

Education Strategy Proposal to Close Skill Gaps for a New Land Administration System in Colombia 2021-2024

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Keywords: Land Administration System, Training Strategy, Workforce, Sustainable Development, Lifelong Learning.

SUMMARY

Due to the newest understanding of land administration in Colombia, public policy is being developed to achieve and maintain effectiveness in the national land management system. In order to contribute to the modernization of the land system and the multipurpose cadaster, education agents and land administration stakeholders have designed a disruptive proposal in the education strategy. This strategy seeks to close the skill gaps identified in the research to gradually prepare and strengthen the national workforce.

There are multiple industries related to land tenure, land use, land value, and land development; hence, there are many education and training systems involved in applying the current policy. The education strategy has identified and prioritized four themes: main knowledge, related skills, complementary topics, and attitudes and values of a public servant, which are needed to become responsible stewards engaged in the emerging land administration system as a sub-sector of the economic national framework.

The paper proposes five strategic courses of action to close the gap, through specific formal, non-formal, and informal training programs for seven Colombian regions, along with the qualifications that current and future employees in those locations must have to successfully perform their jobs. During the research phase, the current programs and future workforce needed in the land management field were identified under three types of human capital gaps: quantity, quality, and relevance. Consequently, frameworks and standards for global

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education, blended learning, land administration domain, and worldwide sustainable development, were used as an input to define flexible guidance for the big-scale programs and projects needed to accomplish government goals.

This implementation strategy is expected to last at least four years and is based on strengthening human capital, knowledge transfer, and lifelong learning for the land administration domain. The key factors that ensure success during the execution phase of the strategy are alignment, innovation, and recognition. Aligning all parties requires the implementation of a collegiate body that oversees the capacity-building plan and consider all interests. This ensures that results and achievements from strategy sponsors, allies, and education agents are synchronized and aligned. The proposed strategy is innovative and continuously evolves to pursue short-term results while creating long-term value, which includes digital transformation. Lastly, sponsors, allies, and operators are recognized for their best practices and high-performance results as a differential and competitive strength of the training plan. As a result, this land administration system can become an emerging sub-sector of the economic national framework, well known locally, nationally and in other countries in the region.

An expected outcome of this strategy is to train about 50,000 Colombian citizens. The training plan has a multi-disciplinary and multi-sectoral participation approach to meet the needs of the country as a whole recognizing regional differences through (a) core topics for surveyors, cadasters, and those who work with real state registries; (b) related topics such as data analytics and geomatics; (c) complementary topics for decision-makers in rural and urban areas and those related to community engagement; and (d) public servant behavioral skills such as customer service, effective communication and problem-solving.

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1. INTRODUCTION

A proposal for a national education strategy is presented within the framework of the SwissTierras Colombia project, led by the implementing agency BSF Swissphoto INCINGE in cooperation with the project partners (DNP, SNR, IGAC, ANT, DANE, MADR), for the implementation of the Land Administration System (LAS), through three components aligned with the public policy set out in the CONPES 3958 document (DNP, 2019). The first component focuses on institutional strengthening; the second one, on technical and technological support extended at the national and regional level; and the third one, provides support for the development of a national strategy for blended learning and training in land administration.

The strategy addresses the gaps in quantity, quality, and relevance for the implementation of public policy and multipurpose cadaster in the country; it presents and develops five key pillars for a new national education model at the levels of formal, non-formal (Education for Labour and Human Development - ETDH) and informal education considering regional and differential impact. The demand for jobs related to the implementation of the public policy on land administration and multipurpose cadaster are increasing according to the dynamics of the LAS value chain processes delegated to cadastral managers, which must create a cross-disciplinary team that can handle the work of topography, geography, real state registration (core topics), geomatics, analytics, data (related topics), territorial management and community engagement (complimentary topics).

The methodological path for strategy development is based on the current training programs and the human capital gaps in Colombia for the implementation of the LAS and examines educational frameworks and benchmarks that bring together the world's vision in education and its opportunities and challenges. Besides this, it outlines the forward-looking vision of land administration training and puts forward an integrated LAS training plan to support the development of the skills of an emerging sub-sector in the country, from 2021 to 2024. Finally, it determines the strategic paths and develops a high-level business plan with estimated costs to demonstrate the investment baseline required to strengthen the LAS education system.

Globally, the education sector faces new learning models, new platforms, and media to access content and knowledge, as well as new education management models. The transformation of the Colombian education system is necessary to meet the country's development needs, which requires the use of

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technology as a support mechanism in the teaching and learning process. Although the COVID-19 pandemic forced the country to engage in the use of technology and media in 2020 to give continuity to learning processes, the Colombian educational system has not yet adopted the virtual model 100%, such as those offered internationally; likewise, expert support is required to advance in the adoption of best practices of the LAS, favoring the regional and gender differential approach in line with Colombia's population social and economic diversity.

The formulation of programs, projects, and deliverable products suggested in each path are the inputs for the regulation of the training plan of the LAS acting as at the engine of modernization of the administration of the Colombian territory. The strategy makes visible the new stakeholders in the LAS that serve as sponsors, allies, facilitators, and operators of the proposal showing the need to create a joint LAS training body to direct the strategy by supporting its philosophy, innovation, and position through the combination of think tanks that may articulate the educational and administrative systems of the country. The teamwork of public Higher Education Institutions (HEI), SENA, ESAP, the Public Service, and its allies allow the successful implementation of the strategy.

2. OVERVIEW OF HUMAN CAPITAL GAPS IN COLOMBIA TO IMPLEMENT THE LAND ADMINISTRATION SYSTEM (LAS)

The analysis of the current training programs in the Colombian educational system required a mixed research for this study with a multi-method research design due to the inherent complexity of land management. The study was conducted by the SwissTierras Colombia project team where both primary sources (40 organizations directly related to the LAS) and secondary sources (official data sources), were interviewed. As a result, human capital gaps in quality, quantity, and relevance were shown between the LAS training programs and the demand for current and future jobs by employers. The study of the quantity gaps highlights the results in figures for the formal, non-formal (ETDH), and informal levels of education, indicating a deficit or absence between demand and supply of specific graduate profiles and training programs associated with the LAS. The quality gaps are related to the public servant behavioral skills (customer service, effective communication and problem-solving) and specific knowledge expected (core, related and complementary topics) by new authorized cadastral managers and operators (SwissTierras, 2020).

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2.1 Quantity Gaps

At the *formal higher education level*, it was confirmed that there is a lack of trained personnel at the post-graduate higher education level in geomatics, data analytics, and geography to strengthen leadership and administrative jobs in the LAS value chain. Besides, it is necessary to develop an offer of continuous training with the support of experts (national or international, as appropriate) to prepare active students, graduates, and related personnel in the LAS to know the scope and challenges of the application of public policy in the context of the reality that Colombia faces in its territory. Although 139 research and innovation groups (endorsed by the last call for proposals by COLCIENCIAS, 833 of 2018) were found aligned to the core subjects (topography, geography, cadaster, and real estate registration), related (geomatics, data analytics), and complementary (land management and community engagement); it was not possible to identify a national research line and focus directly related to LAS.

In the study of *non-formal: Education for Labour and Human Development (ETDH)*, it was recognized that SENA with its 33 training centers present in all regions of the country can expand coverage at the national level. 87 IES with regional offers in ETDH, can expand their program portfolio with core and complementary topics of the LAS. At this training level, the topics of geomatics and analysis of data related to LAS are not addressed because they correspond to skills that do not rely on supporting trades, on the contrary, they are considered professional areas, mainly at the postgraduate level (specialization, master's, doctorate and post-doctoral).

At the *informal education level*, a training offer was set through courses, webinars, and workshops with different durations (from 2 hours to 7 weeks) at the international level. In Colombia, 51 types of training were identified in courses, workshops, and lectures provided by key LAS agents, mainly in the field of cadaster, property registration, land management and community engagement.

2.2 Quality Gaps

During the discovery phase, the employers of LAS in Colombia indicated that the workforce's knowledge and skills need to be strengthened in the theoretical field on topics related to "the LAS value chain processes" (SwissLands, 2020, p. 8), in public servant behavioral skills (customer service,

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effective communication and problem-solving) in all levels associated with the area of administrative functions.

On the other hand, it is necessary to strengthen and update concepts that are essential for the territory's operations and the applicable legal rules, as well as to focus on the provision of new generation elements in topography, geography, cadaster, and real estate registration (core topics) acquired from the challenges that the fulfillment of public policy in Colombia brings. Data geomatics and analytics (related topics) should be considered together with development skills in services, infrastructure, and LAS applications.

The supporting core topics of land management related to upper level departmental and municipal government, and the community engagement to promote social participation, should be both strengthened with high-level training of the LAS and the management in its environmental, economic, productive, social aspects of ownership and, in general, the concept of land management in Colombia.

2.3 Relevance Gaps

The LAS employers confirmed that being physically present restricts access to specialized knowledge (core, related and public servant skills) in the regions, they, therefore, call for the use of new hybrid teaching and learning methods that allow the regions to know firsthand and in parallel with the major cities, the global trends of land administration in specific contexts, without the location being a limitation. They also request access to high-quality content, promoting student mobility across regions, and updating the training of current and future staff members in practical scenarios that benefit the real elements of LAS operations.

Figure 1. Consolidates main, related, complementary and public servant behavioral skills at the educational levels: Formal, Non-Formal: Education for Labour and Human Development (ETDH), and Informal.

Figure 1. Core Topics of Land Administration System

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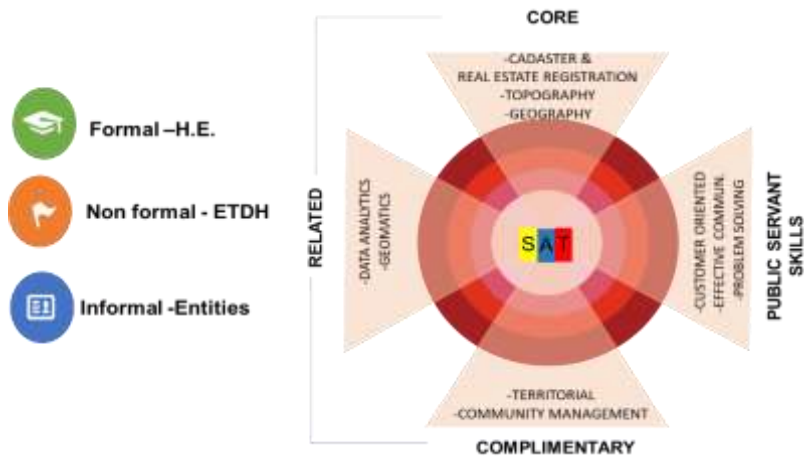
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3. NATIONAL EDUCATION STRATEGY FOR LAND ADMINISTRATION SYSTEM (LAS) IN COLOMBIA

The transformation process of the supply and demand of a competent workforce in the LAS, planned in the strategy, considered key elements of the benchmarks in the global field of education as (a) the framework proposed by the Organization for Cooperation and Economic Development (OECD) that determines the course of education at all levels until the year 2030 (OCED, 2018); (b) the development of alternative methods other than in-person training, such as the hybrid model in the higher education sector proposed by the University of Los Andes (Galvis Panqueva, 2019); (c) a design of a curriculum model provided by the academic department of the HEI (Universidad de Los Andes, 2011) recognized as the best university in Colombia in terms of university excellence results (Webometrics, 2020); and (d) the global trend towards classes taught through digital platforms that enable the teaching-learning process to thousands of students in Mass Online Courses (Edu Trends, 2014).

3.1 Strategic Direction

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The strategic direction of the LAS training sets out the mission, vision, and objectives that evolve to the extent that the strategy is being implemented and the expected results are achieved unless setbacks from uncontrolled factors occur.

The strategic objectives are:

- Socialize the benefits, challenges, and opportunities of development and sustainable growth in land administration in Colombia.
- Building an innovative portfolio of programs that contribute to the development of society by educating and training a competent and responsible workforce in the field of LAS.
- To guarantee the creation of useful knowledge in people to promote employment and entrepreneurship in the fields of LAS.
- Managing LAS at all levels of the Colombian education system with the participation of the academy, LAS, the national government, and society.
- Manage national and international mobility agreements for students, teachers, researchers, graduates, and experts in the related core topics of LAS.

3.2 Participants and Stages of the Strategy

Participants of the strategy implementation:

1. Initiative Managers: International Cooperation and Project Partners

SwissTierras (DANE, DNP, IGAC, ANT, MADR, SNR).

2. Sponsors

The Central Government of Colombia and national authorities on the LAS

3. National Allies:

- Government Sector: Ministry of National Education, Ministry of Science, Technology and Science Innovation, Ministry of Labor, Public Service, Special Administrative Unit of the Public Employment Service.
- Higher Education Institutions with Branches in Different Regions:
- National University - UN, Higher School of Public Administration - ESAP, National Abierta y a Distancia University - UNAD, Faculty of Engineering and its Cadastral and Geodetic

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Engineering of the Francisco José de Caldas District University and SENA which offer technological programs in higher education.

- Leader of Education for Labour and Human Development (ETDH) in the Country: SENA
- Higher Education Institutions with Growth in Virtuality: University Institution Politécnico Grancolombiano - POLI and Fundación Universitaria del Zona Andina - Andean Area.
- Leaders in Research with LAS-aligned Topics: Research groups selected by COLSCIENCIAS in the country.

4. Potential International Partnerships:

- International Cooperation: Fachhochschule Nordwestschweiz (FHNW) - University of Applied Sciences and Arts of Northwest Switzerland - Basel.
- Specialized LAS Subject Educators: The MuNet Registration program of the Inter-American Network of Land Registration; The Lincoln Institute of Land Policy; Latin American Society in Remote Perception and Space Information Systems - SELPER.
- Researchers in Europe: Swiss international research program by scientific research teams - SPIRIT, which promotes the training of women scientists; and Horizon 2020 Framework Program (H2020).

5. National Strategy Operators:

- New national collegiate body for the management of LAS training (created within the framework of the strategy execution).
- Formal Education Sector: 7 selected public IES, one for each region.
- Public IES: UN, ESAP, UNAD, and SENA with inter-administrative agreements with institutions at the national level with LAS.
- Non-Formal Education (ETDH): SENA and 7 institutions authorized by the Ministry of Education in each region, with the operation of ETDH programs.
- Informal Education: SwissTierras Project Team, Direct Project Partners, and Virtual IES to ensure academic leadership in the virtual model for course design and development.
- Mass Online Education Technology Ally: A provider selected to support the creation, management, and produce the respective certification by publishing the results to the IES and employers who make part of the LAS training environment and a content representative selected to promote the courses created in the national LAS training ecosystem to Spanish speaking countries.

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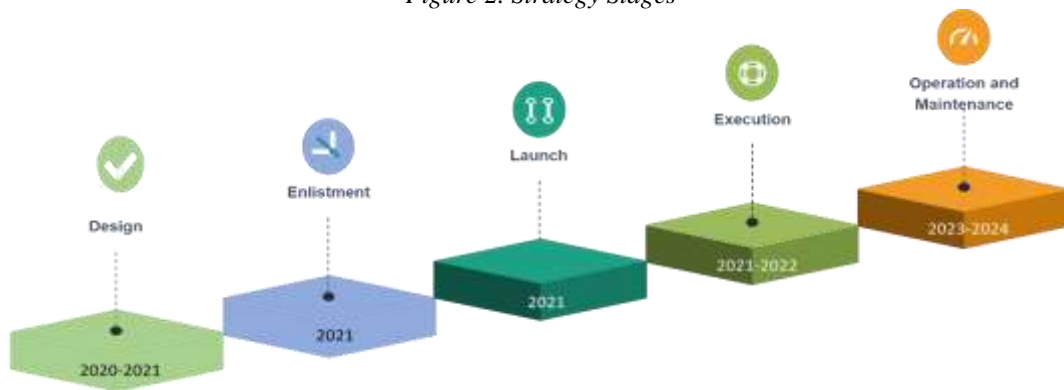
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- LAS Employers Cluster: permanent and temporary employment through organizations and entities of the LAS: project partners, managers, and authorized cadastral operators.
 - LAS Public Service Administrative Career: The National Civil Service Commission (CNSC) to provide career jobs in the public sector.
- 6. Facilitators in the Setup, Operation and Maintenance Stage:**
- Financing Education Projects in Colombia: Fund for Development of Higher Education (FDHE) and Colombian Institute of Educational Credit and Technical Studies Abroad (ICETEX).
 - Strengthening the quality of education: Colombian Institute for the Evaluation of Education (ICFES) and Presidential Council for Youth.
 - Potential Beneficiaries of the Strategy: Qualified Land managers and operators, Municipal and departmental associations, Business Guilds, and others directly related to LAS.

Figure 2. Presents the expected time range for each of the 5 strategies: design, enlistment, launch, execution, operation, and maintenance.

Figure 2. Strategy Stages



Source: By Maria Florez

3.3 Strategic Course of Action

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The strategic courses that make up the LAS's gradual educational success plan in Colombia promote "a competitive advantage that is difficult to copy, profitable and long-lasting" (Serna Gómez, 2010, p. 21) and prioritize integrating the experiences and skills of the participants in the LAS, to reduce the workforce gaps identified in the findings that create value in the administration of land in Colombia.

Each of the strategic courses includes the development of programs as a set of specific projects to achieve the determined objectives that guide the direction of the strategy with a regional and differential focus.

Although Colombia has 32 departments and 1,122 municipalities characterized by the population, social and economic activities (urban-regional component), the living conditions of the population, economic dynamics, environmental resources and their management (environmental component), the institutional skillset of the land authorities, and the security conditions (DNP, 2015, p. 21); since 2010, the Ministry of National Education (MEN) has grouped the departments into 7 regions because of their proximity.

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Figure 3. Regions in Colombia



Source: Regional Profiles (SNIES, 2018)

3.3.1. LAS Positioning in Colombia

This course of action aims to make the Colombian society aware of an educational proposal focused on the regions that make part of the country like "helping people get decent work, increasing their income and generating higher productivity that serves as an engine for economic development" (UNESCO, 2015, p. 27). It includes four programs, the first two of which are developed in the enrollment phase and the remaining two during the launch phase as shown in Figure 4.

Figure 4. LAS Positioning in Colombia

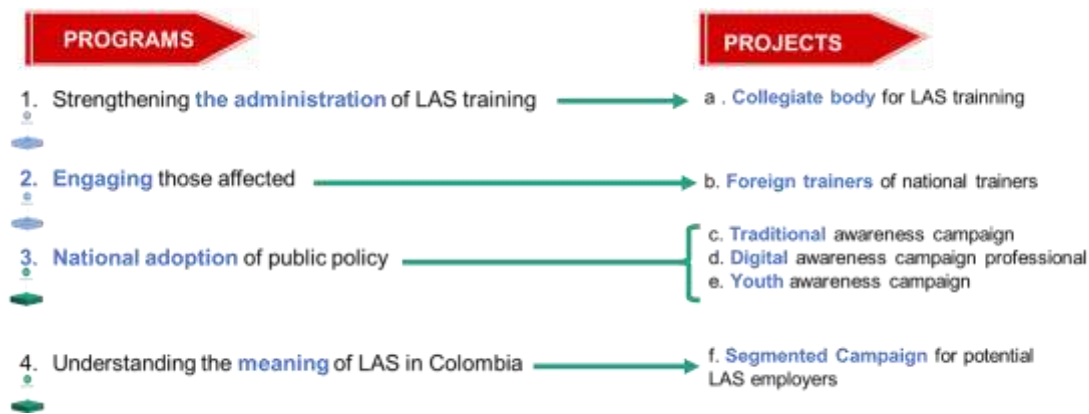
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Source: By Maria Florez

3.3.2. LAS Program Coverage by Educational Level

Coverage expansion in educational programs is one of the goals of the national government "to overcome the challenge of regulating and defining the right to education" (MEN, 2017, p. 37); therefore, broader coverage is foreseen for the Colombian population with formal, non-formal and informal education programs to aid and maintain the fulfillment of the public policy of land administration and multipurpose cadaster.

As shown in Figure 5, this course of action includes five programs. The first two are specifically focused on developing content associated with the core topics to strengthen the training programs that some institutions offer by region. The last three determine the high-impact topics to be prioritized in each of the seven regions of the country.

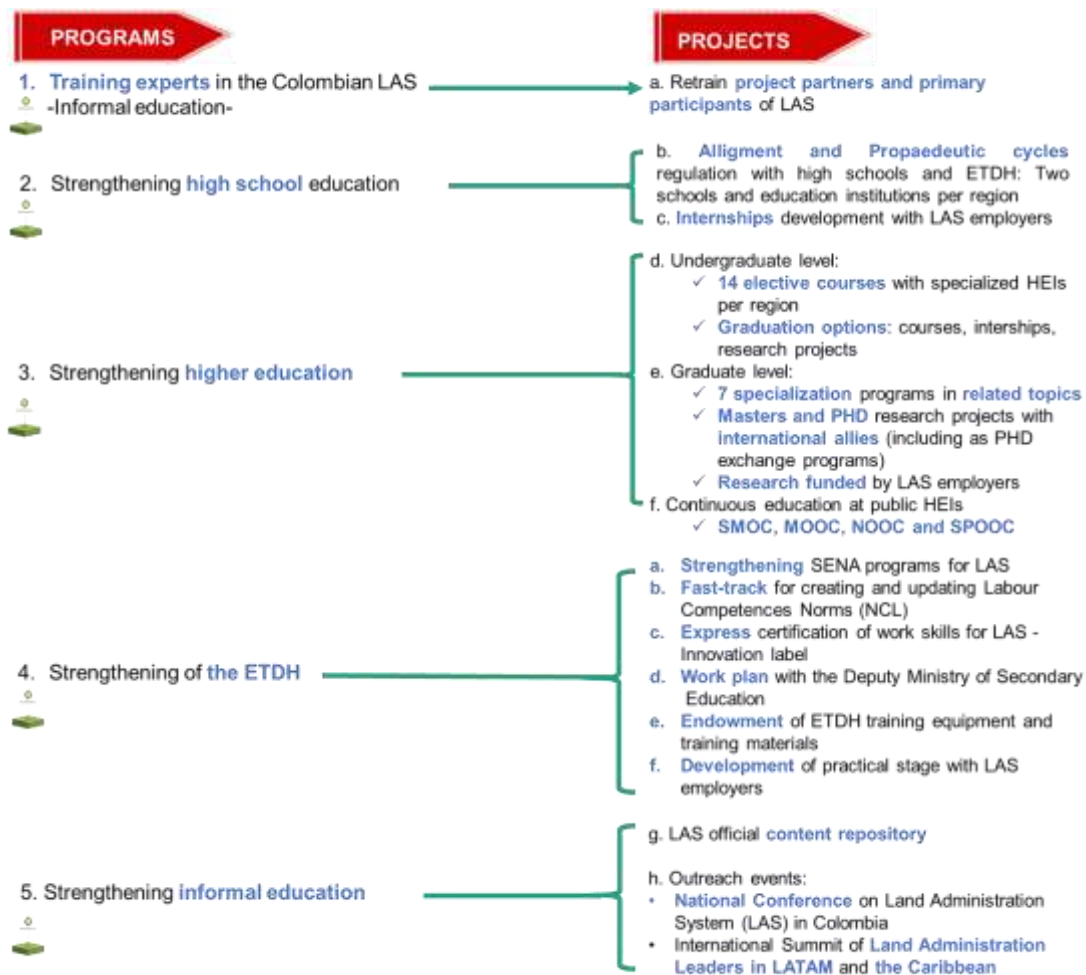
Figure 5. LAS program coverage by educational level

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3.3.3. Creating New Value in LAS Programs

The process of getting aligned with the national context, educational innovation, and student continuity and success are the cornerstones in creating a new value in LAS programs. The digital age

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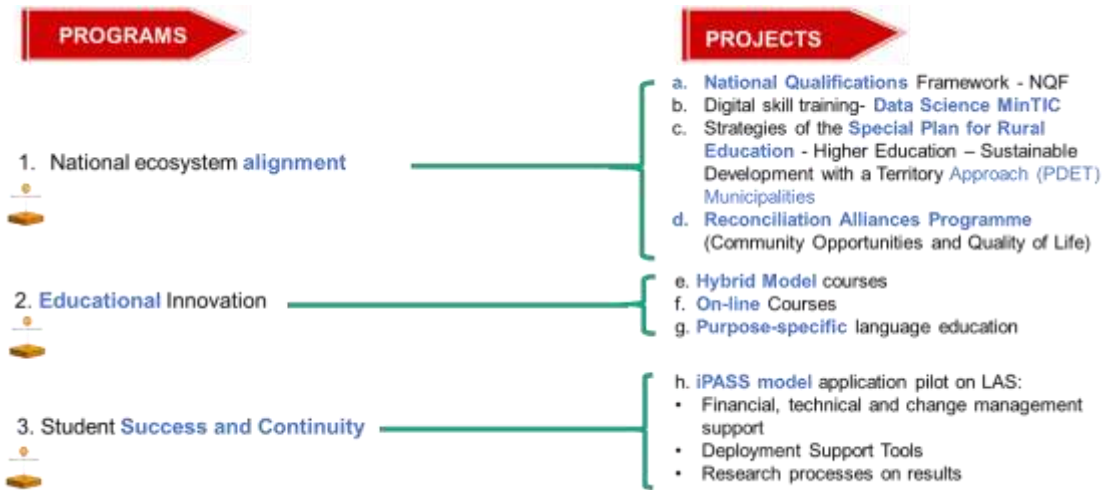
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has slowly reached Colombia in the field of education. The technological gap became noticeable with the arrival of COVID-19, which accelerated a set of trends that had been used before, ongoing changes that were already taking place and are now going to speed up in education. Information technologies and the trend of going virtual will lead to being connected with global audiences. Many universities will start considering themselves as platforms, we are moving towards a robot-proof education (Gaviria, 2020).

Educational innovation for LAS includes the creation of a hybrid model, 100% virtual courses, as well as teaching of languages such as English, German and Swiss, with a specific purpose. Creating and developing hybrid courses is one of the most important educational challenges today and highlights the need to change the educational, operational, and economic models that can compete at the global stage; however, the hybrid model should not be confused with the examples of alternatives that Colombia has reactively adopted as a response to the global pandemic.

Figure 6. Creating New Value in LAS Programs



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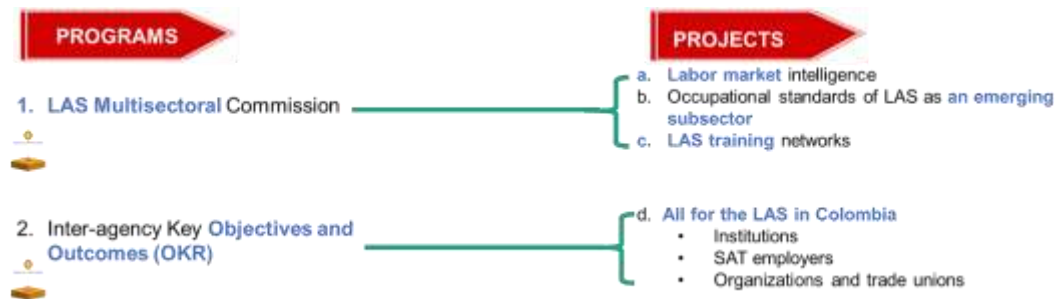
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3.3.4. Mitigating Tensions and Disputes between LAS Trainers

Teamwork between organizations working in different areas, with their own missions and interests, along with how complex relationships between people are, highlights the need to create mechanisms to mitigate differences and join efforts for one common goal. Two programs are carefully thought about in this plan to reach a goal, which includes creating a multi-sectoral committee for the LAS training as well as creating collaboratively key inter-institutional objectives and key results for land administration.

Figure 7. Mitigating Tensions and Disputes between LAS Trainers



Source: By Maria Florez

3.3.5. Exporting LAS Knowledge Base to Other Areas

The longer-term strategic course of action is to strengthen a win-win alliance with a learning management ally that will be responsible for the online educational marketing of LAS training as well as the national and international institutionalization of education leaders in land administration.

Figure 8. Exporting LAS Knowledge Base to Other Areas

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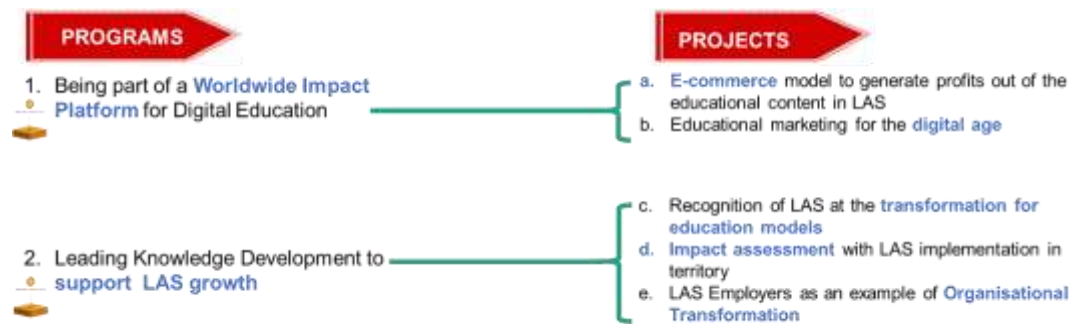
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The development of the five strategic action courses between 2021 and 2024 will impact about 50,000 Colombian citizens. The country should have a preliminary budget of about 5 million USD to execute the strategy, subject to a gradual and phased development of the proposal with the identified participating agents.

4. CONCLUSIONS

The training on topics related to land administration calls for a collective participation of government, educational institutions, organizations, communities, and citizens to achieve the fulfillment of public policy and multipurpose cadaster in the country. The needs, interests, challenges, and efforts of each of the stakeholders vary based on their work with the functions of land use, tenure, development, and value. Hence, it is necessary to promote agreements that allow for coherence and consistency in the collaboration required to implement the educational strategy at a national level, while achieving the short, medium and long term goals established for the country.

Commitment to change requires participants to develop sustainable long-term planning skills, identify and engage teams, alert and report on achievements and lessons learned, design contingency plans, manage programs and projects according to community priorities, focus on the changes according to the organization's internal capacities, designate enough resources to accomplish goals (2) McKinsey, 2018), and above all, adapt to ongoing change.

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Innovation requires moving rapidly from the comfort zone to a learning zone, i.e., “moving away from what we normally use and feel comfortable with such as a personal space or a position created by attitudes, procedures, and strategies ” (Fóres M., Sánchez, & Sancho, 2014, p. 206) to another way of thinking where "necessary skills are developed to discover new realities using creativity and talent in all organizational levels" (Ries, 2017, p. 24). The national education strategy requires that education agents commit to educational innovation to "incorporate a significant change in the teaching-learning process: in materials used, class delivery methods, contents or contexts involved in the teaching experience" (Educational Innovation, 2018).

Positioning the strategy along with the national governance of land administration, represents a competitive advantage that allows for surpassing the strategy’s expectations, encouraging a dynamic interaction between stakeholders and promoting democracy in the field (Castro G., 2020). Therefore, the continuous interaction between sponsors, allies, facilitators, operators, and users of LAS training is essential to the LAS's institutionalization. As an interdisciplinary field, LAS belongs to different sub-sectors of the national economy and has concrete results regarding human capital strengthening in land administration. It also integrates "the fundamentals that will allow for a continuous strengthening of the system as a whole while encouraging team effort within the national government and its citizens" (DNP, 2020).

Leveraging the experience of change agents in land administration in other countries will allow the Colombian education system to progressively migrate to digital educational models through the LAS while removing geographical barriers and promoting international recognition of the local knowledge.

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