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ACCREDITATION SCOPES AND ECONOMIC SECTORS COVERAGE IN COLOMBIA

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GLOBAL QUALITY INFRASTRUCTURE INDEX

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ABSTRACT

This study analyses the coverage of accreditation services provided to multiple Conformity Assessment Bodies (CABs) across the country's various productive sectors. A relationship is established between the accreditation schemes offered by ONAC (Organismo Nacional de Acreditación de Colombia, the National Accreditation Body in Colombia) and economic activities according to the International Standard Industrial Classification (ISIC). The total number of CABs is characterized by the schemes and scopes covered, allowing for the identification of the sectors with the greatest and least accredited conformity assessment service offerings. The findings of this analysis provide an understanding of the productive sectors with the greatest coverage of accreditation services and their relationship with the employment they generate, as well as the sectors with the fewest ONAC services.

BACKGROUND

Accredited conformity assessment is a fundamental pillar for ensuring the quality, safety, and regulatory compliance of products, processes, and services. In several countries, quality infrastructure (QI) has evolved to respond to the demands of commerce, industry, and regulation. In Colombia, the National Accreditation Body (ONAC) is responsible for accrediting CABs through various schemes that are part of its service portfolio (laboratories, inspection bodies, product and management system certification, among others). However, until now, no analysis had been conducted to understand the coverage of the accreditation schemes and scopes offered by ONAC among economic sectors using the International Standard Industrial Classification (ISIC). This allows for identifying gaps and opportunities to strengthen accreditation in strategic sectors.

OBJECTIVE

To analyse the coverage and scope of accreditation schemes offered by ONAC in the country's various economic sectors, using the International Standard Industrial Classification (ISIC). The aim is to identify concentration patterns, sectors with greater and lesser coverage, and opportunities to strengthen the country's quality infrastructure.

SCOPE

This study examines the accreditation service offering in Colombia, categorizing them by accreditation schemes and scopes, and relating them to economic sectors according to the ISIC. Certification, inspection, testing, validation, verification, and calibration bodies are included, providing a comprehensive view of accreditation coverage in the national economy. It does not address aspects of CAB performance evaluation or international comparisons but rather focuses on the characterization and distribution of CABs across the country's economic sectors.

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ACRONYMS

ACRONYMS	DEFINITION
CDA	Automotive Diagnostic Centre's
CAB	Conformity Assessment Bodies
CPR	Product Certification Bodies (Products, processes and services)
CRC	Driver Recognition Centre's
CSG	Management System Certification Bodies
ECD	Digital Certification Entities
ISIC	International Standard Industrial Classification
LAB	Testing Laboratories
LAC	Calibration Laboratories
LCL	Clinical Laboratories
OCP	Person Certification Bodies
OIN	Inspection Bodies
ONAC	National Accreditation Body of Colombia
OVM	Metrological Verification Body
OVV	Validation and Verification Bodies
PEA	Proficiency Testing Providers
PMR/PRM	Reference Materials Producers

PREFACE

by Alessandro Nisi, Studi e Statistiche, ACCREDIA - L'Ente Italiano di Accreditamento

The study "Accreditation Scopes and Economic Sectors Coverage" by Juan Sebastián Parada Portilla and Diego Alejandro Contreras López represents a timely and highly relevant contribution to understanding how Colombia's quality infrastructure aligns with the structure of its economy. By systematically analysing the coverage of ONAC's accreditation services across accreditation schemes and ISIC economic sectors and mapping accredited conformity assessment bodies (CABs) according to the specific scopes for which they are accredited, the authors offer one of the first integrated, economy-wide pictures of how accredited conformity assessment bodies (CABs) are distributed in relation to productive activities and GDP. This perspective is not only of academic interest; it provides an evidence base that can support strategic decisions by policymakers, regulators, ONAC itself, and economic actors seeking to strengthen competitiveness and trust in Colombian products and services.

A distinctive value of this work lies in its methodological clarity and transparency. The authors adopt a descriptive–analytical and cross-sectional design that combines ONAC's internal data on schemes and scopes with official economic statistics from the National Administrative Department of Statistics (DANE), making full use of the International Standard Industrial Classification (ISIC) as a common language between quality infrastructure and economic analysis. Through careful mapping of scopes to ISIC divisions and the use of descriptive statistics and the Herfindahl–Hirschman Index (HHI), the study moves beyond anecdotal observations and provides a structured, framework for assessing how accreditation actually permeates different sectors and territories. The explicit discussion of methodological limitations, including judgment in scope–ISIC matching and the use of CAB counts rather than capacity measures, further reinforces the robustness and integrity of the approach.

The empirical results are rich and thought-provoking. The paper shows, for example, that accreditation in Colombia is far from uniformly distributed: there are areas of clear specialization, such as the strong presence of transit-related schemes (for Automotive Diagnostic Centers (CDA) and Driver Recognition Centers (CRC)) driven by regulatory requirements in vehicle inspection and driver recognition, alongside diversified but more fragmented coverage in certification, inspection, and laboratory services. The analysis by schemes and groupings highlights how product and system certification, inspection, testing, calibration, clinical laboratories, validation and verification, and transit services connect to manufacturing, professional and technical services, health, and other key sectors. The use of ISIC allows these patterns to be interpreted in direct relation to the productive structure, and the integration of GDP data reveals a nuanced relationship between economic weight, regulatory intensity, technological complexity, and the demand for accredited services—illustrated, for instance, by the high number of CABs in professional, scientific, and technical activities relative to their GDP share, and the comparatively low coverage in agriculture.

From the perspective of international accreditation and quality infrastructure statistics, this work resonates with and complements broader efforts to quantify the economic and developmental role of quality infrastructure. Recent studies, such as those on the macroeconomic effects of quality infrastructure in Europe and the growing body of evidence on the value of accreditation for productivity, trade, and institutional trust, underline that standards, conformity assessment, and accreditation are not merely technical instruments but key enablers of competitiveness and sustainable development.

The ONAC analysis brings this global debate into the concrete Colombian context, demonstrating how national accreditation data—when properly structured—can inform policies on sectoral upgrading, regional diversification, and risk management in the face of external shocks, as reflected in the territorial concentration patterns captured by the HHI.

This study also opens an important research and policy agenda. By proposing a replicable mapping between accreditation scopes and ISIC codes, it creates the conditions for comparative work overtime and across countries, including potential integration with global indices such as the Global Quality Infrastructure Index (GQII) and the Quality Infrastructure for Sustainable Development (QI4SD) Index. Future extensions could incorporate weighting schemes for scope complexity or service volume, longitudinal analysis, and additional explanatory variables such as export intensity, innovation indicators, and regulatory frameworks, bringing the analysis closer to causal inference and policy prioritization. For ONAC and for the Colombian quality infrastructure community, the present report already provides a solid platform for dialogue with regulators, development banks, and sectoral stakeholders about where accreditation is most needed, how it can support new industrial and sustainability strategies, and how to ensure that no economically significant sector remains underserved.

For these reasons, this paper deserves attention well beyond Colombia's borders. It exemplifies how a national accreditation body can use its own data, in combination with official statistics and international classifications, to generate strategic intelligence on the alignment between quality infrastructure and economic development. It is hoped that this work will inspire similar exercises in other countries and will encourage further collaboration between accreditation bodies, statistical offices, and research institutions in building a more evidence-based understanding of the contribution of accreditation to inclusive and sustainable growth.

1

INTRODUCTION

Conformity Assessment Bodies (CABs) accreditation plays a fundamental role in the quality infrastructure (QI), validating the technical competence of these organizations, which in turn helps ensure that products, processes, and services meet recognized regulatory standards. In this regard, it is worth investigating the relationship between the availability of accreditation services and the country's economic structure.

According to ISO/IEC 17011:2017, an accreditation scheme is the set of rules, processes, and requirements that an accreditation body uses to assess the competence of CABs. Each scheme is based on international standards such as ISO/IEC 17025, ISO/IEC 17020, or ISO/IEC 17065 and establishes technical, normative, and procedural criteria to ensure the impartiality and competence of CABs. In this context, the scope of accreditation details the specific activities, services, and methods for which the CAB has been assessed and recognized, while the sub-scopes represent more specific subdivisions that allow for a more detailed description of competencies in particular areas, such as the differentiation of analytical techniques in a laboratory.

The organization and operation of these schemes are structured in several stages: first, the development of the scheme based on international or national standards or documents such as Specific Accreditation Criteria (CEA) and the needs of the sector, at which point the scope of accreditation covered by the scheme is defined, and then a series of plans and processes are put in place that culminate in the launch of a new accreditation service or maintenance of an existing service. When the service is available to CABs, they voluntarily (or compulsorily, if required by the regulator) decide in which scope they wish to be accredited. If they meet the criteria and the evaluation carried out by ONAC and receive the decision granting the accreditation, and it is published in the DOA, the CABs can carry out the conformity assessment accredited by ONAC.

This process is complemented by periodic evaluations to maintain the accreditation's competency and validity. The definitions and structures presented here are based on the following documents: ISO/IEC 17011:2017, ISO/IEC 17000:2020, and complementary and mandatory documents from the regional or global forums or cooperation organizations of which ONAC is a member.

On the other hand, the ISIC Classification is a system for coding and classifying economic activities developed to provide a uniform framework that facilitates the collection, processing, analysis, and comparison of statistical data internationally. This tool is essential for the production of economic statistics, the formulation of public policies, and the analysis of the productive structure, as it allows activities to be grouped into uniform and comparable categories. Essentially, the ISIC serves to identify, classify, and analyse the economic activities of companies, industries, and sectors, which is crucial for assessing the contribution of each activity to the economy as a whole.

The ISIC structure is hierarchical and organized into different levels of specificity: sections, divisions, groups, classes, and subclasses. Each level is identified by alphanumeric codes that ensure a systematic and standardized classification of economic activities, allowing for periodic updates to reflect changes in the global economy. The use of this classification is important because it provides a homogeneous framework for categorizing economic activities, facilitating comparisons between sectors, structured analysis of the distribution of economic activities, and integration with economic information generated by organizations such as national statistical offices.

This paper seeks to analyse this relationship based on the classification of the CABs accredited by ONAC until January 2025 and its correspondence with the ISIC classification of economic sectors. To this end, a link is established between the standards applied in the accreditation processes and the productive sectors, in order to identify trends and potential impacts on economic development.

[1] *The OVM, ECD and CRC (in transition) schemes are based on their own CEA (Specific Accreditation Criteria) type documents.*
[2] *CP-2.1-01: DESIGN, DEVELOPMENT AND IMPROVEMENT OF SERVICES*
[3] *https://onac.org.co/acreditate-con-onac/#proceso*

2 LITERATURE REVIEW

Evidence from international case studies, including those analysed by Ramkissoon and Nisi (2024), shows that accreditation exerts a broad and measurable influence on economic performance and organizational capability. At the firm level, accreditation enhances productive efficiency, reduces manufacturing and operational costs, and supports job creation, while also decreasing losses associated with non-conforming products, rework, or measurement inaccuracies. These internal improvements are complemented by important external effects: accreditation increases credibility, fosters informed decision-making among consumers and regulators, and facilitates fair competition through transparent and interoperable conformity assessment practices aligned with internationally recognized standards. By harmonizing technical requirements across markets, accreditation contributes directly to expanded market access, reduced technical barriers to trade, and improved export readiness.

Beyond its economic implications, accreditation strengthens social and environmental outcomes by guaranteeing safer products, more reliable services, and higher compliance with environmental and public-health regulations. Its influence spans multiple sectors, from healthcare and food safety to engineering, energy, and information technologies, acting as a unifying mechanism that improves quality and reinforces confidence in institutional and industrial systems. The evidence of consumer trust, price premiums for accredited products, and the broader sustainability benefits associated with accredited practices highlights the role of accreditation as a foundational component of national quality infrastructure and a key driver of long-term competitiveness, institutional trustworthiness, and sustainable development (Ramkissoon and Nisi, 2024).

Blind et. al. (2025) presents an integrated econometric estimation of the macroeconomic impact of QI—including standards, conformity assessment, accreditation, metrology, and market surveillance—on the gross domestic product of European countries. Using an extended panel regression model (Cobb–Douglas type) with data from 1990 to 2020, the authors find that standards, ISO 9001 certifications, and participation in the International Accreditation Forum (IAF) have

positive and statistically significant effects on GDP, while market surveillance also contributes positively, though to a lesser extent; metrological standards do not exhibit a significant aggregate effect. In a combined model of all QI elements, the hypothetical removal of these components would result in an estimated 7.8% loss of GDP, underscoring that Quality Infrastructure is not merely a technical system but an economically relevant asset for national productivity, competitiveness, and long-term growth.

There are efforts to measure the Quality Infrastructure in the world. The Global Quality Infrastructure Index (GQII) is an open, data-driven tool developed by independent consulting firms Mesopartner and Analyticar to measure and compare the development of national quality infrastructure (QI) systems across economies worldwide. It compiles and standardizes publicly available data on key QI components—such as standards, metrology, accreditation, and conformity assessment—to generate a composite score that reflects the relative maturity of a country's quality infrastructure. The GQII ranking facilitates international benchmarking, enabling policymakers, quality institutions, and researchers to assess how well countries' QI systems support market transparency, competitiveness, and economic performance. It also serves as an evidence base for strategic decision-making, highlighting links between quality infrastructure and broader development outcomes such as export capability, trade facilitation, and sustainable growth (Harmes-Liedtke, 2024).

Furthermore, the Quality Infrastructure for Sustainable Development (QI4SD) Index is a global benchmarking tool developed by the United Nations Industrial Development Organization (UNIDO) in collaboration with the International Network on Quality Infrastructure (INetQI) to assess how national quality infrastructure systems support the United Nations Sustainable Development Goals (SDGs). It evaluates the readiness and performance of a country's QI across five core dimensions—standardization, metrology, accreditation, conformity assessment, and quality policy—aggregating them into composite scores mapped to the SDG pillars of Prosperity, People, and Planet. The Index's comprehensive framework and expanded coverage (over 150 countries) provide actionable evidence for policymakers and development partners to identify strengths, gaps, and pathways to strengthen QI systems and advance sustainable economic and social development (United Nations Industrial Development Organization, 2023).

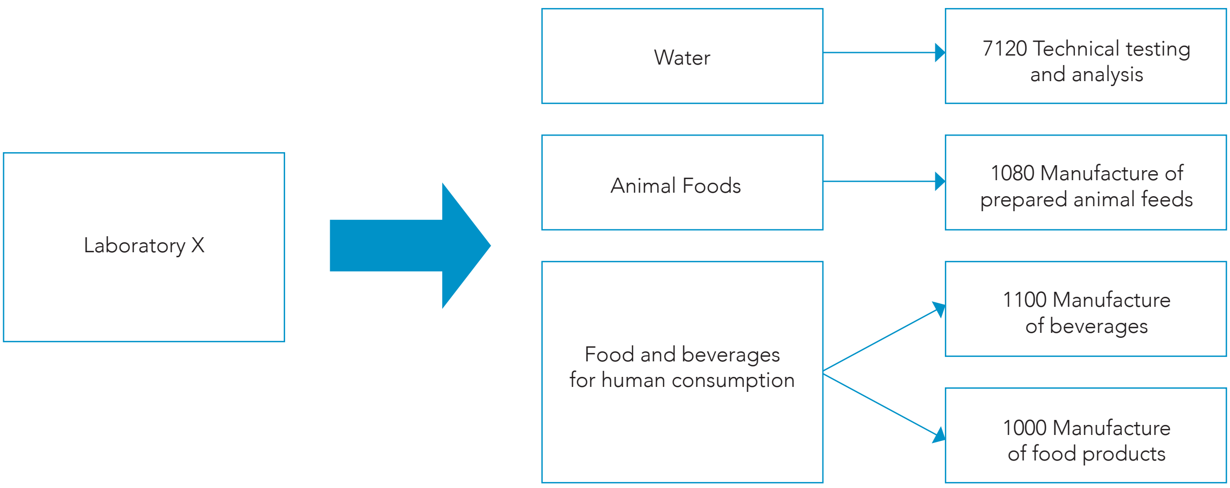
3

METHODOLOGY

The analysis was carried out in several stages. First, the scope of the accredited CABs was compiled and tabulated, reviewing the regulatory references available on the ONAC website. This data was classified according to the accreditation scheme and, in some cases, by specific scope.

Subsequently, a correspondence was established between the scopes of the CABs and their respective ISIC group or class, relating them to the corresponding division and economic section. This mapping was performed manually by a team of researchers with expertise in conformity assessment and economic classification. For each accreditation scope, the researchers identified the economic activity or activities to which it most directly relates, based on the technical description of the scope, the nature of the products, processes, or services it covers, and the official definitions of the ISIC classes, groups, divisions, and sections as published by DANE (Rev. 4, Update 2022). In cases where a scope could reasonably be assigned to more than one ISIC class, the researchers applied their expert judgement to select the most relevant classification, prioritising the primary economic activity served by the scope. As an example, Illustration 1 shows how a laboratory has several scopes, and each scope can be associated with one or more economic sectors. Laboratory X has three scopes, covering everything from water to food and beverages for human consumption, which can be associated with various economic sectors such as the production of prepared animal feed, beverage production, and food product production, respectively.

Illustration 1 : Example of association of scopes and economic sector.



Since a CAB can cover multiple scopes and a single scope can be linked to various economic activities, a detailed analysis of the distribution of these bodies across different productive sectors was conducted. The analysis was carried out in several stages. First, a general characterisation of all CABs was performed, considering their distribution by scheme and the scopes they cover. Next, the relationship between the laboratory, certification, validation and verification, inspection, and transit schemes recognised by ONAC and the economic sections to which their scopes are linked was established, allowing for the identification of accreditation coverage patterns in different industries.

This was done by aggregating the number of CABs per scheme at each ISIC hierarchical level – from class to section – using the scope-to-ISIC mapping described above. Finally, a more detailed classification by scheme was carried out, with the aim of segmenting and specifically analysing the participation of CABs in each economic division. To this end, descriptive statistics were applied, allowing for the characterisation of the economic sections associated with ONAC accreditation schemes. The following grouping of schemes is presented to clarify the results:

- Laboratories: LCL, LAB, LAC, PEA, PMR
- Certification: OCP, CSG, CPR
- Validation and verification: OVV
- Inspection: OIN
- Transit: CRC, CDA

An Herfindahl-Hirschman Index (HHI) was calculated at the departmental level, with the purpose of evaluating the degree of economic diversification in each territory based on the accredited economic divisions.

Lastly, DANE data were integrated to analyse the relationship between GDP performance and the number of CABs in each sector. This approach allowed us to assess the distribution of accreditation scopes in terms of its economic impact, providing key information on its alignment with the country's productive development.

Limitations

Despite its strengths, the methodology is subject to several limitations that should be considered when interpreting the results. First, the assignment of accreditation scopes to ISIC divisions involves an element of expert judgment, particularly in cases where scopes span multiple economic activities. This may introduce classification bias, especially in emerging or cross-cutting sectors where ISIC boundaries are less precise. While this limitation is inherent to any scope-based mapping exercise, it may affect the exact distribution of CABs across economic divisions.

Second, the analysis relies on counts of CABs and scopes rather than measures of capacity, intensity, or market share. As a result, all accredited bodies are implicitly treated as equivalent, regardless of differences in size, technical depth, number of clients, or geographic reach. This may overestimate the effective coverage of quality infrastructure in sectors dominated by small or highly specialized bodies, while underestimating the influence of large, multi-scope CABs.

Third, the use of GDP data to explore economic alignment introduces a correlation-based perspective rather than a causal one. The observed relationship between the number of CABs and sectoral GDP should not be interpreted as an income or growth effect of accreditation, as reverse causality and omitted variables (such as regulatory intensity, export orientation, or technological complexity) may drive both economic size and accreditation demand.

Future research could enhance the robustness of this approach by incorporating weighting schemes based on scope complexity, number of accredited activities, or estimated service volumes, allowing for a more nuanced representation of accreditation capacity. Sensitivity analyses using alternative scope-to-ISIC matching criteria could also help assess the stability of sectoral distributions. Moreover, extending the analysis longitudinally would enable the construction of panel data to examine dynamic relationships between accreditation coverage and economic development over time.

Finally, integrating additional explanatory variables—such as export intensity, regulatory frameworks, or innovation indicators—could help disentangle structural drivers of accreditation demand and move the analysis closer to causal inference. Despite these limitations, the methodology provides a solid and transparent foundation for understanding how quality infrastructure is distributed across economic sectors and territories, and it offers a replicable framework for comparative studies at the regional or international level.

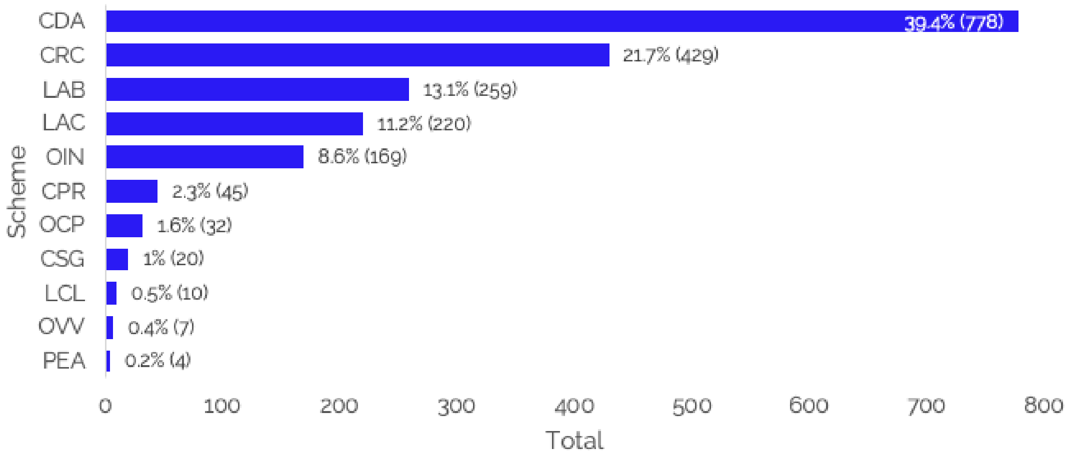
4 RESULTS

Chart 1 shows the number of CABs by scheme, as of January 31, 2025. The data indicates a marked concentration in a few schemes, with CDA accounting for almost 40% of the total, closely followed by CRC at 21.7%. This implies that more than 60% of the distribution is concentrated in schemes related to vehicular transport. The LAB (13.1%) and LAC (11.2%) schemes complement the structure, while OIN (8.6%) contributes a significant share, although it is lower than the first two.

The presence of schemes with very low participation, such as CPR, OCP, CSG, LCL, OVV, and PEA (each with less than 2.5%), indicates that, although there is diversification, their share in distribution is lower compared to the main ones. This distribution is due both to the size of the national vehicle fleet and the number of drivers and potential drivers, and to the mandatory nature established by Law 769 of 2002, which requires the vehicle fleet to undergo technical-mechanical inspections at an Automotive Diagnostic Center (CDA) accredited by ONAC at defined intervals[4]. Likewise, drivers must undergo physical and mental aptitude tests at an accredited Driver Recognition Center (CRC)[5], while non-mandatory schemes depend on market incentives, responding to the dynamics of supply and demand.

[4] *Resolution 3768 of 2013*
[5] *Resolution 217 of 2014*

Chart 1 : Total CABs by scheme



Source: ONAC. Own calculations, ONAC

Characterization of the CAB by Schemes and Scopes

We have organized all CABs according to their scopes, by scheme, and classified them into five groups: Certification, Inspection, Laboratories, Validation and Verification, and Transit. The top five scopes for each scheme are then extracted. In the certification grouping reflected in Table 1 , it is observed that in the CPR (Product and Process Certification) scheme, the accredited scopes cover diverse industrial sectors, with a high concentration in electrical and optical equipment (10.3%), rubber and plastic products (9.4%), and non-metallic mineral products (8.9%). The significant presence of these sectors suggests that CPR certification is aligned with industries that require strict quality and safety standards, due to technical regulations and market demands. Likewise, the inclusion of base metals and metal products (8%) and manufacturing not elsewhere classified (8%) indicates that this scheme not only focuses on highly regulated sectors but also covers a broader spectrum of industrial and manufacturing processes with specialized certifications.

For the CSG (Management Systems Certification) scheme, the results show a strong focus on standards that guarantee quality, sustainability, and security in the organizational environment. ISO 9001 (19.4%), ISO 14001 (17.2%), and ISO 45001:2018 (16.1%) dominate the landscape, reflecting organizations' interest in consolidating their processes under recognized international standards. The presence of more specialized certifications such as NTC 5555:2011 (7.5%, currently replaced by ISO 21001) and ISO/IEC 27001 (5.4%) shows that, although to a lesser extent, information security management and other specific governance approaches continue to gain relevance in the certification ecosystem. This pattern suggests that companies are increasingly seeking to improve their organizational performance, strengthen their reputation, establish a differentiating factor over their competitors, and offer added value by ensuring their services, in addition to accessing markets with greater regulatory demands.

Within the OCP (Person Certification Bodies) scheme, there is a strong concentration of certification in lifting equipment handling competency (36.2%), which denotes the importance of ensuring technical competencies and operational safety in this area. The certification of supply operators in CNGV service stations (8.5%), security (8.5%), electrical installations (RETIE - 6.4%), and justice (6.4%) highlights the need to assess and validate specific knowledge in sectors with a high impact on safety, infrastructure, and technical regulation. This reflects a labour market trend toward accreditation of key competencies, ensuring quality standards and risk mitigation in strategic sectors.

Table 1 : Top 5 scopes by scheme – Certifications

Scheme	Scope	Total CAB	Percentage
CPR	Electrical and optical equipment	23	10.3%
	Rubber and plastic products	21	9.4%
	Non-metallic mineral products	20	8.9%
	Base metals and metal products	18	8%
	Manufacture not elsewhere classified	18	8%
CSG	Quality management system - ISO 9001	18	19.4%
	Environmental management system - ISO 14001	16	17.2%
	Occupational health and safety management system - ISO 45001:2018	15	16.1%
	Quality management system - NTC 5555:2011	7	7.5%
	Information Security Management System - ISOIEC 27001	5	5.4%
OCP	Lifting equipment	17	36.2%
	CNGV service stations	4	8.5%
	Security	4	8.5%
	Electrical Installations (RETIE)	3	6.4%
	Justice	3	6.4%

Source: ONAC. Own calculations, ONAC.

In inspection, where it is represented in Table 2 The main accreditation areas covered by the scheme focus on electrical and gas infrastructure, with a focus on safety, energy efficiency, and regulatory compliance. Electrical Installations - RETIE (15.9%) leads the ranking, demonstrating the importance of ensuring technical standards in electrical networks, mitigating the risk of failures and accidents. This is followed by Internal Installations for Fuel Gas Supply (14.6%), suggesting significant interest in the regulation and control of gas distribution systems, a key sector for energy supply in residential and industrial settings.

Public or Outdoor Lighting Installations - RETILAP [6](11%) and Indoor Lighting Installations - RETILAP (10.7%) highlight the importance of efficiency and safety standards in lighting systems, both in urban spaces and in private buildings, probably driven by modernization and energy efficiency policies. Finally, the inspection of Equipment and Elements through Non-Destructive Testing (8.8%) shows the growing need to apply advanced inspection methodologies to evaluate the integrity of materials and equipment, without compromising their functionality, something fundamental in industries such as construction, manufacturing and the energy sector.

While these achievements reflect sectors with high regulation and technical demands, they also demonstrate a trend toward professionalization and quality assurance in areas critical to infrastructure and public safety. Certification in these areas not only responds to mandatory regulations but also becomes a key factor in competitiveness and market confidence.

[6] *Technical Regulations for Lighting and Public Lighting (RETILAP). The regulation specifies the requirements for different types of light sources. https://www.minenergia.gov.co/es/misional/energia-electrica-2/reglamentos-tecnicos/reglamento-t%C3%A9cnico-de-iluminaci%C3%B3n-y-alumbrado-p%C3%BAblico-retilap/*

Table 2: Top 5 scopes by scheme – Inspection

Scope	Total CAB	Percentage
Electrical Installations - RETIE	49	15.9%
Internal installations for fuel gas supply	45	14.6%
Public or outdoor lighting installations - RETILAP	34	11%
Interior lighting installations - RETILAP	33	10.7%
Equipment and elements through non-destructive testing	27	8.8%

Source: ONAC. Own calculations, ONAC

In the laboratory group, Chart 4 shows four distinct schemes, each with a specific focus. In the LAB (Testing Laboratories) scheme, the main scopes of conformity assessment focus on sectors critical to public health and infrastructure. Water (12.6%) and Food and Beverages for Human Consumption (12.1%) lead the list, reflecting a strong emphasis on quality control and safety in essential resources. Construction Materials (10.9%), both metallic and non-metallic, stand out as a key area, likely due to the need to ensure the durability and strength of structures. On the other hand, accreditation in Petroleum, Derived Products, Fuels and Renewable Energies (6.9%) and Electrical and Electronic Equipment, Apparatus and Components (6.7%) indicates the relevance of the evaluation of energy and technological products in the industry.

In the case of LAC (Calibration Laboratories), the most frequent scopes are related to the magnitudes [7]of Thermodynamics (14.4%), Pressure (13.4%), Mass (12.5%), and Volume (12.4%), the most representative magnitude codes. This result highlights the importance of calibration in industrial sectors where measurement accuracy is crucial to guarantee the quality and reliability of production processes.

Within the LCL (Clinical Laboratories) framework, Immunology (32%) and Hematology (24%) stand out as the areas with the highest number of accredited CABs. In addition, areas such as General Chemistry and Drug Monitoring (12%), Microbiology (8%), and Biological Fluid Analysis (4%) are strengthened, allowing for the generation of formal trust in these laboratories that support medical diagnoses, enable the establishment of clinical treatments, and instill confidence in healthcare systems.

Finally, in PEA (Proficiency Assessment Programs), the accredited scopes are distributed equally between Clinical Laboratories (40%), Testing Laboratories (40%), and Calibration Laboratories (20%), thus fulfilling the key technical competence assessment in these three areas to guarantee the reliability of the results issued by the laboratories. Additionally, in the PMR scheme, three CABs are accredited in the Reference Material and Certified Reference Material scopes (100%).

[7] GU-3.0-03: GUIDE FOR THE EXPRESSION OF ACCREDITATION SCOPE SCHEME FOR CALIBRATION LABORATORIES.

Table 3 : Top 5 scopes by scheme – Laboratories

Scheme	Scope	Total CAB	Percentage
LAB	Waters	51	12.6%
	Food and beverages for human consumption	49	12.1%
	CONSTRUCTION MATERIALS - Sub-Division into metallic (C47) and non-metallic (C58)	44	10.9%
	Petroleum, derivatives, fuels and renewable energies	28	6.9%
	Electrical and electronic equipment, appliances and components	27	6.7%
LAC	Thermodynamics	85	14.4%
	Pressure	79	13.4%
	Mass	74	12.5%
	Volume	73	12.4%
	Relative humidity	55	9.3%
LCL	Immunology	8	32%
	Haematology	6	24%
	General chemistry and drug monitoring	3	12%
	Microbiological	2	8%
	Analysis of biological fluids	1	4%
PEA	Clinical laboratories	2	40%
	Testing laboratories	2	40%
	Calibration laboratories	1	20%
PMR	MR and MRC	3	100%

Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

Chart 5 shows the distribution of coverages for the transport grouping, where the majority of activity in the CDA scheme is concentrated in the Technical-Mechanical Inspection and Pollutant Emissions Testing service for motorcycles, with 752 CABs (55.7%), followed by light vehicles (341 CABs , 25.3%) and the mixed category (light and heavy) (241 CABs, 17.9%). CABs can provide the service to multiple types of vehicles, so it is not exclusive. This suggests that, within this scheme, there is a large coverage for the technical-mechanical inspection of motorcycles, which could be linked to the high penetration of this type of vehicle in certain markets or to a trend in urban and rural mobility. The heavy vehicle categories and mobile lines (motorcycles, light vehicles, and mixed vehicles in mobile mode) represent a very small proportion, indicating that the greatest relevance focuses on the traditional and established supply of motorcycles, light vehicles, and mixed vehicles.

In contrast, the CRC scheme is almost exclusively oriented toward the certification of motor vehicle drivers, covering different groups of driving licenses (with 428 CABs, representing 93.2%). Certification for individuals related to the possession and/or carrying of weapons constitutes only a very small fraction (31 registrations, 6.8%). This disparity in the CRC scheme is explained by the fact that the scheme was primarily created to serve the traffic system, to ensure driver competence and safety, which can be interpreted as an effort to strengthen driving standards and reduce road risks. Later, the scheme was extended to include certification for weapons possession; although at present, it has a much more limited scope, reflecting a very specific regulatory or market niche.

Table 4 : Highest ranges by scheme – Transit

Scheme	Scope	Total CAB	Percentage
CDA	Motorcycles	752	55.7%
	Light	341	25.3%
	Mixed	241	17.9%
	Heavy	10	0.7%
	Motorcycles (mobile line)	2	0.1%
CRC	Motor vehicle drivers for the following categories: Group 1: A1, A2, and B1. Group 2: B2, B3, C1, C2, and C3.	428	93.2%
	Natural persons for possession and/or carrying of weapons.	31	6.8%

Source: ONAC. Own calculations, ONAC.

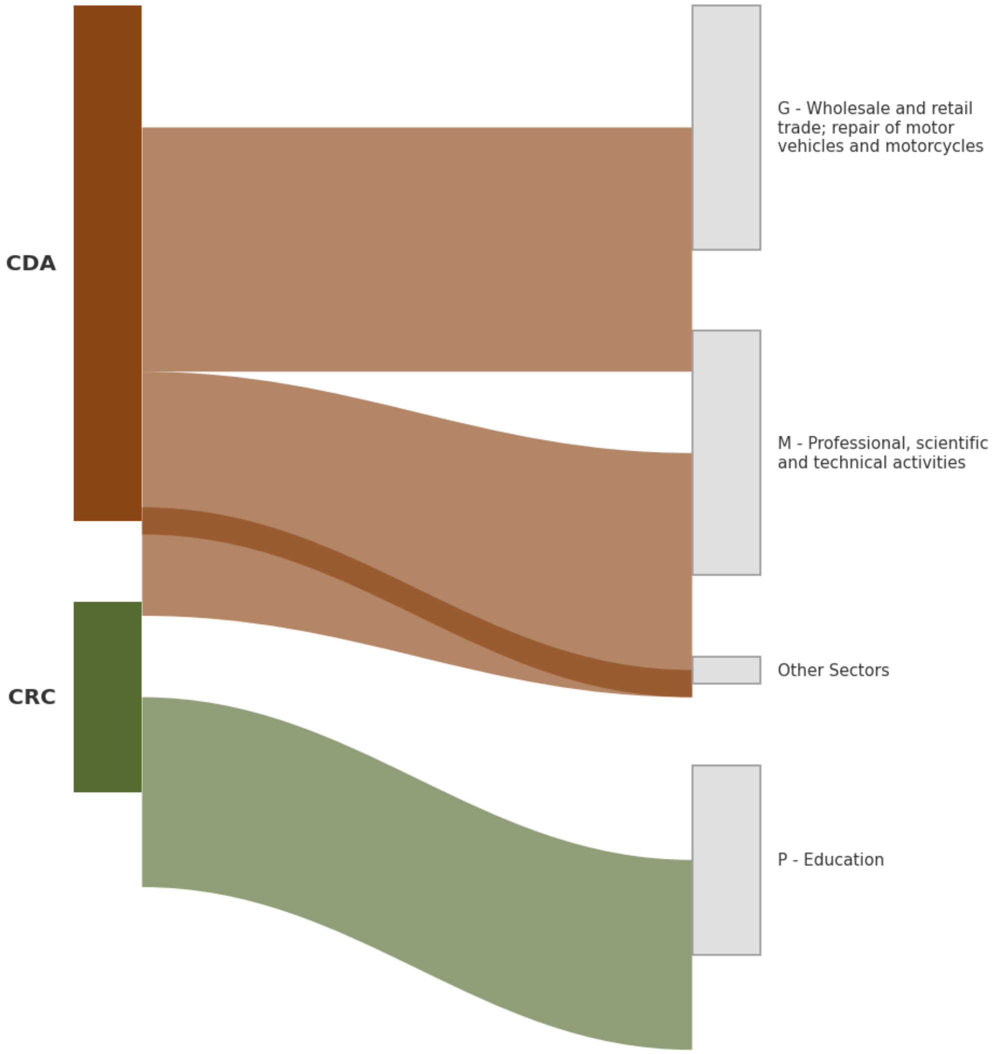
In the OVV (Validation and Verification) scheme, absolute specialization is observed, since 100% of the accredited entities (7 in total) cover the scope associated with Greenhouse Gases (GHG), meeting the requirements of the ISO 14065:2020 standard, which establishes requirements for validation and verification bodies that issue environmental information. Some OVVs perform validation and verification of GHG projects, while others perform verification of GHG inventories at the organizational level.

Relationship between schemes and economic sections

After establishing the correspondence between each scope and its respective economic class for all CABs, the number of CABs by accreditation scheme and economic activity was aggregated and totalled, grouped at the ISIC section level. In the ISIC hierarchy, a “section” refers to the broadest classification level, identified by a letter code (e.g., Section C – Manufacturing), which encompasses multiple divisions, groups, and classes. This exercise allows for a precise mapping of the flow of accreditation service coverage for each scheme, facilitating the diagnosis of specialisation in specific sections and the identification of areas with low coverage.

Figure 7 shows that the CDA scheme covers two sections of the ISIC: the 778 CABs are associated with Section G, which covers wholesale and retail trade, as well as the repair of motor vehicles and motorcycles. They are also linked to Section M, corresponding to professional, scientific and technical activities. In contrast, the CRC scheme shows a marked concentration in Section P, intended for the educational field, with 428 CABs, while in Section N, which groups other sectors, only 31 CABs are recorded. This disparity in absolute values underlines that the CRC scheme is mainly oriented towards the certification of vehicle driving skills, which could be associated with ISIC activities 8522: Technical and vocational secondary education, 8550: Educational support activities and 8549: Other teachings.

Chart 2 : Relationship between schemes and economic sections – Transit.

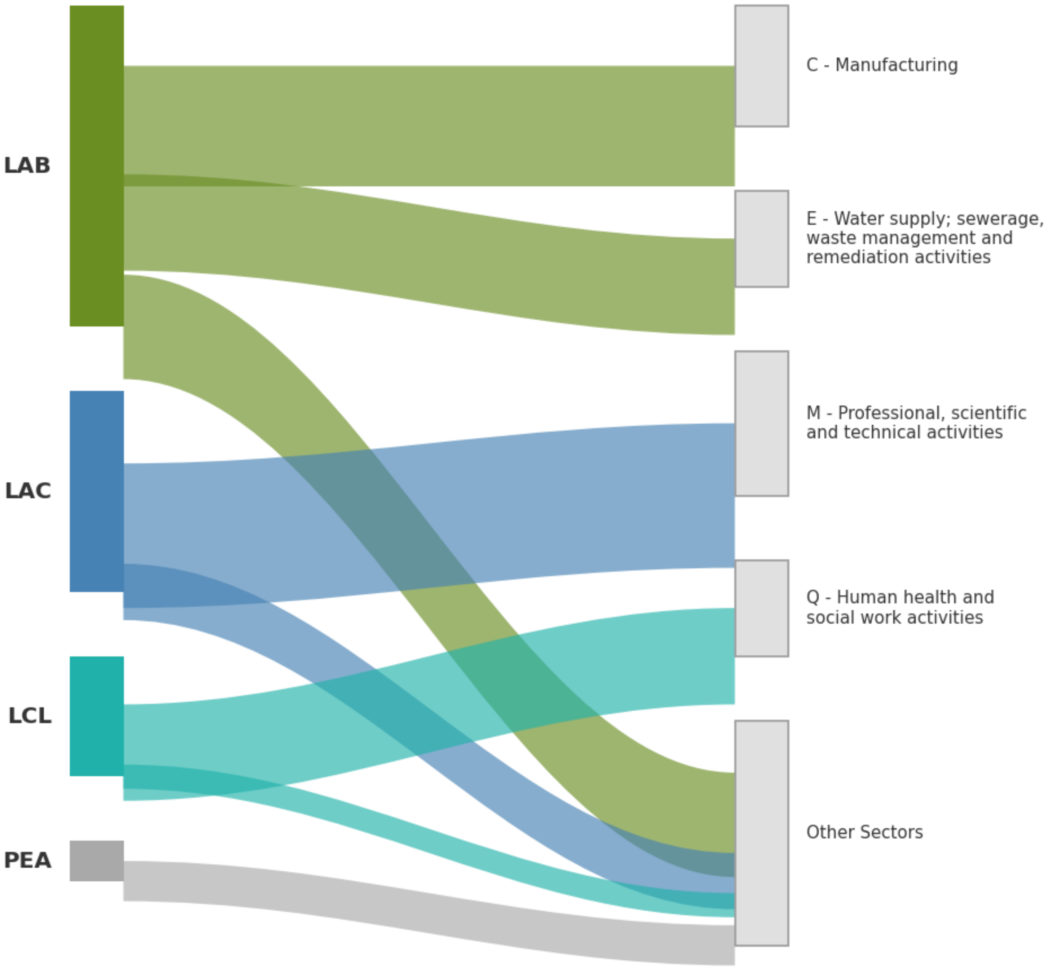


Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

Regarding the grouping of laboratories, reflected in Chart 3 , a concentration in certain areas is observed. Most laboratory schemes (LAB and LAC) are linked to manufacturing industries and professional, scientific, and technical activities, which highlights their role in production and specialized analysis services. In contrast, clinical laboratories (LCL) respond to the needs of the health sector, according to their purpose. Although some laboratories appear in less representative sectors, their presence suggests that their services have applications in diverse areas, albeit with a lesser impact compared to the dominant sectors.

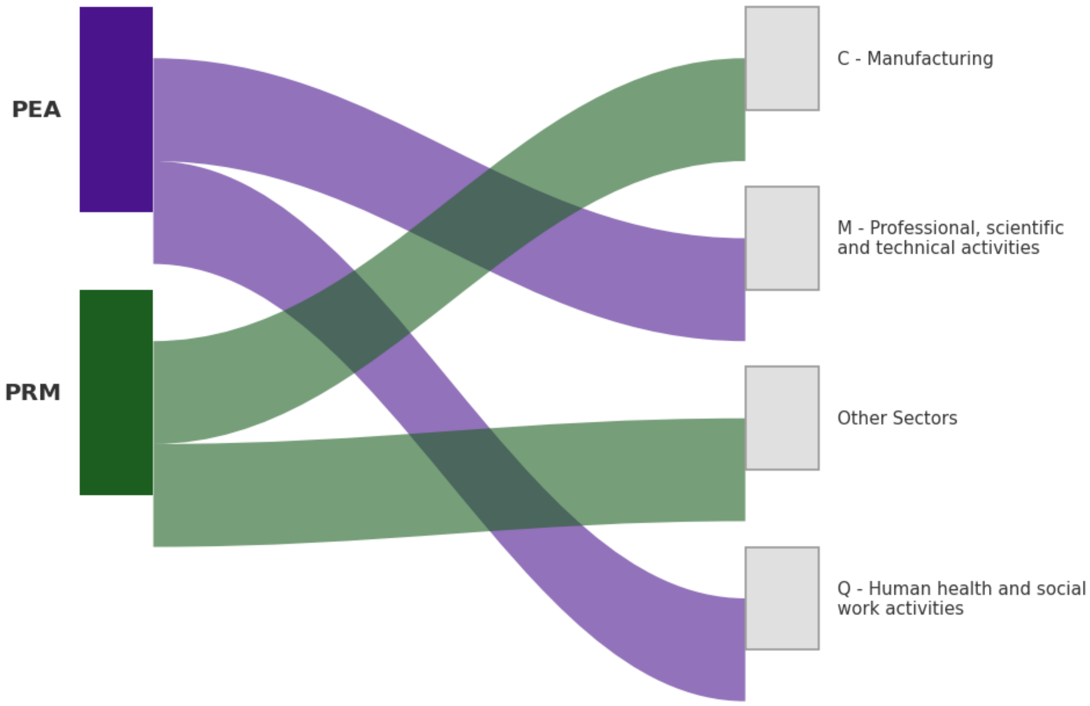
On the other hand, Chart 4 shows how PEA and PMR schemes are associated with manufacturing industries, professional, scientific, and technical activities, and human health care and social assistance activities.

Chart 3 : Relationship between schemes and economic sections - Laboratories



Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

Chart 4 : Relationship between schemes and economic sections - PMR and PEA

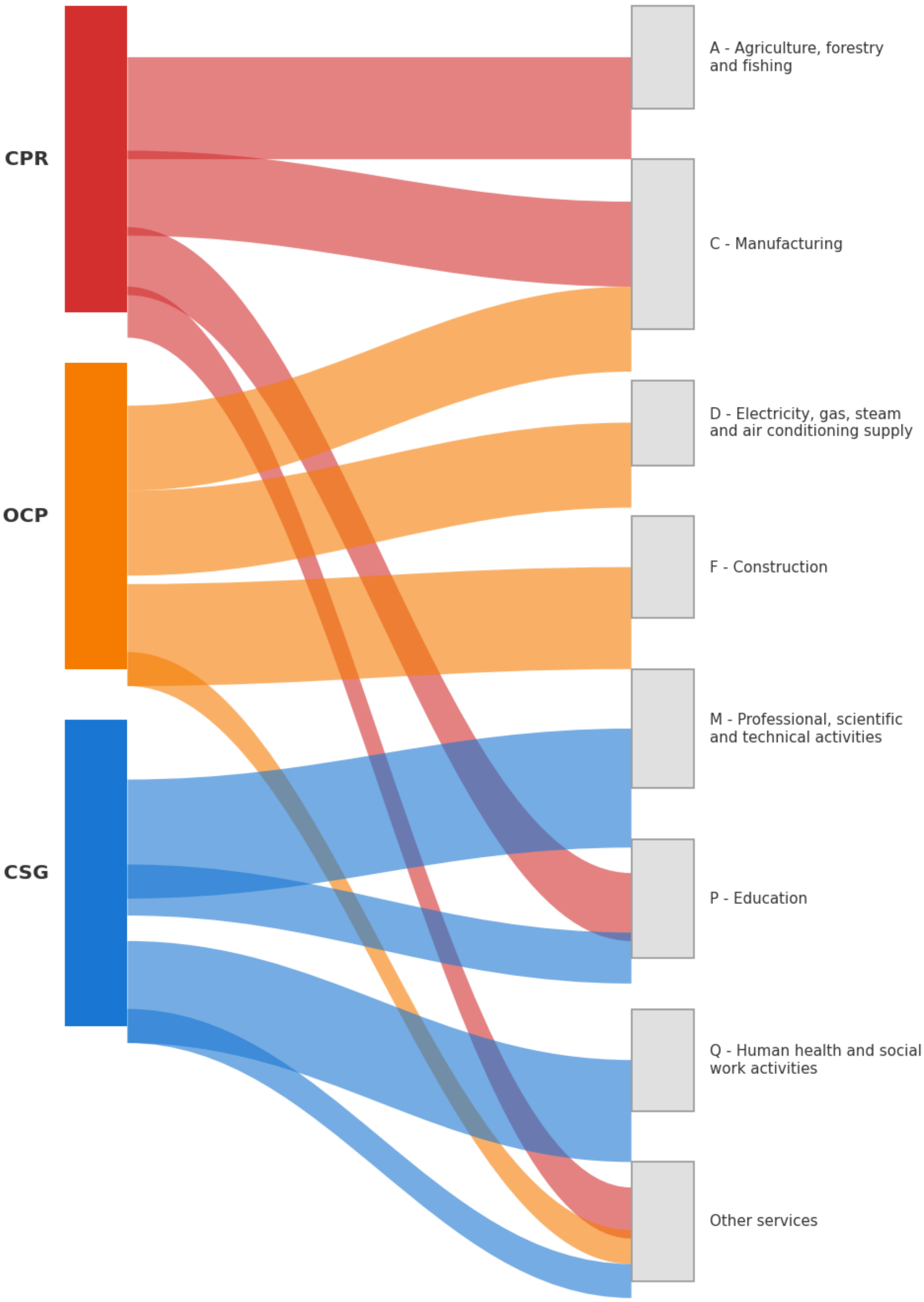


Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

Chart 5 shows how Product Certification Bodies, Management Systems Certification, and Person Certification Bodies are distributed across different economic sections. Product Certification has a marked presence in manufacturing, mining, and the agricultural section, suggesting its relevance in the validation of production processes and raw materials. In the case of management systems, their connection with scientific and technical activities and the occupational health section is notable , highlighting the need to guarantee quality and safety standards in these areas. On the other hand, Person Certification is associated with professional activities and education, where individuals must demonstrate competencies and knowledge in various areas. Although some sectors have a lower presence, accreditation in them remains relevant to ensure regulatory compliance and good practices.

[8] *Certifications such as the ISO 45001 occupational health and safety management system*

Chart 5 : Relationship between schemes and economic sections - Certification

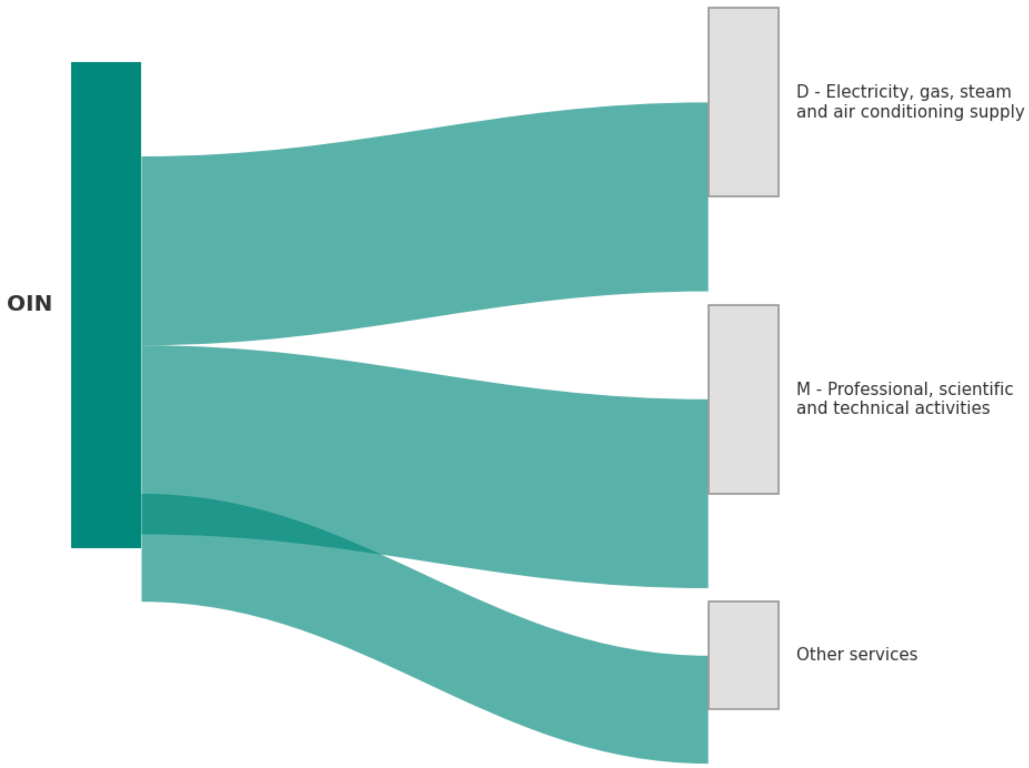


Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

Inspection bodies, shown in Chart 5 , have a strong presence in the electricity, gas, steam, and air conditioning supply sectors, indicating the importance of these processes in verifying safety and regulatory compliance. Significant participation is also observed in professional, scientific, and technical activities, suggesting a focus on evaluating specialized standards and procedures. Furthermore, sectors such as manufacturing and administrative services show some representation, reflecting the diversity of areas in which inspection plays a key role in ensuring quality and regulatory compliance.

On the other hand, the Verification and Validation Bodies (OVV) scheme, outlined in Chart 6 , is exclusively linked to professional, scientific, and technical activities, reflecting their specialized role in conformity assessment and process validation within highly technical sectors. Their focus in this area suggests that their work is geared toward ensuring the accuracy and reliability of methodologies, procedures, and regulations applied in various professional and scientific fields.

Chart 5 : Relationship between schemes and economic sections - Inspection



Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

Chart 6 : Relationship between schemes and economic sections – Validation and Verification

Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

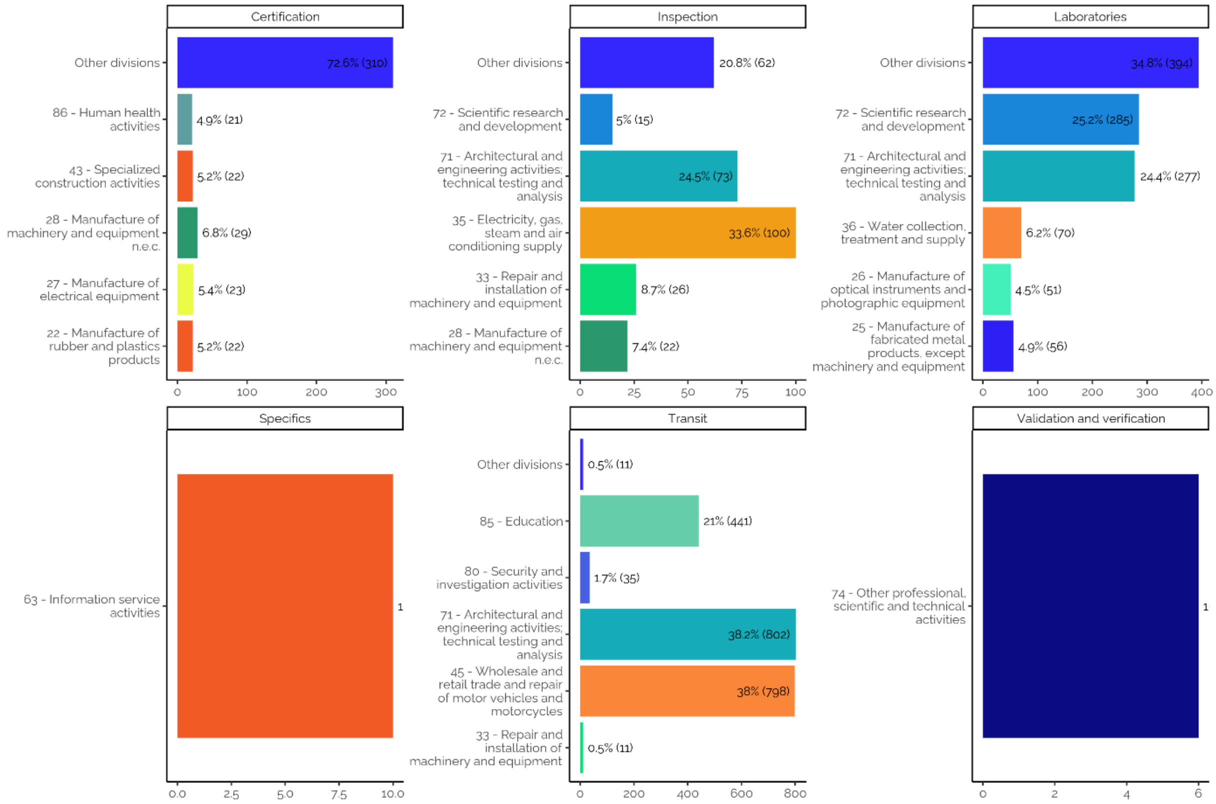
By divisions

In order to achieve a detailed understanding of the industrial spectrum covered, a thorough disaggregation and classification of the scopes into smaller-scale ISIC divisions is carried out, where the CABs are aggregated by grouping rather than by scheme, seeking to quantify CAB coverage by division. This strategic segmentation enables a detailed analysis of potentially covered industries, contributing to the formulation of more effective strategies and maximizing the impact of coverage. The results are shown in Chart 7 .

In the Certification group, most CABs cover the "Other Divisions" category, representing approximately 72% of the total. This suggests that, beyond the five specific divisions—which include professional, scientific, and technical activities (Division 74), education (Division 85), specialized maintenance (Division 33), and two branches of the technology sector (Division 26 and 27)—there is a wide range of activities that, while less concentrated individually, together comprise the majority of certification. This overview indicates that the certification sector encompasses both traditional areas and emerging niches, which can favour diversification and adaptation to new economic and technological requirements.

In the Inspection group, the CABs are concentrated in the provision of basic services (such as electricity, gas, steam, and air conditioning), representing approximately 30% of the total, followed by a grouping of smaller divisions and engineering sectors and professional activities. In Laboratories, meanwhile, there is a high concentration of engineering, testing, and technical analysis activities (over 35%), complemented by a significant research and development component. Finally, in Transit, CABs are predominantly distributed among activities related to automotive trade and maintenance, and technical engineering services, underscoring the importance of these sectors in the operation and safety of mobility. These associations make it possible to clearly identify the areas with the greatest impact on the economy, highlighting both strengths and potential opportunities for sector strengthening.

Chart 7 : Total CABs by divisions and groups



Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

Herfindahl-Hirschman Index (HHI) for concentration of economic activities

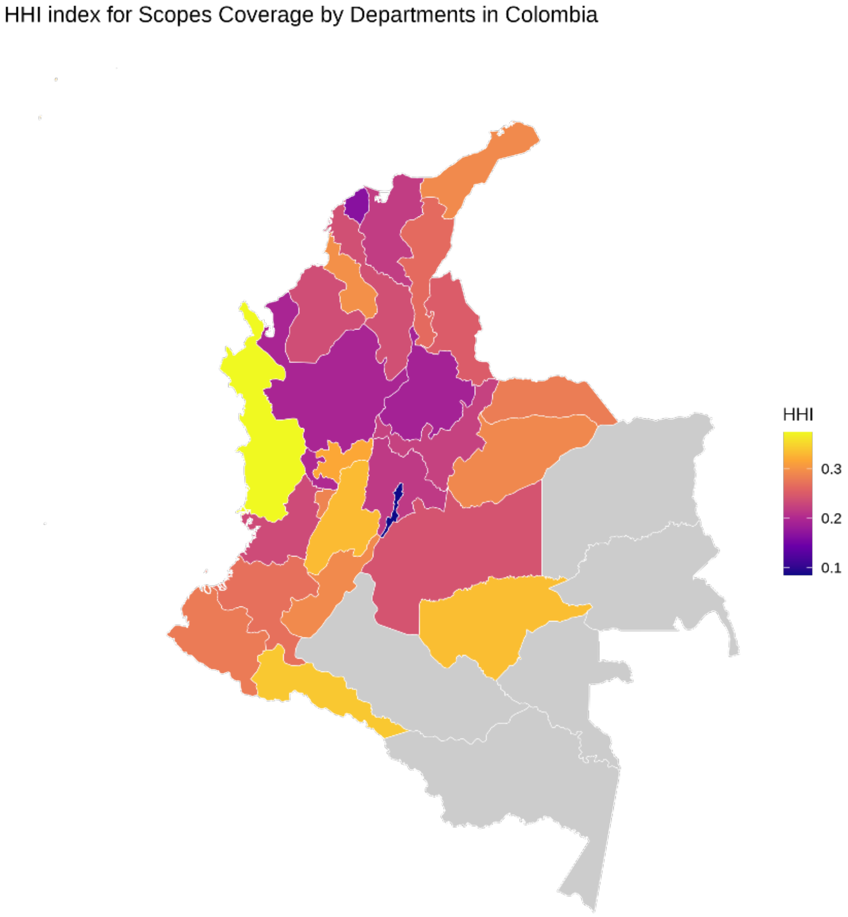
The Herfindahl-Hirschman Index (HHI) is a quantitative measure of market concentration, calculated as the sum of the squares of the market shares of all firms within a defined market[9]. This index generally provides an accurate assessment of firm size distribution, giving more weight to firms with larger market shares. However, for the purposes of this exercise, it can be used to understand the distribution and concentration of CABs and their associated accreditation scopes within each economic division. The results of the exercise can be seen in Chart 8 .

The index values presented by department show different levels of concentration in the distribution of economic activities that each one hosts. The following thresholds are typically used in concentration analyses:

- HHI < 0.15: Low concentration distribution (high diversity)
- 0.15 ≤ HHI < 0.25: Moderate concentration
- HHI ≥ 0.25: High concentration

[9] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Herfindahl_Hirschman_Index_(HHI)

Chart 8 : HHI index for scopes coverage by Departments in Colombia



Source: ONAC. Own calculations, Coordination of Economic and Social Research for Quality Infrastructure.

Bogotá, with an HHI of 0.09, exhibits the lowest concentration on the list, suggesting a wide variety of CABs distributed across multiple economic sectors. Departments such as Atlántico (0.17), Antioquia (0.19), Santander (0.19), and Risaralda (0.2) fall within the moderate concentration range, indicating a relatively broad distribution of activities, although somewhat more focused than in the capital.

At the other extreme, departments such as Chocó (0.38), Caquetá (0.34), Putumayo (0.34), Guaviare (0.33), and Tolima (0.33) have indices above 0.33, demonstrating greater concentration. This would imply that, in these territories, the CABs are more concentrated in a few divisions or sectors, which may reflect economic specializations (e.g., mining, agribusiness, or a few dominant productive sectors).

From a public policy perspective, departments with a high sectoral concentration could be more vulnerable to fluctuations in demand or external shocks, while those with greater economic diversification tend to be more resilient to crises or market changes. For example, a department in the Llanos region whose main source of income is oil would be exposed to fluctuations in crude oil prices, which would significantly affect its economic stability.

In contrast, cities or departments with a more diversified productive structure can better mitigate these external impacts. This situation may also be influenced by the lower productive development in remote regions of Colombia, where the economy is primarily concentrated in primary sectors, such as hydrocarbon exploitation, limiting the presence of other industrial or service sectors that require accredited conformity assessment.

Relationship between CAB and GDP

The analysis of the Gross Domestic Product (GDP) for 2024 reveals a clear dominance of certain sectors in the economy[10]. In terms of billions of pesos, the G+H+I sectors (commerce, transportation, accommodation, and food services) top the list with 171.424 billion pesos, followed by O+P+Q (public administration, education, and health) with 157.880, and C (manufacturing industries) with 110.282 billion pesos.

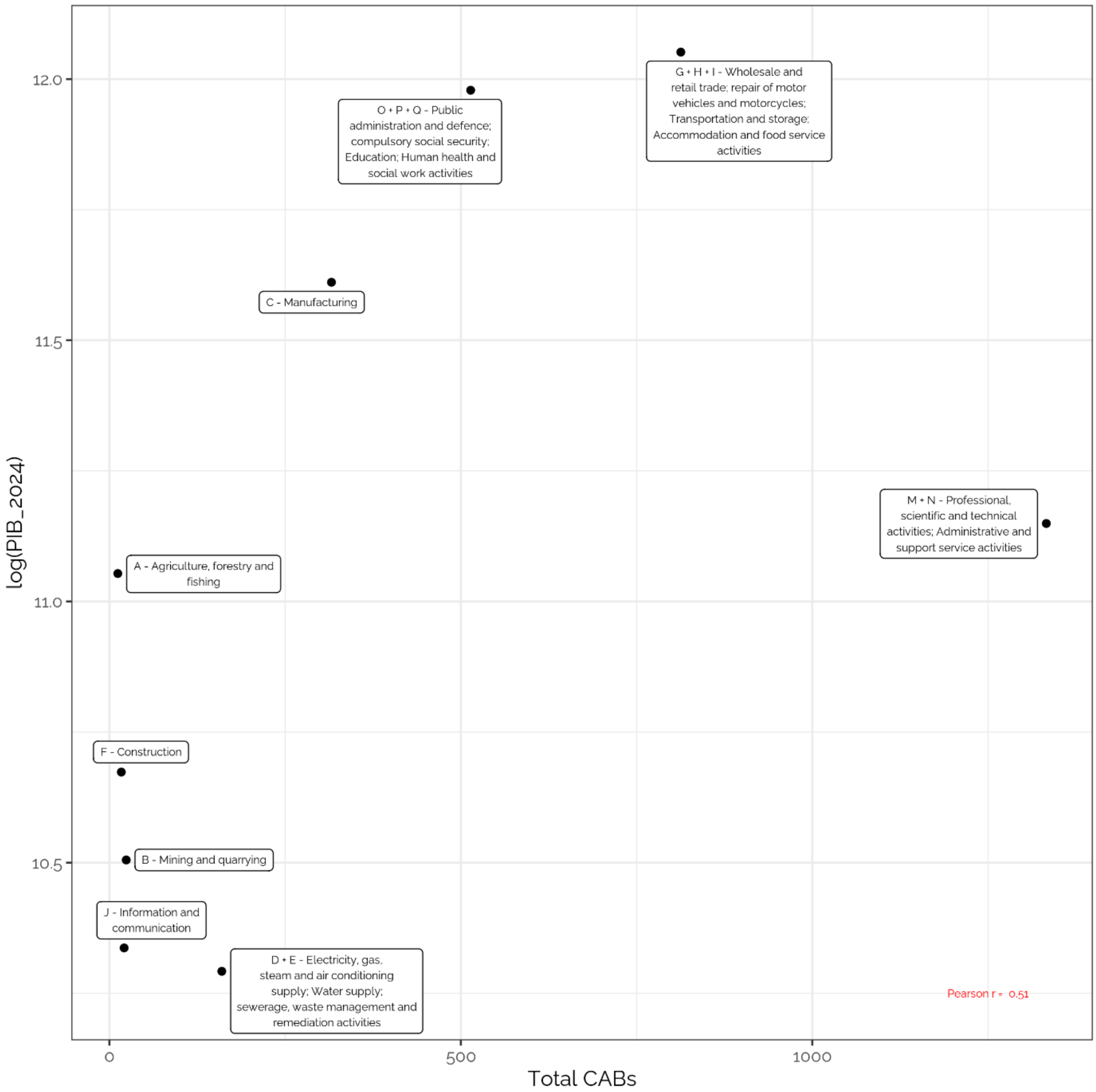
The relationship between the economic size of a sector and the number of CABs is directly proportional, showing a mild positive correlation with a Pearson coefficient of 0.51, as illustrated in Chart 9 . The M+N sectors (professional, scientific and technical activities; administrative services) stand out with the largest number of CABs (1,333), despite having a GDP of 69.426 billion pesos, significantly lower than the leading sectors. This phenomenon suggests that the demand for accreditation is intrinsically linked to the complexity and level of regulation of services, rather than to the economic volume of the sector.

In contrast, sectors such as A (agriculture and fisheries), with a GDP of 63.061 billion pesos but only 12 CABs, could benefit from strengthening the supply of accredited conformity assessment services. This is especially relevant to improve their competitiveness and facilitate access to international markets. Likewise, sectors C and O+P+Q, despite their high GDP levels, have a lower number of CABs than M+N, which could indicate specialization in specific certification schemes or a differentiated regulatory structure.

Overall, the distribution of CABs across economic sectors reflects a complex interaction among economic scale, technical requirements, and sector-specific regulations. This distribution underscores the importance of tailoring conformity assessment policies to the particular needs and characteristics of each branch of production, while noting that the observed correlation should not be interpreted as an income-driven effect on the number of CABs or the opposite effect.

[10] *GDP data by economic sectors grouped by DANE for the year 2024 can be found in Table 5 of the annex.*

Chart 9 : Correlation between total CABs by economic sector and GDP - 2024



Source: ONAC. Own calculations, ONAC+

5 CONCLUSIONS

This study revealed that accreditation, measured by the scope of ONAC-accredited CABs, is unevenly distributed among the country's various economic sectors. By associating the scope of accreditation with ISIC divisions, strategic areas were identified where certification, inspection, laboratories, and other accredited conformity assessment activities are most concentrated, suggesting pockets of service supply and, in other cases, economic sectors with the lowest supply.

In the sector characterization, it was observed that schemes such as CPR cover industrial sectors such as electrical equipment, rubber, plastics, and non-metallic mineral products. Meanwhile, the scope of OIN focuses on areas of electrical and gas infrastructure, highlighting regulations such as RETIE, RETILAP, and Internal Installations for the Supply of Fuel Gas, which guarantee the quality and regulation of energy supply to homes, industries, and businesses.

The CABs of the LAB scheme covers sectors such as Water, Food, and Construction Materials, ensuring their quality and safety. In the LAC scheme, measurements in quantities such as Thermodynamics, Pressure, Mass, and Volume are prioritized for industrial processes. Those of the LCL scheme excel in Immunology and Hematology, guaranteeing reliable medical analysis. Proficiency Testing programs are distributed among clinical, testing, and calibration laboratories, underscoring the importance of technical competence in each of these fields.

When analysing sectors by smaller-scale ISIC divisions, it was observed that in the certification grouping (OCP, CSG, CPR), the majority of CABs are grouped under the "Other divisions" category (72%), demonstrating broad coverage across traditional and emerging sectors. In inspection (OIN), CABs are primarily focused on the provision of basic services such as electricity and gas (30%), followed by engineering and professional activities. In laboratories (LCL, LAB, LAC, PEA, PMR), more than 35% of CABs are related to engineering, technical testing, and analysis, with a significant presence of research and development. In transit (CRC, CDA), CABs are primarily distributed across automotive trade and maintenance, as well as technical engineering services, highlighting their relevance to the operation and safety of mobility. This segmentation offers a clear view of the sectors with the greatest economic impact and the opportunities to improve coverage.

Additional analysis using the Herfindahl-Hirschman Index (HHI) at the departmental level showed that some regions have a high concentration of economic activities, which could generate vulnerability to sectoral changes or external shocks. Furthermore, the integration of DANE economic data allowed for a correlation between the presence of CABs and GDP performance, demonstrating that quality infrastructure has a variable economic impact depending on the sector. Sectors such as manufacturing and specialized services exhibit a synergy between high economic volumes and an adequate supply of accreditation services, while areas with less coverage could benefit from policies that strengthen their certification capacity and, therefore, their competitiveness both nationally and internationally. These results not only provide a comprehensive view of the relationship between accreditation and economic performance but also identify areas of opportunity for improving quality infrastructure, which is critical to supporting productive development and competitiveness in an increasingly demanding global environment.

From a policy perspective, the findings suggest the need to design a structured methodology to expand Accreditation and Quality Infrastructure services to sectors currently lacking adequate coverage, considering cost structures, regulatory priorities, and the expected demand for conformity assessment. Policymakers could also use regional concentration patterns to focus incentives or strategic interventions in areas vulnerable to sector-specific shocks, while fostering the development of CABs in emerging fields such as renewable energy, digital services, biotechnology, and circular economy activities.

For future research, the relationship between accreditation scopes and ISIC codes offers a scalable analytical framework that can be replicated across countries and over time to build comparable panel datasets, enabling more robust regional benchmarking and empirical evaluation of quality infrastructure impacts. Further studies could also explore causal mechanisms between accreditation, productivity, and innovation, or evaluate how improvements in conformity assessment capacity contribute to export readiness and compliance with international technical requirements.

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APPENDIX

Table 5 : GDP 2024 by economic section

Section	Concept	GDP 2024
A	Agriculture, livestock, hunting, forestry and fishing	63.061
B	Mining and quarrying	36.555
C	Manufacturing industries	110.282
D + E	Supply of electricity, gas, steam, and air conditioning; water distribution; wastewater disposal and treatment; waste management; and environmental remediation activities.	29.495
F	Construction	43.195
G + H + I	Wholesale and retail trade; motor vehicle and motorcycle repair; transportation and warehousing; accommodation and food services	171,424
J	Information and communications	30,863
M + N	Professional, scientific and technical activities; Administrative and support service activities	69.426
O + P + Q	Public administration and defense; compulsory social security plans; education; human health care and social services activities	157,880

Source: DANE. Values in billions of Colombian pesos.

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