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https://doi.org/10.1590/SciELOPreprints.17384

Submitted on: 2026-08-11
Posted on: 2026-08-20 (version 1)
(YYYY-MM-DD)

External assessment and institutional effects in Angolan higher education: national evidence from 877 programs

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ABSTRACT

Purpose — To analyze the national results of the external assessment and accreditation (EAA) of 877 undergraduate programs in Angola and identify institutional, disciplinary, and territorial associations relevant to higher education regulation. Design/methodology/approach — A quantitative, observational, cross-sectional, and analytical study. The analysis combines robust descriptive statistics, nonparametric tests, binary logistic regression, and multilevel models, with programs nested within higher education institutions (HEIs). Findings — Of the 877 programs, 481 (54.85%) were accredited, and 396 (45.15%) were not; no program reached level A, and only 6 reached level B. The material nature of the sponsoring entity provided information beyond the public/private distinction, although the effects were small and no causal interpretation is warranted. The multilevel model revealed strong within-institution dependence, with an intraclass correlation coefficient (ICC) of 0.512 in the null model and 0.479-0.485 in the adjusted models. Originality/value — The study provides the first integrated national analysis of the five phases of program assessment in Angola. It demonstrates that supervision should combine program-level evidence with institutional context. The results are proposed for prudent use in regulatory intelligence and to support forthcoming institutional evaluation. Research limitations/implications — The cross-sectional nature of the data, the absence of the 11 disaggregated indicators, and small counts in some strata preclude causal inference and limit identification of the internal mechanisms of quality.

Keywords: Angola; external assessment and accreditation; higher education; multilevel models; regulation; quality assurance.

1. Introduction

Quality assurance in higher education has become central in systems characterized by expanded provision, institutional diversification, and growing demands for public trust. International literature assigns institutions primary responsibility for quality, complemented by independent, transparent external assessment oriented towards continuous improvement (European Association for Quality Assurance in Higher Education et al., 2015; African Union Commission, 2018). In Angola, this agenda is particularly relevant because the higher education subsystem has expanded in the number of institutions, programs, students, and territories without a uniform development of teaching, scientific, laboratory, and organizational capacity (Carvalho, 2012; Ministry of Higher Education, Science, Technology and Innovation [MESCTI], 2026a).

In this context, external assessment and accreditation (EAA) should be understood simultaneously as verification of minimum standards, an accountability mechanism, and a source of information for regulatory decision-making. Accreditation is not merely an administrative act concerning the continuation of a program; it is also an instrument of public governance with implications for HEIs, students, territories, and national development priorities.

This article extends the study by Ricardo & Cruz (2025), which focused on 284 programs in Medical and Health Sciences and Education Sciences, to a national database of 877 programs assessed in phases 1 to 5, covering Health, Education, Science, Technology, Engineering and Mathematics (STEM), and Humanities, Arts and Social Sciences (HASS). This expansion enables a shift from a sectoral reading to a national analysis of performance differences, territorial asymmetries, institutional effects, and opportunities for regulatory intelligence.

The study makes four contributions: it systematizes the national EAA results; estimates associations between institutional, disciplinary, and territorial characteristics and the outcomes; shows that the material nature of the sponsoring entity adds information beyond the public/private dichotomy; and demonstrates, through multilevel modeling, that regulatory supervision should connect program performance with the institutional context of HEIs.

The sectoral framework brings together the Higher Education Statistical Yearbooks 2021–2024, the National Development Plan (PDN) 2023–2027, and the 2024 Population and Housing Census (RGPH), situating EAA within a subsystem under pressure from demographic growth, territorial expansion, a low gross enrolment ratio in higher education, and challenges in faculty qualification (Ministry of Economy and Planning, 2023; National Institute of Statistics, 2025a, 2025b; MESCTI, 2026a).

1.1. Problem, objectives, and hypotheses

The research problem is to determine the extent to which final EAA results reveal relevant differences by external-assessment phase, field of knowledge, territory, legal status, HEI institutional category, and material nature of the sponsoring entity, and how these results can be converted into practical instruments of regulatory intelligence. The issue is critical because publicly available data mainly disclose the final score and accreditation decision, without the 11 disaggregated indicators of the assessment model.

The general objective is to analyze the final EAA results for 877 programs in Angola and to identify institutional, disciplinary, and territorial patterns relevant to regulation and forthcoming institutional evaluation. Specifically, the study describes the distribution of scores, levels, and decisions; compares results by phase-field block, region, institutional class, legal status, and material nature of sponsoring entities; estimates adjusted associations with the score and probability of accreditation; and formulates implications for MESCTI, INAAREES, HEIs, and sponsoring entities.

The hypotheses were formulated in testable terms: H1 — the final score and probability of accreditation differ across geographical regions; H2 — the final score and probability of accreditation differ according to legal status, institutional class, and the material nature of the sponsoring entity; H3 — the phase-field block, subfield, region, institutional category, legal status, and material nature have adjusted associations with the final score or accreditation; and H4 — a substantial share of the variance in final scores lies between HEIs, justifying hierarchical modelling. Because this is an observational, cross-sectional study, none of the hypotheses are interpreted causally.

2. Literature review

This section establishes the conceptual basis for the empirical analysis. It first situates external quality assurance within the broader literature on higher education quality and then examines institutional heterogeneity through the material nature of sponsoring entities. Together, these perspectives support the subsequent analysis of program-level results, institutional context, and risk-proportionate regulation.

2.1. Quality in higher education and external quality assurance

Quality in higher education is multidimensional: it involves institutional mission, management, curricular relevance, faculty qualifications, research, extension, infrastructure, and legal compliance. In expanding systems, quality is not synonymous with growth in provision; it must be demonstrated through verifiable evidence and internal and external mechanisms of continuous improvement.

Independent, periodic external assessment based on known criteria complements institutional responsibility for quality (European Association for Quality Assurance in Higher Education et al., 2015). In Angola, EAA verifies minimum standards, stimulates self-assessment, guides the correction of weaknesses, and supports institutional learning in conjunction with the national legal framework (President of the Republic of Angola, 2018; MESCTI, 2020).

In this article, external assessment and accreditation are treated as related but distinct concepts. External assessment is a technical judgment grounded in evidence of quality, whereas accreditation translates that judgment into a formal decision with legal and regulatory effects. The final score is therefore treated as assessment evidence and the accreditation decision as its legal-administrative consequence.

African and Angolan quality-assurance frameworks value harmonization, comparability, public trust, and institutional capacity—dimensions that are essential when territorial expansion of provision requires national regulation combined with sensitivity to regional needs (African Union Commission, 2018; UNESCO, 2024; Carvalho, 2012; Canoquena et al., 2023).

2.2. Material nature of sponsoring entities and institutional heterogeneity

The formal legal distinction between public and private HEIs is necessary but insufficient to understand the economic and institutional diversity of the subsystem. HEIs are binary in legal status—public or private—but sponsoring entities are not. In the private sector, commercial companies, associations, foundations, faith-based entities, and other non-profit organizations (NPOs) coexist; in the public sector, corporate or hybrid forms may also exist.

The material nature of the sponsoring entity provides information on mission, governance, financing, reinvestment, and accountability. At the regulatory level, Presidential Decree No. 310/20 recognizes public, private, and public-private HEIs and links private HEIs to the private-law legal person that sponsors their establishment and is responsible for their organization and operation. This makes it possible to treat the sponsoring entity as a relevant legal category and then to characterize its institutional regime in material terms (President of the Republic of Angola, 2020, arts. 25 and 37).

The literature on NPOs emphasizes the non-distribution of surpluses to owners or shareholders, which may favor reinvestment, mission focus, and public trust (Hansmann, 1980; Salamon & Anheier, 1992, 1997; Weisbrod, 1977). This feature does not imply higher academic quality. However, it creates incentives and constraints that differ from those observed in for-profit organizations (FPOs), thereby requiring responsible governance and accountability (Drucker, 1990).

In higher education, two legally private HEIs may compete for the same students while operating under different material regimes. If an NPO benefits from tax, asset, reputational, or funding advantages, those advantages should correspond to duties of transparency, reinvestment, and public commitment. The variable describing the material nature of the sponsoring entity does not replace legal status; it qualifies it for risk-proportionate supervision.

3. Methodology

This study adopts a quantitative, observational, cross-sectional, and analytical design with adjusted associative models. It is quantitative because it is based on final scores, accreditation decisions, and codable institutional and territorial variables; observational because it does not interfere with the assessment process; cross-sectional because it analyses results from phases 1 to 5 within a specific empirical snapshot; and analytical because it seeks to identify differences and associations with scores and the probability of accreditation, without claiming causality.

The empirical population comprises 877 undergraduate programs assessed in phases 1 to 5 of EAA (INAAREES, 2024a, 2024b, 2025, 2026). The primary unit of analysis is the assessed program, not the reassessed program. The programs are nested within 95 HEIs. Angola currently has 21 provinces; however, Moxico Leste and Cuando have no higher education provision in the database considered. The empirical territorial component therefore covers 19 provinces with an effective presence of HEIs or assessed programs.

The external-assessment phases structurally coincide with the fields of knowledge assessed: phases 1 and 2 cover Medical and Health Sciences; phase 3 covers Education Sciences; phase 4 covers STEM; and phase 5 covers HASS. Consequently, phase and field are not independent factors. In multivariate analyses, this structure was treated as a phase-field block, and observed differences may simultaneously reflect disciplinary characteristics, professional and infrastructural requirements, the institutional composition of provision, the timing of assessment, and the evolution of the EAA process itself. Accordingly, autonomous effects of phase and field of knowledge are neither estimated nor interpreted.

The main dependent variables are the program final score and the accreditation decision; the accreditation rate was used as an aggregate measure at institutional and territorial levels. Explanatory and stratification variables include the phase-field block, subfield of knowledge, province, geographical region, legal status, HEI institutional category, and material nature of the sponsoring entity. Derived variables were also created, including distance from the accreditation threshold, performance quartiles, provincial accreditation rate, risk typology, and cluster membership. IBM SPSS Statistics, version 32, was used.

Coding of the material nature of the sponsoring entity began with the regulatory distinction among public, private, and public-private HEIs and with the concept of the sponsoring entity established in Presidential Decree No. 310/20 (President of the Republic of Angola, 2020). The variable was operationalized at the institutional level and merged into the program database using the HEI identifier. For descriptive purposes, Public, public enterprise entity (PE), NPO, and FPO were retained; for program-level inferential analyses, Public, NPO/PE, and FPO were used because PE had residual frequency. PE was aggregated with NPO/PE only as a sensitivity option and never interpreted as legal or material equivalence. Binary contrasts—FPO versus non-FPO and, within the private subset, NPO versus FPO—were also examined.

The database was constructed under traceability rules linking each program to its HEI, province, assessment phase, and public source. Sponsor classification was recorded in a dedicated matrix containing the documentary source and decision rule; ambiguous cases were conservatively classified pending validation. Reassessed programs were not treated as new independent units, thereby avoiding duplication of the primary unit of analysis. The analytical matrix and outputs were preserved in a controlled repository for audit and, where appropriate, authorized replication.

The analysis of material nature followed an exploratory and cautious logic. Non-parametric tests (χ^2), Cramér's V, adjusted residuals, binary logistic regression, and sensitivity analysis weighted by number of programs and cluster profiles were used. Interpretation is associative and regulatory, not causal, because the data are observational and do not cover all internal determinants of academic quality.

The statistical procedures were selected according to the hierarchical, categorical, and asymmetric structure of the data. Robust descriptive statistics and non-parametric tests were used for between-group comparisons; binary logistic regression was used to estimate adjusted associations with accreditation; and multilevel linear models were used to decompose variance in final scores between programs and HEIs. Interpretation jointly considered statistical significance, effect magnitude, substantive plausibility, multiplicity of comparisons, and the observational nature of the data; no model was used in isolation to support sanctions or causal claims.

Territorial analysis was conducted on two complementary planes. At the provincial level, the accreditation rate was used descriptively and cartographically, with low counts flagged. At the inferential level, geographical regions were used because they are more stable. The administrative universe comprises 21 provinces; Moxico Leste and Cuando were classified as provinces with no observed higher education provision and therefore were not assigned an accreditation rate or performance class. The 19 provinces with provision were grouped into the Special, North, West, Center, East, and South regions.

The cartographic analysis aggregated results by province. The provincial accreditation rate was calculated as the ratio of accredited programs to assessed programs in the province. When aggregation was based on HEI statistics, the provincial mean score was weighted by the number of programs assessed at each institution. This distinction avoids interpreting the direct provincial rate as involving additional weighting. Jenks classes were used as the principal classification, with quantiles used only as a sensitivity test.

4. Results

The results are organized from the national profile to progressively more specific institutional and territorial analyses. Section 4.1 describes the overall accreditation pattern; Section 4.2 examines territorial variation; Section 4.3 evaluates the material nature of sponsoring entities; Section 4.4 presents the main associative and multilevel results; and Section 4.5 returns to the hypotheses and synthesizes the empirical evidence.

4.1. National accreditation profile

Of the 877 programs assessed, 481 were accredited (54.85%), while 396 were not accredited (45.15%). The distribution by level reveals a structure concentrated in the lower tiers: no program reached level A; only six programs were classified at level B, all in phase 4; 475 were at level C; and 396 at level D, as shown in Table 1. Thus, although most programs were accredited, the near-absence of higher levels indicates that the system still operates predominantly at the minimum quality threshold.

Table 1. Summary of EAA phases.

Phase	Predominant field	Accreditation level					Accreditation		
		Level A	Level B	Level C	Level D	Total	Accredited	Not accredited	% accredited
1	Medical and Health Sciences	0	0	8	22	30	8	22	26.67
2	Medical and Health Sciences	0	0	55	60	115	55	60	47.83
3	Education Sciences	0	0	70	69	139	70	69	50.36
4	STEM	0	6	154	75	235	160	75	68.09
5	HASS	0	0	188	170	358	188	170	52.51
Total		0	6	475	396	877	481	396	54.85

Note. Authors’ elaboration based on INAAREES data (2024a, 2024b, 2025, 2026).

Phase 4, associated with STEM fields, had the highest accreditation rate, at 68.09%. The phases linked to Medical and Health Sciences showed weaker performance, especially Phase 1, with only 26.67% of programs accredited. Phase 3, relating to Education Sciences, recorded an almost equal balance between accredited and non-accredited programs, whereas Phase 5, relating to HASS, recorded an accreditation rate of 52.51%. These results, summarised in Table 1, suggest that fields of knowledge do not face the same constraints and that institutional maturity, infrastructure availability, and specific professional requirements may affect performance.

By subfield of knowledge, Engineering and Technology had the highest accreditation rate (70.80%), followed by Agricultural Sciences (64.30%), Humanities and Arts (56.70%), Social Sciences (52.10%), and Education Sciences (50.40%). Medical and Health Sciences were below the national accreditation rate, at 43.40%, while Natural Sciences recorded 25.00%; the latter result is based on only 12 programs and therefore requires caution.

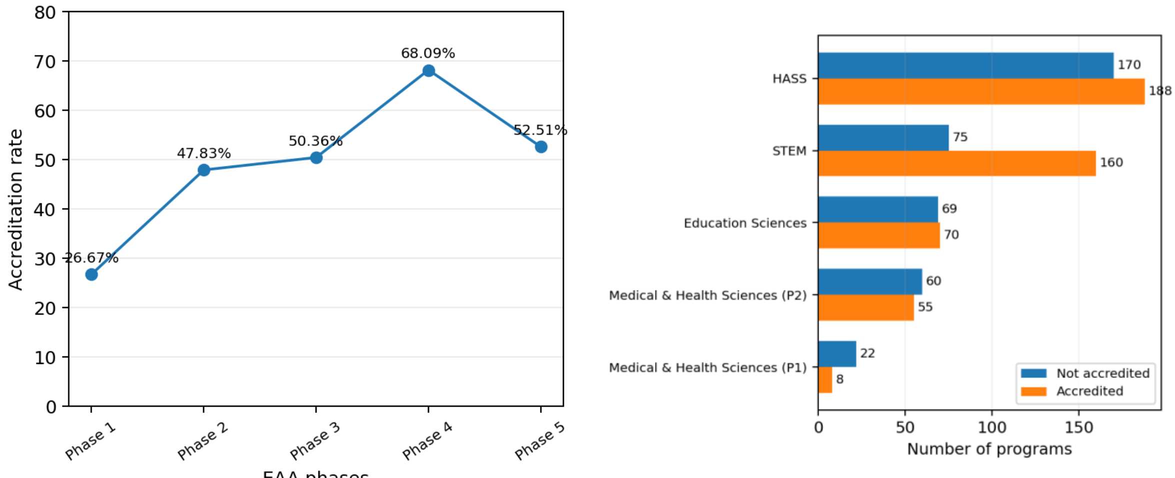
To describe the national profile of final scores directly, the database of 877 programs has a mean of 56.94%, a standard deviation of 12.89%, a median of 60.33%, a first quartile of 48.80%, and a third quartile of 65.30%. The minimum observed score was 10.38% and the maximum 89.81%. Negative skewness (-0.72) suggests a concentration of programs close to or above the minimum threshold, but with a relevant lower tail. The binary accreditation decision should therefore be complemented by distance from the 60.00% threshold, because programs slightly below that threshold do not have the same regulatory meaning as programs in critical situations.

Table 2. National descriptive profile of final scores.

N	Mean (%)	SD (%)	Median (%)	Q1 (%)	Q3 (%)	Minimum (%)	Maximum (%)	Skewness	Kurtosis
877	56.94	12.89	60.33	48.80	65.30	10.38	89.81	-0.72	0.39

Note. SD = standard deviation; Q1 = first quartile; Q3 = third quartile. Authors’ elaboration based on INAAREES data (2024a, 2024b, 2025, 2026).

Before comparing groups, normality of the national distribution of final scores was tested. The one-sample Kolmogorov–Smirnov test was statistically significant ($D = 0.140$; $p < 0.001$), indicating departure from strict normality (Maroco, 2003; Hair et al., 2019; Laureano, 2020; Maroco, 2021). This result should not be interpreted mechanically because, in large samples, normality tests tend to detect small deviations as statistically significant. For this reason, and following the methodological guidance of Maroco (2003, 2021) and Laureano (2020), as indicated in Table 2, the analysis prioritized robust statistics, medians, interquartile ranges, non-parametric tests, and effect sizes rather than relying exclusively on parametric assumptions.



(a) EAA phase

(b) Field of knowledge assessed

Figure 2. Illustration of the accreditation rate and assessed programs by phase and field of knowledge—authors' elaboration based on INAAREES data (2024a, 2024b, 2025, 2026).

The phase-by-phase analysis, as illustrated in Figure 2, confirms that the best mean performance and the highest accreditation rate occurred in the fourth phase, associated with STEM fields, with a mean score of 60.33% and an accreditation rate of 68.09%, respectively.

The first phase, linked to Medical and Health Sciences, recorded the weakest performance, with a mean of 51.14% and only 26.67% of programs accredited. This difference should be interpreted with caution because the phases encompass scientific fields, institutional maturity, professional requirements, infrastructural demands, and the maturity of the EAA process itself.

Table 3. Final score and accreditation by assessment phase.

Assessment phase	N	Mean (%)	SD (%)	Median (%)	Accredited	% accredited
First	30	51.14	7.82	50.84	8	26.67
Second	115	56.73	10.99	57.27	55	47.83
Third	139	56.81	10.52	60.09	70	50.36
Fourth	235	60.33	13.47	62.06	160	68.09
Fifth	358	55.33	13.76	60.13	188	52.51

Note. First and second phases: Health; third phase: Education; fourth phase: STEM; fifth phase: HASS. Authors' elaboration based on INAAREES data (2024a, 2024b, 2025, 2026).

The breakdown by geographical region, presented in Table 4, provides a more stable territorial reading than isolated comparisons among provinces. The South region had the highest accreditation rate (67.44%), followed by the Center (60.66%) and the East (56.90%).

Conversely, the Special and North regions showed greater vulnerability, with 26.92% and 32.14% of programs accredited, respectively.

Table 4. Final score and accreditation by geographical region.

Geographical region	N	Mean (%)	SD (%)	Median (%)	Accredited	% accredited
Centre	183	60.96	10.80	61.47	111	60.66
Special (Cabinda)	26	49.69	12.67	47.34	7	26.92
East	58	57.34	12.11	60.53	33	56.90
North	84	49.52	11.87	48.14	27	32.14
West	440	56.64	13.67	60.39	243	55.23
South	86	59.04	10.20	61.60	58	67.44

Note. The regions follow the coding used in the original data matrix—an elaboration by the authors based on INAAREES data (2024a, 2024b, 2025, 2026).

Regarding legal status (Table 5), programs at private HEIs show slightly higher mean scores (57.52%) and accreditation rates (57.74%) than programs at public HEIs (55.76% and 48.06%). However, this result should not be read as a simple superiority of the private sector, as the private group includes both the minimum score (10.38%) and the maximum score (89.81%), revealing strong internal heterogeneity. By institutional class, in the same table, universities have the highest mean (59.01%) and accreditation rate (60.20%), whereas institutes show greater relative vulnerability.

This evidence is particularly important for the ongoing debate on private higher education in Angola. The accreditation rate of private programs is higher than that of public programs in the analyzed dataset. However, the private sector is highly heterogeneous internally and includes both high and critical performance levels. Thus, although private programs represent more than twice as many cases, the data justify neither a generic stigmatization of private higher education nor its uncritical defense. The most scientifically defensible conclusion is that regulation should be evidence-based, proportionate to risk, and sensitive to institutional context, distinguishing consolidated, intermediate, and vulnerable institutions regardless of legal status.

Table 5. Final score by legal status and institutional class.

Group	N	Mean (%)	SD (%)	Median (%)	% accredited	Min. (%)	Max. (%)
Public	283	55.71	10.93	59.16	48.06	29.20	75.11
Private	594	57.52	13.69	60.80	57.74	10.38	89.81
School	29	56.30	12.78	60.88	58.62	30.55	72.71
Institute	549	55.84	13.62	60.05	51.37	10.38	89.81
University	299	59.01	11.20	61.25	60.20	29.20	88.04

Note. The first two groups correspond to legal status; the last three correspond to institutional class—authors' elaboration based on INAAREES data (2024a, 2024b, 2025, 2026).

From an inferential perspective, the results reinforce this interpretation. At the program level, final scores differ significantly according to HEI legal status (Mann–Whitney: $U = 73{,}297.500$; $z = -3.066$; $p = 0.002$; Mann & Whitney, 1947), although with a small effect ($r = 0.10$) (Maroco, 2003, 2021; Laureano, 2020). Statistically significant differences were also observed by geographical region (Kruskal–Wallis: $H = 58.273$; $df = 5$; $p < 0.001$; $\varepsilon^2 = 0.06$; Kruskal & Wallis, 1952), institutional category ($H = 10.954$; $df = 2$; $p = 0.004$; $\varepsilon^2 = 0.01$), field of knowledge ($H = 29.959$; $df = 3$; $p < 0.001$; $\varepsilon^2 = 0.03$), and subfield of knowledge ($H = 46.600$; $df = 6$; $p < 0.001$; $\varepsilon^2 = 0.05$). These results partially support H1, H2, and H3: statistically significant differences exist, but their interpretation should consider significance, effect magnitude, and regulatory relevance, as recommended by Maroco (2003, 2021) and Laureano (2020).

4.2. Territorial analysis and choropleth map

The territorial analysis covered the 19 provinces with observed higher education provision and assessed programs. Moxico Leste and Cuando, although part of the country's 21 provinces, were not assigned accreditation rates because they had no higher education provision in the database considered.

The overall mean accreditation rate of HEIs is approximately 53.30%. The provinces with the highest provincial rates were Cubango (83.30%), Namibe (82.00%), Bengo (75.00%), and Cuanza Sul (71.40%), classified as j4 (high). Cubango and Bengo were flagged as low-count cases because fewer than 10 programs were assessed. At the other extreme, Cabinda (26.10%) and Cuanza Norte (16.70%) were classified as j1 (very low). Provinces with intermediate or low performance require contextual interpretation, particularly Luanda, Benguela, Huíla, and Huambo because they concentrate substantial numbers of programs or HEIs. Moxico Leste and Cuando should remain in a separate cartographic class—' no observed higher education provision'—rather than being assigned a performance category.

The table should be interpreted as a map of regulatory attention, not as a provincial ranking. The 19 provinces with observed provision are compared based on assessed programs; Moxico Leste and Cuando are identified separately as territories without provision, without assigning them negative performance.

Table 6. Provincial accreditation rate and Jenks classes.

Province	No. of HEIs	No. of programs	Weighted mean (%)	Weighted accreditation rate (%)	Jenks class	Note
Cubango	2	6	62.80	83.30	j4 - high	Low count (n < 10)
Namibe	1	17	63.00	82.00	j4 - high	
Bengo	1	4	60.00	75.00	j4 - high	Low count (n < 10)
Cuanza Sul	4	21	60.00	71.40	j4 - high	
Bié	5	31	62.30	67.60	j3 - intermediate	
Benguela	8	63	63.20	65.10	j3 - intermediate	
Moxico	3	32	59.60	62.60	j3 - intermediate	
Huíla	7	61	57.70	60.60	j3 - intermediate	
Luanda	33	377	57.80	57.80	j3 - intermediate	
Lunda Sul	2	28	54.30	54.00	j3 - intermediate	
Huambo	8	68	58.50	50.10	j3 - intermediate	
Icolo e Bengo	5	41	49.10	41.40	j2 - low	
Uíge	3	40	52.90	34.80	j2 - low	
Malanje	3	32	45.80	34.30	j2 - low	
Zaire	4	17	49.20	29.40	j2 - low	
Cabinda	4	27	49.00	26.10	j1 - very low	
Cuanza Norte	2	12	47.30	16.70	j1 - very low	

Note. Accreditation rate (%) = ratio of the number of accredited programs to the total number of assessed programs in the province. Weighted mean = mean score weighted by the number of assessed programs. Low counts were flagged when n < 10 programs were assessed. Lunda Norte and Cunene were included, respectively, under Lunda Sul and Huíla for institutional reasons related to the provision of programs by ULAN and UMN—authors' elaboration based on INAAREES data (2024a, 2024b, 2025, 2026).

Provincial differences may reflect the scale of provision, field composition, institutional maturity, and the concentration of programs in a small number of HEIs. They therefore support prioritization and diagnosis, but not causal inferences about territories.

4.3. Material nature of the HEI sponsoring entity

Introducing the material nature of the sponsoring entity enabled a deeper institutional interpretation of EAA results. Of the 877 assessed programs, 292 (33.30%) were associated with public or public-enterprise sponsors, 102 (11.60%) with NPOs, and 483 (55.10%) with FPOs. Most assessed provision is therefore associated with FPOs, while NPOs also represent a regulatorily relevant share.

Programs linked to NPOs recorded the highest mean score (M = 63.48%; Md = 66.05%) and accreditation rate (72.50%). FPO programs had a mean of 56.33%, a median of 60.30%, and an accreditation rate of 55.10%; programs at public or public-enterprise institutions had a mean of 55.65%, a median of 58.98%, and an accreditation rate of 47.60%. The Kruskal–Wallis test (Kruskal & Wallis, 1952) indicated statistically significant differences in final scores by sponsor material nature ($H(2) = 35.940$, $p < 0.001$, $\varepsilon^2 = 0.039$), with a small effect size (Laureano, 2020; Maroco, 2021). Pairwise comparisons with Bonferroni correction indicated significantly higher performance for NPOs than for Public/PE and FPOs, whereas the Public/PE–FPO difference was not significant (Laureano, 2020; Maroco, 2021).

The accreditation decision was also associated with the material nature of the sponsoring entity, $\chi^2(2, N = 877) = 19.670$, $p < 0.001$, Cramér’s V = 0.147 (Maroco, 2003, 2021). Adjusted residuals indicated overrepresentation of accredited programs among NPOs and of non-accredited programs in the Public/PE group. However, the small magnitude of the association precludes deterministic interpretations. The binary comparison between FPO and NPO_public sponsors was not significant, indicating that the variable loses discriminatory power when reduced to a for-profit versus non-profit/public dichotomy.

In the expanded logistic model, inclusion of material nature improved fit relative to the baseline model: Nagelkerke R^2 increased from 0.094 to 0.103, and the difference between models was statistically significant, $\Delta\chi^2(2) = 8.427$, $p = 0.015$. The variable retained an adjusted association with accreditation (Wald(2) = 7.995, $p = 0.018$) after controlling for assessment phase, subfield of knowledge, geographical region, institutional category, and formal HEI legal status. The explanatory gain is modest but regulatorily relevant because it shows that the sponsoring entity's material nature provides information not captured by the public/private dichotomy.

In the institutional matrix of 95 HEIs, unweighted differences by material nature were not statistically significant for mean score, accreditation rate, rate at the threshold, or number of programs. However, in the sensitivity analysis weighted by exposure across the 877 programs, differences became significant for mean score, $H(3) = 76.830$, $p < 0.001$, $\varepsilon^2 = 0.085$; accreditation rate, $H(3) = 63.930$, $p < 0.001$, $\varepsilon^2 = 0.070$; and rate at the threshold, $H(3) = 45.720$, $p < 0.001$, $\varepsilon^2 = 0.049$ (Maroco, 2003, 2021). This duality indicates that the variable is more discriminating when the effective curricular mass exposed to each sponsor profile is taken into account.

The association with institutional clusters reinforces the variable's regulatory usefulness. Significant associations were observed with CLU3_1 (K-means solution with three institutional clusters), $\chi^2(4, N = 95) = 14.785$, $p = 0.005$; CLU4_1 (K-means solution with four institutional clusters), $\chi^2(6, N = 95) = 16.861$, $p = 0.010$; and TSC_5611 (SPSS TwoStep Cluster solution for institutional segmentation), $\chi^2(6, N = 95) = 41.079$, $p < 0.001$ (Maroco, 2003, 2021). In the three-cluster solution, public HEIs accounted for 91.70% of the most vulnerable cluster, despite representing only 30.50% of the institutional database. This result should be interpreted as a signal for diagnosis and capacity strengthening, not as a causal or reputational judgment about the public sector.

4.4. Inferential results and analytical-associative models

Inferential tests confirm that final scores vary statistically significantly across some institutional, disciplinary, and territorial categories, although interpretation should prioritize effect sizes and substantive relevance. In large samples, small differences may become statistically significant without substantial regulatory usefulness—the analysis therefore combined significance, effect, and contextual plausibility.

Table 7. Summary of the main associative models.

Method	Key result	Regulatory implication
Binary logistic regression	$\chi^2(12)=91.324$; $p<0.001$; Nagelkerke $R^2=0.132$; overall classification=64.50%.	Statistically relevant association, but with moderate-to-low explanatory power because the 11 disaggregated indicators are unavailable.
Logistic regression with sponsor material nature	$\Delta\chi^2(2)=8.427$; $p=0.015$; Nagelkerke R^2: 0.094 to 0.103; Wald(2)=7.995; $p=0.018$.	Material nature adds incremental information beyond the public/private dichotomy, with a modest gain and a non-causal interpretation.
Multilevel model	Null ICC = 0.512; adjusted ICC = 0.485 in the model with region and 0.479 in the model with province.	Institutional context accounts for a substantial share of the variation in programs' final scores; supervision should combine the program and the HEI.

Note. Authors' elaboration based on INAAREES data (2024a, 2024b, 2025, 2026).

In the territorial domain, the results show significant differences across geographical regions and strong heterogeneity across provinces. However, inferential robustness is greater at the regional level, whereas provincial comparisons require additional caution due to low observation counts in some territories and unequal provision composition. Provincial evidence should therefore be used for prioritization, diagnosis, and differentiated supervision, but not for simple ranking of provinces.

Binary logistic regression yielded $\chi^2(12) = 91.324$, $p < 0.001$, Nagelkerke $R^2 = 0.132$, a Hosmer–Lemeshow test with $p = 0.175$, and an overall classification rate of 64.50% (Hosmer et al., 2013). The model supports associative analysis of non-accreditation but has moderate-to-low explanatory power (Maroco, 2003; Hair et al., 2019; Laureano, 2020; Maroco, 2021), consistent with the absence of disaggregated indicators in the assessment model. The regression should therefore not be interpreted as fully identifying the determinants of quality, but as an approximation based on the publicly available variables.

Table 8. Interpretive summary of multilevel models.

Dimension	Technical result	Substantive interpretation	Implication for the article
Programs nested within HEIs	Null ICC = 0.512; adjusted ICC = 0.485 (region) and 0.479 (province).	There is high within-institution dependence: programs within the same HEI tend to be more similar to each other than programs from different HEIs.	Retain a strong argument about the weight of institutional context, with an associative and non-causal interpretation.
Aggregated institutional database of 95 HEIs	Formal ICC = 0.000 when HEI_ID is used as the random subject.	The random parameter is redundant because there is one observation per HEI; the result does not demonstrate an absence of differences among institutions.	Use the aggregated database for comparison, clustering, and regulatory prioritization, not as a stand-alone multilevel model.
Recommended formulation	Institutional context accounts for a substantial share of the variation in programs' final scores.	The analysis should avoid directly associating the multilevel model with HEI accreditation rates.	Supervision should address programs and HEIs' internal systems, based on complementary evidence.

Note. Table prepared by the authors based on SPSS outputs reinterpreted in the technical report on multilevel models. The reading is associative and non-causal; substantive multilevel evidence comes from the program database, where genuine nesting within HEIs is evident.

The overall classification percentage was interpreted relative to the proportion of the majority category, rather than as a sufficient performance measure. Model appraisal should jointly consider calibration, discrimination, coefficients, odds ratios, confidence intervals, and collinearity diagnostics. In the absence of external validation, estimated probabilities are used for associative interpretation rather than for automatic classification of programs or HEIs.

Given the nesting of programs within HEIs, the results of conventional logistic regression should be interpreted cautiously because independence among observations may be partially compromised. In the absence, in this manuscript, of multilevel logistic regression or HEI-clustered robust standard errors, the model is treated as an adjusted associative analysis rather than a stand-alone confirmatory or predictive instrument.

The multilevel model of programs is one of the strongest pieces of evidence in the study. In the null model, the estimated mean final score was 56.449, with residual variance of 89.166, between-HEI variance of 93.509, and an intraclass correlation coefficient (ICC) of 0.512. The ICC was calculated as the ratio of institutional-level variance to the estimated total variance, that is, 93.509/(93.509 + 89.166) (Gelman & Hill, 2007; Snijders & Bosker, 2012). Thus, 51.20% of the estimated total variance is attributable to HEIs, indicating high similarity in program scores within the same institution. The result demonstrates within-institution dependence but does not causally identify which characteristics of the HEI or sponsoring entity generate this variance. The conclusion, summarised in Tables 7 and 8, is regulatorily relevant: supervision should consider both the program and the institutional context in which it is embedded.

This evidence justifies institutional-supervision policies in addition to program-by-program measures. When several programs within the same HEI show weaknesses, the regulatory response should go beyond isolated plans and address EAA indicators, internal quality-assurance systems, and the culture of self-assessment.

4.5. Summary of research hypotheses

H1 receives partial support: territorial asymmetries are evident, but provincial comparisons require caution because of low counts and unequal provision composition. H2 is supported at the program level because final scores and accreditation outcomes differ by legal status, institutional class, and the sponsor's material nature. However, effect sizes and adjusted gains are generally modest. H3 is also supported: the adjusted associative models identify statistically relevant associations between the phase-field block, subfield, region, institutional category, legal status, sponsor material nature, and the final score or accreditation outcome. H4 is strongly supported by the multilevel models, which show substantial between-HEI variance and therefore justify explicit consideration of institutional context. These findings support the hypotheses as associative statements rather than causal explanations.

The relationship between non-accreditation, territorial coverage, and enrolment rate requires balance: expanding access does not justify programs without a minimum level of quality, but the regulatory response should combine requirements, technical support, scheduled reassessment, and the responsible expansion of accredited provision.

In summary, the study should be understood as a robust national analysis of accreditation patterns and regulatory intelligence, not as a definitive causal model of the internal determinants of program quality.

5. Discussion

The results reveal a system in regulatory transition. Most programs achieve minimum accreditation, but the absence of programs at level A and the presence of only six at level B indicate that consolidated performance remains rare; the dominant pattern is level C, accredited with substantial reservations.

A proper reading should avoid two extremes: concluding that the system has collapsed because 45.15% of programs were not accredited, or considering performance satisfactory merely because 54.85% were accredited. The evidence points to possible improvement, structural weaknesses, and the need for differentiated monitoring.

The analysis converges on five findings: the territory in which the HEI is located is associated with results, but requires caution; there is high within-institution dependence; the phase-field block, legal status, and institutional class are associated with outcomes; the material nature of the sponsor adds information beyond the public/private dichotomy; and the Field × material-regime cross-tabulation shows that this association is not uniform across fields of knowledge.

Translating these results into public decisions should be guided by proportionality, contextualization, the right to respond, documentary verification, and technical follow-up. The models generate regulatory signals; they do not definitively classify institutions, fields of knowledge, or provinces.

The public-policy implication is that any material, fiscal, or reputational advantages enjoyed by certain sponsoring entities, given their social purpose, should be accompanied by proportionate duties of transparency, reinvestment, and accountability. The aim is not to penalize better-performing entities, but to ensure that institutional advantages translate into public value, quality, and student protection.

Fields of knowledge face distinct challenges. Health depends on laboratories, practice settings, ethics, patient safety, and coordination with health services; Education is strategic because it trains teachers; STEM requires robust technical infrastructure; and HASS requires attention to curricular relevance, employability, research, and teaching quality.

The multilevel model of programs is one of the central findings: the null ICC of 0.512 and the persistence of high values in adjusted models (0.479–0.485) show that program quality also depends on the institutional environment, shared resources, management, quality culture, stability of governing bodies, faculty qualifications, and the capacity to implement improvement plans. This justifies combining program-by-program assessment with institutional supervision.

The territorial component should guide priorities, not rankings. Provinces in classes j1 and j2 require diagnosis and support; provinces with many programs, such as Luanda, Benguela, Huambo, and Huíla, require internal analysis by HEIs and fields of knowledge; and provinces with low counts require confirmation in subsequent cycles.

Clusters and CHAID can make the results more actionable by differentiating regulatory responses from urgent audit to routine supervision. They should remain exploratory segmentation tools: neither replaces technical assessment, documentary verification, the right to respond, or human judgment, and the nominal traceability matrix should support audit and authorized regulatory use rather than indiscriminate public exposure or automatic sanctions.

Field-level disaggregation qualifies the aggregate sponsor result. Kruskal–Wallis tests were significant in Education, HASS, Health, and STEM, with small-to-moderate effect sizes. Mean ranks favored NPO-sponsored programs in Education, HASS, and STEM, whereas FPOs showed the more favorable pattern in Health. The significant Field × material-regime interaction in the general linear model confirms that sponsor effects are not uniform across fields, although variance heterogeneity and unequal group sizes require caution.

The regulatory implication is therefore conditional rather than categorical: sponsor material nature is useful for regulatory intelligence only when interpreted alongside field of knowledge, institutional context, territory, composition of provision, mandatory indicators, and demonstrated capacity for improvement. It should never operate as a stand-alone criterion for public decisions.

The GovTech proposal should be understood as a stage following the empirical analysis: the results identify patterns, while the digital architecture organizes those patterns into dashboards, risk maps, alerts, monitoring of improvement plans, and scenario simulations (MESCTI, 2026a; OECD, 2025; World Bank(2025).

5.1. Implications for public policy and institutional evaluation

For MESCTI and INAAREES, the main implication is the adoption of risk-proportionate regulation. Programs and HEIs at critical risk should receive priority supervision, a mandatory improvement plan, verifiable targets, and scheduled reassessment. Programs at moderate risk or near the threshold should be subject to early warnings. Programs and HEIs with consistent performance can support benchmarking and dissemination of good practices.

For HEIs, the priority is to transform accreditation into an ongoing quality-management process. This entails internal quality-assurance systems, up-to-date evidence, regular self-assessment, faculty development, investment in infrastructure, research, extension, student monitoring, and self-monitoring of legal obligations (Canoquena et al., 2023). Recurrent weaknesses across several programs should be treated as a signal of institutional risk.

In this sense, the EAA results of programs should serve as a preparatory basis for institutional evaluation, enabling the identification of recurrent patterns of weakness or consolidation that extend beyond the program level and point to governance, academic capacity, and the HEI's internal quality systems.

For provinces and academic regions, the map should guide territorial support. Classes j1 and j2 require in-depth diagnosis; class j3 requires monitoring, especially when many programs are concentrated there; class j4 may provide useful practices, but these should be confirmed when counts are low. Absence or incipient provision should be treated as an access vulnerability rather than as negative performance.

For public communication, transparency accompanied by technical explanation is recommended. Disclosure should clarify thresholds, levels, risk zones, low counts, limits of territorial comparison, the possibility of reassessment, and the difference between statistical evidence and administrative decisions. Punitive communication creates noise; contextualized communication strengthens trust.

For funding and incentives, EAA can support fairer decisions by prioritizing investment in vulnerable programs and HEIs, making benefits conditional on transparency and reinvestment obligations, protecting students, and linking quality to responsible expansion. This agenda contributes particularly to SDGs 4 and 16.

Taken together, these policy implications translate the empirical findings into a differentiated regulatory agenda: strengthen vulnerable programs and institutions, preserve proportionality and due process, use territorial evidence to support rather than to rank, and convert accreditation data into continuous institutional learning. The conclusion that follows therefore focuses on what the national evidence establishes, what it does not establish, and the priorities for future validation.

6. Conclusion

This article analyzed the national EAA results of 877 undergraduate programs in Angola. The data show that 54.85% of programs are accredited and 45.15% are not accredited. The absence of programs at level A and the presence of only six at level B indicate that accreditation is concentrated mainly at the minimum tier, while consolidated performance remains limited.

The main conclusion is that EAA should be interpreted as an instrument of systemic improvement, not merely as a binary decision (accredited or not accredited). The final score yields greater public value when considered alongside distance from the 60.00% accreditation threshold, the territorial map, clusters, CHAID, and adjusted models.

The multilevel model of programs shows high within-institution dependence: 51.20% of the estimated total variance is attributable to within-institution effects in the null model, and the ICC remains high in adjusted models. This evidence supports institutional supervision as a complement to program-by-program assessment, without causally identifying the mechanisms responsible for differences among HEIs. The aggregated database of 95 HEIs should be used for descriptive analysis, comparison, clustering, and regulatory prioritization, but not as stand-alone multilevel evidence with HEIs as random subjects.

This evidence is particularly relevant at a time when EAA of programs will be followed by institutional evaluation. The high proportion of variance explained between HEIs indicates that program scores should not be analyzed solely as isolated attributes of each program. However, the model does not allow this variance to be attributed to specific institutional mechanisms. The results therefore provide an empirical basis for forthcoming institutional evaluation to examine academic governance, internal quality-assurance systems, teaching resources, research, extension, infrastructure, and the culture of self-assessment, linking program-by-program decisions to broader institutional diagnoses.

The territorial analysis reveals relevant asymmetries but should not result in simplistic provincial rankings. Classes j1 (very low) and j2 (low) indicate priority for follow-up; classes j3 (intermediate) and j4 (high) require contextual interpretation, especially when counts are low.

The public/private comparison should be complemented by the sponsoring entity's material nature and the field of knowledge. The distinction among Public, NPO, and FPO proved more informative for discussing funding, tax benefits, reinvestment, accountability, institutional competition, and student protection. However, its interpretation should be stratified and non-causal.

The relationship between non-accreditation, territorial coverage, and enrolment rate requires balance. Expansion of provision does not justify offering programs without a minimum level of quality; on the other hand, withdrawal or suspension of programs in vulnerable territories should be accompanied by technical support, scheduled reassessment, and responsible expansion.

The main contribution is to demonstrate that program results can guide institutional evaluation and proportionate supervision, provided they are interpreted alongside disaggregated indicators and contextual evidence.

6.1. Limitations and future research

The immediate research agenda should prioritize obtaining disaggregated results for the 11 EAA indicators. These data would make it possible to identify the dimensions that best explain non-accreditation and to move from interpreting the outcome to indicator-level diagnosis, thereby guiding more precise investments and institutional reforms.

Longitudinal validation is another priority. With reassessments, it will be possible to verify whether improvement plans increase scores, change levels, or lead to accreditation, transforming EAA into a historical series of institutional learning.

Future research should deepen the relationship between quality and territory by integrating demographic indicators, secondary-school completion rates, potential demand, distance from urban centers, local economic capacity, and the distribution of qualified faculty. This approach will help distinguish problems of performance, coverage, and territorial equity.

At the institutional level, research should examine the maturity of HEIs and programs, the legal framework, the sponsor’s material nature, administrative autonomy, management stability, investment per student, tuition-fee structure, tax benefits, reinvestment, full-time faculty, scientific output, and the maturity of the internal quality-assurance system.

The methodological agenda should test explainable predictive models, such as validated trees, regularised regression, hierarchical models, and multicriteria classification methods. In the absence of the 11 indicators, methods such as ELECTRE TRI-C and ELECTRE TRI-nC may support future sorting and classification studies (Almeida-Dias et al., 2010, 2012). Any algorithmic advance should preserve transparency, auditability, non-discrimination, proportionality, and the right to respond.

Future validation of clusters should use internal quality measures such as the silhouette coefficient (Rousseeuw, 1987), the Calinski–Harabasz index (Calinski & Harabasz, 1974), and the Davies–Bouldin index (Davies & Bouldin, 1979), especially once the 11 disaggregated indicators become available.

Overall, future research should move from cross-sectional outcome description toward validated, longitudinal, indicator-level explanations while preserving transparency, auditability, proportionality, and institutional rights of response. This agenda would allow the national EAA system to evolve from a sequence of accreditation decisions into a cumulative evidence base for regulatory learning and institutional improvement.

Acknowledgements

The authors thank MESCTI and INAAREES for making the national EAA results available, an essential condition for this analysis and for strengthening a public culture of quality, transparency, and continuous improvement. They thank Benezela Pindal and Jesus Sapalo for support in collecting, organizing, and rechecking the results of phases 4 and 5, and Delfino Chicanha for the cartographic representation of the weighted accreditation rate.

Author contributions (CRediT taxonomy)

Amaro Ricardo: Conceptualization; Methodology; Formal analysis; Writing – original draft; Writing – review & editing. José Maria de Sousa Cruz: Methodology; Validation; Writing – review & editing.

Conflict of interest

The authors declare no conflict of interest.

Data availability statement

The dataset supporting the results of this study is not publicly available. The nominal nesting of programs and HEIs within clusters, classification of the material nature of sponsoring entities, variable dictionary, recoding rules, analytical traceability matrices, SPSS syntax, and complementary statistical outputs are held in a repository controlled by the authors. Access may be granted upon a reasoned request and express authorization, subject to ethical, institutional, and confidentiality safeguards. Whenever legally and institutionally possible, an anonymized analytical matrix may be made available for replication purposes.

Artificial intelligence use statement

Generative artificial intelligence was used as an auxiliary tool for methodological planning, support in data interpretation, article structuring, and textual harmonization. Its use was assistive; scientific, interpretive, ethical, and editorial responsibility remains entirely human and rests with the authors.

Ethical considerations

The study used exclusively publicly accessible administrative and institutional data, with no collection of personal data and no direct participation of human subjects. No individual-level personal or sensitive data were analyzed.

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