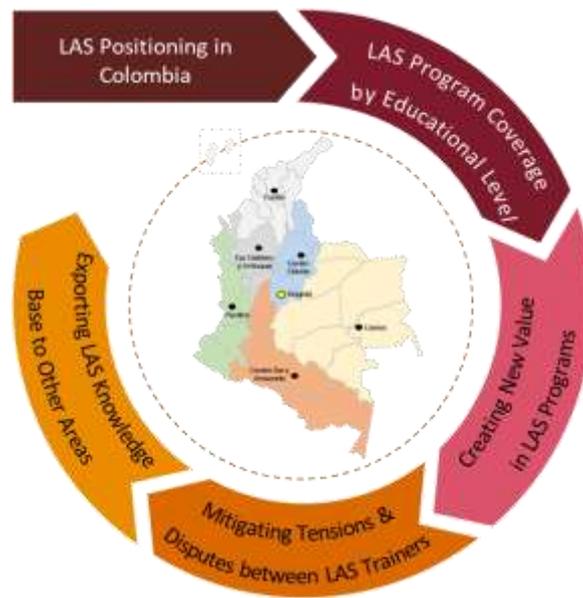
1. CONTEXT

The Swiss Agency for Development and Cooperation began providing support to Colombia in 2015. Since then, the country has been working on implementing a Land Administration System (LAS). The objective is to define, register, integrate, and disseminate land-related information (tenure, value, use, and development) in order to facilitate and promote informed decision-making and the comprehensive provision of services—coordinated among various stakeholders and citizens—in pursuit of sustainable development (DNP, 2022, p. 55).

At the technical and financial level, international cooperation agreements have leveraged the national transformation process in order to adopt better land administration practices, thereby exploring new concepts, tools, instruments, and technology recognized and accepted worldwide. Colombia is a growing country with challenges and opportunities around acquiring knowledge, skills, and capacities to achieve a lasting and sustainable transformation. Consequently, the national education system must recognize Colombia's needs stemming from public policy implementation, in line with the new required concepts and methodology.

The Swiss Tierras Colombia project designed and is currently implementing a gradual national educational strategy to improve human capital in the Land Administration System (LAS), which involves five strategic courses of action: position the LAS at the national level; improve LAS program coverage with a regional and inclusive approach; add value to the training programs; reconcile tensions and issues among the various stakeholders; and export this knowledge about the LAS to other Spanish-speaking geographic regions. The strategic guideline for creating added value involves innovating education. Motivating factors include the COVID-19 pandemic—which revolutionized the education sector—and the interest of higher education leaders themselves in dealing with the sector's evolution in a world of digital citizens.

Figure 1. Strategic Courses of Action for 2020-2024 LAS Training



Source: Prepared by SwissTierras

The plan to build capacities related to land administration and management in the 2020-2024 period is aligned with UNESCO's Millennium Development Goals. It promotes lifelong learning, favors equal conditions among men and women, increases the number of trained young people and adults that are eligible for job opportunities offered by managers, operators, and other stakeholders responsible for implementing the activities in the LAS value chain (SwissTierras, 2020, p. 89).

As the labor market evolves, the education sector is presented with new learning models and ways to access knowledge from the productive sectors. Colombia is making progress in the conceptualization and implementation of its training and educational mobility initiatives under the National Qualifications System (NQS), understood as a set of policies, instruments, components, and processes needed to align education and training with Colombia's social and productive needs, as well as to promote learning, citizens' personal and professional development, labor insertion or reintegration, and productive development at the national level (Congreso de Colombia, 2019).

While the NQS was developing the National Qualifications Framework (NQF) to be its instrument par excellence, Los Andes University—a pioneer of educational innovation in Colombia—started analyzing an initiative around "flexible and relevant continuing education structured around the modular model and stackable microcredentials for lifelong learning." (UniAndes, 2021, p. 1). After the university carried out its creative and approval process for microcredentials and macrocredentials, they became institutional guidelines; now, the academic-administrative Center for Innovation in Technology and Education (Conecta-TE, as per its acronym in Spanish) and the Center for Teaching and Learning (CeyA, as per its

acronym in Spanish) are responsible for helping academic departments include them in the institution's academic portfolio.

After analyzing cases of microcredentialing being applied to higher education and professional training in the United States, Spain, Mexico, and Colombia, Los Andes University established that microcredentials are "digital certifications that validate and recognize a specific competence, skill, and/or ability, which can be verified through evidence and observable tasks that meet previously established quality criteria" (Galvis Panqueva, Aguirre Herrera, & Mora Aponte, 2021, p. 50).

As the Colombian labor market has achieved greater technical understanding and functional implementation of instruments and tools in areas related to land tenure, value, use, and development, gaps in knowledge have become more obvious, especially in regards to the multipurpose cadaster, the Land Administration Model (LADM_COL), and spatial planning. As such, cadastral management and land administration have the greatest environmental, social, economic, and cultural impact in Colombia's municipalities. For this reason, having suitable and qualified human capital who can implement the LAS at the managerial, tactical, and operational levels is important for both academia and public policy.

The SwissTierras Colombia project, Los Andes University, Eninco S.A., and the Colombian Association of Cadastral and Geodesta Engineers (ACICG) collaborated to create a curriculum that included both a managerial and technical focus. At the next institutional level, it can be part of the microcredentialing track aligned with formal education programs offered by Los Andes University's Interdisciplinary Center for Development Studies (CIDER, as per its acronym in Spanish), which include a Land Management and Spatial Planning postgraduate degree (specialization), and a Master's degree in Urban and Regional Planning. Certain elements of the internal microcredentialing process for the managerial program still need to be decided to be able to grant academic credits to students.

2. LIFELONG LEARNING

Lifelong learning is closely linked to employability. In terms of international cooperation and the progress of nations, the Sustainable Development Goals summarize and guide nations' and multilateral organizations' efforts. The fourth Sustainable Development Goal (SDG 4), quality education, is to "ensure inclusive, equitable, and quality education and promote lifelong learning opportunities for all." The 2030 goals related to formal higher education and EWDH (Education for Work and Human Development) are: a) ensure equal access for all women and men to affordable and quality technical, vocational, and tertiary education, including university; and b) substantially increase the number of youth and adults who have relevant skills, including technical and vocational, for employment, decent jobs, and entrepreneurship (UNESCO, 2015, pp. 40-42).

UNESCO's vision of lifelong learning covers all levels of training (formal, non-formal, and informal) and all ages—from birth and throughout an entire lifetime. As such, this understanding breaks down concepts and practical elements that must be shared by all educational subsystems around the world; however, universities are the educational institutions responsible for implementing it (UNESCO, 2015, p. 7).

The concept of lifelong learning in any field of application requires education systems to adopt new educational, operational, and economic models proven to work in traditional education. Therefore, in addition to process performance analytics, there are several other factors that must be considered when configuring the specific focus for lifelong learning programs. These include decisions about the pedagogy to be implemented, the type of learning environment, content organization and development, and evaluation as a means to strengthen knowledge (and offer certifications when appropriate). In the recent commitment to hybrid education, it is imperative to consider the following:

- a. In-person events should be significantly different from online learning events.
- b. Online content must be available to students regardless of in-person attendance.
- c. Collaboration between students and teachers should be encouraged.
- d. The aim is to promote formative and summative assessments as part of lifelong learning.
- e. Resources and controlled reference materials should be provided to deepen knowledge when required.
- f. Pedagogical, organizational, technological, and communicative capacities will be developed as per the new model's demands (Galvis Panqueva, 2019, pp. 59-69).

Lifelong education fosters social connections and calls for us to take a closer look at what we all have in common and be a little freer. Therefore, incorporating innovative education policies and practices allows education to be experienced as a real and ongoing public commodity (Beltrán Llavador, 2015). Although educational transformation can be contradictory and difficult to achieve, it is crucial. Given the definitive changes in the productive sector's social, cultural, environmental, and technological realms—at the local, regional, national, and global levels—innovation is the predominant distinguishing factor for sustainability.

In fact, lifelong learning encompasses all learning activities undertaken throughout life, with the aim of improving knowledge, skills, and abilities in the personal, civic, social, and work spheres. The intention or goal of the learning act is the critical factor that distinguishes these activities from learning activities, such as cultural or sports activities (OECD, 2022, p. 120).

In recent years, there has been a discussion about the similarities and differences between lifelong learning and lifelong education. Each one's scope—along with what it promotes, its results and background, how it is implemented, and the reasons remuneration is received—aligns with people's and institutions' specific intentions and needs.

Table 1. Similarities and Differences Between Lifelong Learning and Lifelong Education

Category	Lifelong learning	Lifelong education
Fundamentals	Personal factors and goals	Institutional factors and goals
Processes	Life experience	Experience gained through training
Outcomes	Learning and development	Societal progress and/or change
Background	Individual knowledge and skills	Social institutions, practices, norms, and aspects
Implementation	Knowledge, skills, and values	Expected impact on society
Remuneration	Vocation	Occupation

Source: Adaptation of Different Premises of Lifelong Learning and Lifelong Education (Billett, 2018, p. 3)

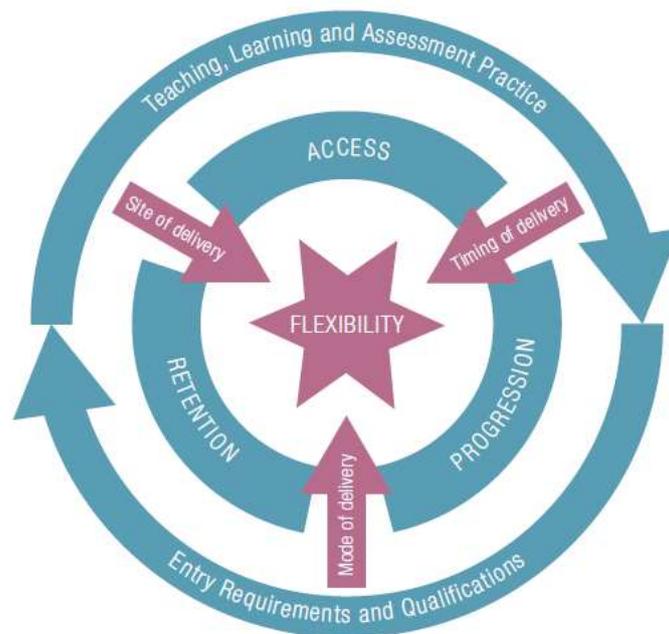
It is crucial to understand that lifelong learning goes a little further than the tracks proposed as continuing education (at the intentional levels of formal and non-formal education). The lifelong learning dynamic is based on life experiences, as well as the corresponding acquired knowledge, sharpened skills, and developed talents. In other words, vocation determines learning interests, and an occupation is the vehicle for application, based on the productive sector's needs (Billett, 2018, p. 6).

Flexible elements include all the possible solutions, improved access to educational instruments, various teaching and learning methods, entry requirements, qualifications, and accreditations of knowledge (UNESCO, 2015, p. 35).

The Organization for Economic Co-operation and Development (OECD) states that countries are pressuring education systems to develop more flexible learning opportunities as alternatives to traditional education, identifying microcredentials as a tool for modern education systems that can be used to respond to the challenges of lifelong learning (OECD, 2022, p. 117).

Likewise, EDUCAUSE's annual Horizon report—which outlines the key trends, technology, and practices shaping the future of teaching and learning, and envisions a number of scenarios and implications for that future—draws on the perspectives and expertise of a global panel of higher education leaders. This report refers to microcredentials as one of the successful trends in flexible curriculum structures that contributes to lifelong learning (EDUCAUSE, 2022).

Figure 2. Flexible Elements



Source: Adaptation of *Heuristics of Flexible Elements* (UNESCO, 2015)

3. MACROCREDENTIALS AND MICROCREDENTIALS

Taking into account the dynamism of modern labor markets, it is increasingly common that a complete postgraduate degree is not needed in order to update an individual's professional profile; instead, the person acquires the specific skills they need for their job (UniAndes, 2021, p. 1). Therefore, the need to make education programs more flexible in order to meet the productive and service sectors' evolving needs has increased opportunities for alternative credentials and accreditations.

Defining which flexible lifelong learning programs are "possible, probable, and preferable" is subject to interpretation and based on socio-cultural norms and economic factors within each stakeholder's education and training system. However, even though they are new and imperfect structures, macrocredentials and microcredentials have gained traction as ways to build "a new future-fit credential ecology" (Brown & Nic-Giolla-Mhichil, 2022).

In addition to being certifications based on skills that can be more valuable than the professional degrees awarded in post-secondary (EDUCAUSE, 2022, p. 29) education and training, microcredentials have also become a growing trend in higher education because of their flexible learning formats and their ability to be stacked in personalized learning structures, which is very attractive to people who are active in changing labor markets. The macrocredential corresponds to the highest level for a given skill. For Los Andes University, this is understood

as a certification for a comprehensive skill set, which is achieved through a training process whose design, objectives, and evidence of learning meet the criteria required to achieve competence. This could be achieved through a set of stackable microcredentials or predefined complementary courses, or it could be recognized in programs leading to degrees in higher education institutions complying with the standardization guidelines (UniAndes, 2021, p. 2).

3.1. Microcredentials at Los Andes University

Microcredentials are certifications that validate and recognize a specific competence, skill, or ability, which is achieved through a training process and verified through evidence and observable tasks that meet previously established criteria. Microcredentials can be recognized in programs leading to a degree in higher education institutions, as long as they comply with the respective standardization guidelines (UniAndes, 2021).

The following are the guidelines for creating new formal programs and presenting certifiable courses with microcredentials at the Los Andes University:

- a. Define the competence to be developed, which goes beyond basic knowledge and must specify skills and abilities to be achieved.
- b. Design the training process needed to achieve competence, specifying the format (in-person, online, hybrid), the total duration, the synchronous (accompanied by teacher or not) and asynchronous (autonomous) time commitment per week, the learning environments, the teaching and learning strategy and activities, content modules and structure, resources, and materials.
- c. Define evaluation methods to demonstrate achieved competencies through observable tasks that meet previously established criteria.
- d. Define how academic credits are granted. When applicable, define the number of credits granted based on the student's time commitment and specify the program and the types of courses in which the credits granted could be standardized (UniAndes, 2022).

The microcredentials applied to the industry are generally called professional certifications. Those from Los Andes University follow the first three steps mentioned above; since they are not standardized or transferable as academic credits, they must be formalized by an exchange mechanism or validated by the international agency responsible for standardizing professional certifications.

Currently, the university offers the following land-related macrocredentials as a set of stackable microcredentials:

Macrocredential: Spatial Planning: 96 hours, online.

Microcredentials:

- Tools and Innovation in Land Use Planning: 48 hours, online.

- How to Analyze Land Development Policies: 48 hours, online.

Macrocredential: Land Management Instruments and Tools: 384 hours, online.

Microcredentials:

- Spatial Planning Instruments: 192 hours, online.
- Formulation and Management of Development Projects: 16 hours, online.
- Use of Geographic Information Systems for Land Management and Planning: 48 hours, online (UniAndes, n.d.).

The internal process for including a microcredential in the university's portfolio of options is regulated by the Academic Council. This information is outlined in the internal document called "Guidelines for Creating New Formal Programs and for Presenting Certifiable Courses with Microcredentials and Macrocredentials".

3.2. Online Program Case Study: Multipurpose Cadaster and Land Planning in Colombia

As a way to update the research that Los Andes University's Interdisciplinary Center for Development Studies (CIDER) and its partners—the SwissTierras Colombia project, the private company Eninco S.A., and the Colombian Association of Cadastral and Geodestral Engineers (ACGG)—have recently carried out, they decided to jointly design and launch a virtual program in Multipurpose Cadaster and Land Planning in Colombia. The courses aim to meet the high demand for human capital in order to implement the LAS public policy and the peace agreements, especially those related to spatial planning instruments and comprehensive rural reform of the multipurpose cadaster. Likewise, there is demand for human capital with knowledge and skills with a managerial and technical focus, which they intend to supply through the land use planning courses offered by CIDER.

The academic proposal was developed during a 12-week period at the end of 2021, to be offered in the first semester of 2022. The course was planned to last 100 hours, with five 20-hour modules. Modules 1 and 5 include the following topics: cadaster, land policies, urban management and land use planning, as well as cadastral management and land governance in the Havana agreements. All these would be studied by students in both tracks, given the overarching relevance of the topics in the Colombian context. Conversely, modules 2, 3 and 4 of each track have specific knowledge that aligns with the student's exit profile.

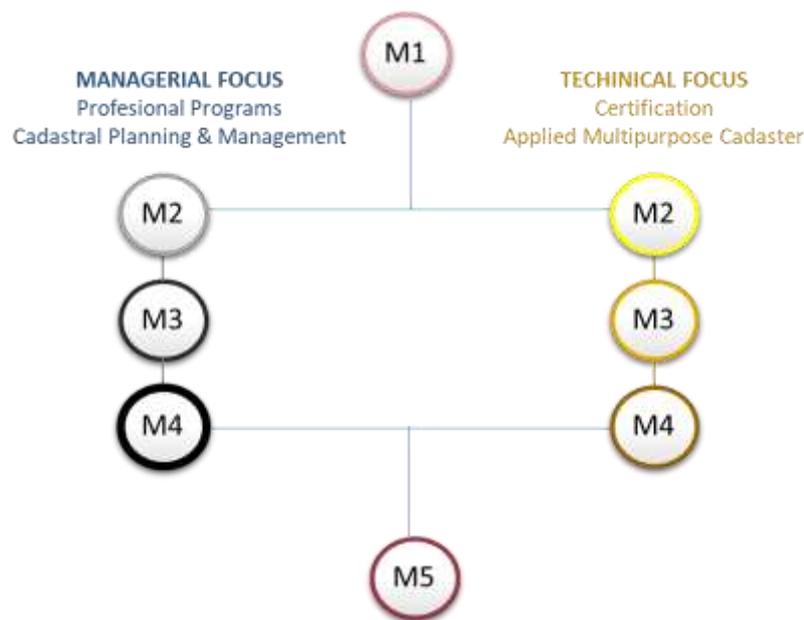
Upon completion of the course in both tracks, students were expected to be able to:

- a) Make progress in the discussion around land policies, the multipurpose cadaster, and land management (urban and rural) in the current Colombian context.
- b) Analyze and discuss the perspectives of comprehensive rural reform and the importance of the multipurpose cadaster as an instrument for achieving a greater understanding of

land problems and their progress towards administration systems that allow for optimal land management.

- c) Reflect on the conceptual, legal, technical, and economic aspects involved in implementing the multipurpose cadaster, land-related policies, and land management over the next decade.
- d) Increase the knowledge and application of land administration domain models (LADM).
- e) Understand the processes of cadastral management and operation, as well as financial alternatives for their implementation.

Figura 3. Interacción entre módulos entre enfoques



Source: Design proposal for the Program "Cadaster and Land Planning in Colombia" (UniAndes, 2021)

Based on the market conditions analysis used to develop the academic program, the managerial track was distributed over two short courses and some complementary academic activities, as a requirement in order to standardize the courses as academic credits that can count towards the university's formal Land Management and Spatial Planning postgraduate program.

The first version of the Multipurpose Cadaster and Spatial Planning in Colombia course began in the first semester of 2021, with two cohorts of 60 and 30 students, respectively. After the new program was structured in collaboration with the aforementioned partners—and considering macrocredentials and microcredentials—the Senior Management in Land Policy, Land Use Planning, and Cadastral Management course was given between March to May 2022. Twenty-two students from all over the country participated. In the second semester of that year, 12 students participated in a complementary course called Senior Management in

Land Administration and Governance. Some were graduates of previous courses and others were new to the subject. This course ended with a discussion that included the World Bank and national experts; together, regional progress and challenges regarding the implementation of modern management instruments were identified. As for the third component of the course, two students participated and advanced on the track to transfer academic credits to a formal education program with CIDER.

On the other hand, the course with a technical focus is contingent upon coordination with companies in the sector or with the National Training Service (SENA, as per its acronym in Spanish), given the scope of its content. However, the university's next steps are aimed at structuring the proposed curriculum for the course with a managerial focus, carried out in 2022, in accordance with the current curriculum guidelines and a possible coordination with the macrocredentials available in the field of land use planning.

4. CONCLUSIONS

Los Andes University's educational commitment to supporting the implementation of the peace process is more than just a formality; instead, it considers the region's most pressing needs around collectively building technical and managerial capacities for implementing spatial planning instruments. In this context, the knowledge and experience gained by the stakeholders (institutional partners and students) in the 2022 course will allow for more rapid progress in qualifying the competences needed to implement comprehensive rural reform, the multipurpose cadaster, and land administration systems.

The deployment of the gradual national educational strategy to develop human capital in the LAS from 2020-2024 shows tangible, sustainable results in the long term. The work carried out by Los Andes University shows that Colombia has tools for implementing a flexible curriculum. These were tested in other educational systems with formal and non-formal educational tracks which are recognized and highly valued for lifelong learning in Colombia's land administration and management sector.

Thanks to the management and promotion of strategic initiatives to improve human capital in the managerial and technical fields, Colombia's best university will update its offer—with support from the Swiss cooperation agency, given their experience—by developing flexible curriculum tracks that include macrocredentials, microcredentials, and professional certifications.

The process of updating a continuing education proposal that allows credits to count towards a formal degree begins with a study of the country's professional development needs and expectations in an applied field. However, the socio-political conditions resulting from a government administration change requires market response mechanisms to be created in order to encourage professionals and technicians to inform themselves about the trends and challenges in public policy implementation, starting from its formation all the way to its

operation backed by one administration or another. The financial support provided by CIDER and its partners facilitated the development of the managerial program's second course.

The challenges of change management—in terms of educational, operational, and economic models that follow global education trends—require educational systems to incorporate instruments that facilitate the transformation of institutions' academic portfolios. As such, the qualifications from Colombia's cadaster sector are expected to be available in the short term. In fact, they are becoming a guiding example of the knowledge, skills, and competencies expected for those working in the land administration and management ecosystem.

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