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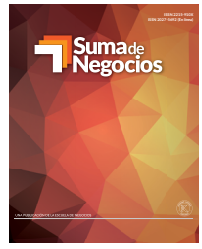

Research paper

Formative governance and execution index in public health

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ABSTRACT

Objective: to present and initially assess a formative composite index that describes integrated governance and execution capacity in four Colombian public health entities using 2025 Institutional Environment and Performance Survey (EDI) microdata.

Methodology: component selection followed a deductive content-validity strategy based on conceptual review, alignment with the EDI thematic structure, organisational relevance, comparability across entities, non-redundancy, and exclusion of variables that operate as outcomes or individual attributes. Valid ordinal responses were transformed to a 0-100 scale; non-substantive codes were treated as missing. Equal weights were used as the main specification. The analysis examined data availability, correlations, VIF, sensitivity to calculation rules, entity-stratified bootstrap intervals, Kruskal-Wallis tests, WLS models with HC3 errors, and internal association with perceived performance.

Results: the sample included 679 records, and the Integrated Governance and Execution Composite Index–Health (ICIGE-S) was computable for 582[1]. The weighted mean was 71.17 (95% bootstrap CI: 70.06-72.27). Entity comparisons are reported as descriptive and exploratory because the available file lacks complete survey-design identifiers and sample sizes are unequal. The PCA-weighted specification was almost identical to the main index (Spearman rho = 0.999).

Conclusion: the ICIGE-S is an initial, transparent, and replicable proposal for profiling perceived capacities in the entities studied. It is not yet a consolidated tool for general use without independent external criteria.

1 According to DANE's EDI 2025 sampling documentation, the sampling frame is updated annually from staff lists provided by each participating entity, and the design is stratified first by entity and then by hierarchical level. Sample sizes are defined at the entity level to achieve acceptable precision and are then allocated proportionally across hierarchical strata; small entities or small strata are treated as censuses. The EDI also reports a high overall response coverage of 93.6% and applies non-response adjustments through the expansion factor. However, the public-use file used in this study does not include the complete sampling-frame identifiers or the eligible staff population for each of the four health entities analysed. Therefore, the observed entity sample sizes cannot be independently assessed against the exact personnel size of each institution, and entity comparisons remain descriptive and exploratory.

Índice formativo de gobernanza y ejecución en salud pública

Palabras clave:
Índice compuesto,
gobernanza pública,
capacidad institucional,
toma de decisiones basada en evidencia,
encuesta EDI,
salud pública.

RESUMEN

Objetivo: presentar y evaluar un índice compuesto formativo para describir la capacidad integrada de gobernanza y ejecución en cuatro entidades públicas de salud de Colombia con microdatos de la Encuesta sobre Ambiente y Desempeño Institucional (EDI) 2025.

Metodología: la selección de componentes siguió una estrategia deductiva de validez de contenido, basada en revisión conceptual, correspondencia con la arquitectura temática de la EDI, pertinencia organizacional, comparabilidad entre entidades, no redundancia y exclusión de variables que operan como resultados o atributos individuales. Las respuestas ordinales válidas se transformaron a una escala de 0 a 100; los códigos no sustantivos se trataron como faltantes. La especificación principal usó pesos iguales. Se evaluaron disponibilidad de datos, correlaciones, VIF, sensibilidad a reglas de cálculo, *bootstrap* estratificado por entidad, pruebas de Kruskal-Wallis, modelos WLS con errores HC3 y asociación interna con desempeño percibido.

Resultados: la muestra incluyó 679 registros y el ICIGE-S fue calculable para 582 registros. La media ponderada fue 71.17 (IC95% *bootstrap*: 70.06-72.27). Las comparaciones entre entidades se reportan como descriptivas y exploratorias por la falta de identificadores completos de diseño muestral y por tamaños muestrales desiguales. La especificación con pesos PCA fue casi idéntica a la principal (rho de Spearman = 0.999).

Conclusión: el ICIGE-S es una propuesta inicial, transparente y replicable para perfilar capacidades percibidas en las entidades estudiadas. No constituye una herramienta general consolidada sin criterios externos independientes.

Introduction

Measuring performance in public health entities cannot be limited to checking formal targets. Public organisations create public value when they coordinate resources, guide staff, use information for decisions, monitor work, and report to citizens and stakeholders. In public health, these capacities matter because policies, protocols, and services depend on organisational routines that turn evidence, leadership, and resources into sustained action.

Recent studies show that public health governance is shaped by intersectoral coordination, evidence use, accountability arrangements, and information governance (Asthana et al., 2024; Ghaffari Heshajin et al., 2024; Haby et al., 2025; Saikat et al., 2025; Song et al., 2025). At the same time, digital transformation is changing how public organisations process information, deliver services, and manage accountability (Guenduez et al., 2025; Haug et al., 2024; Kuch et al., 2026; Ly et al., 2026; Szedmák et al., 2025; Tai et al., 2024). These changes make it necessary to describe organisational capacity at the entity level, not only at the national or system level.

This article proposes the ICIGE-S as an initial formative composite index of integrated governance and execution capacity in four Colombian public health entities: the Federico Lleras Acosta Dermatology Centre, the Central Military Hospital, the National Health Institute, and the National Cancer Institute. The empirical source is the 2025 Institutional Environment and Performance Survey (Encuesta sobre Ambiente y Desempeño Institucional, EDI), an official survey conducted by the National Administrative Department of Statistics (Departamento Administrativo Nacional de Estadística, DANE). The EDI records public servants' perceptions about work environment, institutional management, use of technology and information, accountability, and related issues (DANE, 2026).

Existing measures of public governance often work at a macro level or rely on external audits. They are useful for broad comparison, but they might not identify differences among entities inside the same health system. Conversely, many internal capacity tools describe institutional strengths but do not always translate staff perceptions into reproducible index rules. Recent work on collaborative performance management, public-sector resilience, public management for sustainability, and digital service governance confirms that performance measurement must address coordination, information use, and accountability rather than isolated outputs (Apaza, 2026; Li et al., 2026; Macris et al., 2026; Sinervo et al., 2026; Spanò et al., 2026; Supriatna et al., 2026; Waardenburg et al., 2025).

The contribution of the article is methodological and exploratory. The five dimensions are not treated as interchangeable reflections of one latent variable. The index follows a formative logic: each component contributes a different function within a minimum chain of institutional

capacity. Therefore, the validity argument rests on content coverage, transparent transformations, absence of severe redundancy, stability under alternative aggregation rules, and correct limits on interpretation.

The objective is to construct the ICIGE-S using reproducible rules and to evaluate its empirical behaviour with tests appropriate for a formative index. The research question is: How consistent and robust is this initial proposal for profiling perceived governance and execution capacities in the four public health entities analysed?

Conceptual framework and content validity

The distinction between reflective and formative indicators is central to this study. In a reflective model, items are observable effects of a latent construct; high internal consistency is expected. In a formative model, indicators are causes or components of the construct; they need not be interchangeable, and removing one component changes the meaning of the index (Bollen & Lennox, 1991; Diamantopoulos & Winklhofer, 2001; Jarvis et al., 2003).

The ICIGE-S is defined as formative because its dimensions are not equivalent substitutes. An entity may have strong mission alignment and weak digital capacity, or good accountability and low evidence use. Aggregation summarises a multidimensional capacity profile; it does not estimate a single reflective latent trait. Appropriate tests therefore focus on traceability, sensitivity, redundancy, uncertainty, and interpretation, as recommended for composite indicators (Greco et al., 2019; OECD & JRC, 2008).

Content validity was treated as an explicit argument linking the conceptual domain, the selected components, and the EDI items. In formative indices, the central question is not whether components are highly correlated, but whether they cover the domain that the index claims to measure (Haynes et al., 1995; Messick, 1995; Polit & Beck, 2006). Integrated governance and execution capacity was defined as the perceived capacity of an entity to orient staff, provide resources and skills, incorporate evidence into decisions, translate guidelines into operational follow-up, and respond to citizens or stakeholders (MacKinnon & White, 1985).

Component selection followed six criteria. First, theoretical relevance: each component had to represent a recognisable governance or execution function. Second, operational availability: items had to exist in the 2025 EDI and be comparable across the four entities. Third, organisational level: primarily individual, demographic, or affective variables were excluded. Fourth, proximity to management processes: orientation, decision-making, resources, follow-up, and accountability were prioritised over final outcomes. Fifth, conceptual non-redundancy: no component could replicate the function of another. Sixth, separation from the internal criterion: perceived performance items were not included in the index to avoid contamination between predictor and contrast measure.

The five components cover a minimum functional chain: direction, means, decision, execution, and public responsibility. Variables on climate, satisfaction, discrimination, well-being, employment type, and prevention of irregular practices were excluded because they describe labour conditions, ethical risks, or outcomes rather than the operational definition adopted here. These variables may be used in future extensions, but including them in this first version would make the construct too diffuse.

This content argument does not remove the need for additional validation. The selection is transparent and defensible, but it remains deductive. A later version should submit the component map to expert judgment, estimate formal content validity indices, and compare ICIGE-S scores with independent administrative indicators. For this reason, the index is presented as an initial operationalisation rather than a closed instrument.

Components of the index

The index integrates five components. Alignment and empowerment capture strategic clarity, autonomy, innovation, competencies, and training. Resources and digital capacity represent the availability of inputs, information, technology, and skills needed to process data and support work. Evidence-based decision-making measures the use of technical support, stakeholder input, and staff views in decisions. Managerial coherence and follow-up capture directives, resource planning, and monitoring of activities and goals. Operational accountability measures information delivery, citizen requests, dialogue, and publication of service information.

These components are consistent with recent literature on evidence-informed public health, digital public administration, and accountability in public organisations (Clark et al., 2024; Figueredo & Silva, 2026; Guenduez et al., 2025; Haby et al., 2025; Subahe et al., 2026).

Table 1. Formative components of the ICIGE-S

Component	Items	Operational content
Alignment and empowerment	7	Strategic clarity, autonomy, innovation, competencies, and training.
Resources and digital capacity	7	Information, work inputs, information and communication technologies, and digital or analytical skills.
Evidence-based decision-making	3	Use of technical support, stakeholder input, and staff views in decisions.
Managerial coherence and follow-up	9	Directives, resource planning, and follow-up of activities and goals.
Operational accountability	4	Public information, citizen requests, dialogue, and publication of services.

Source: Authors' own calculations based on DANE EDI 2025 microdata.

Methodology

Data

The study analysed 2025 EDI microdata for four Colombian public health entities. The EDI is directed at public servants with more than six months of service in the entity. It records perceptions about work environment, management, technology use, accountability, and the prevention of irregular practices. According to the methodological documentation, the survey uses stratification by entity and hierarchical level, simple random selection within strata, and expansion factors linked to the Horvitz-Thompson estimator (DANE, 2026).

The analysed file contains 679 records and the final expansion factor FEXPFINAL. Because the available file did not include complete operational stratum or cluster identifiers, FEXPFINAL was used as an analytical weight. Uncertainty was approximated with HC3 robust errors and an entity-stratified bootstrap. This approach preserves the available weighting information, but it does not replace a complete complex-design variance estimator. Therefore, entity comparisons are treated as descriptive evidence with approximate statistical support, not as definitive tests of institutional differences.

Table 2. Sample and scores by entity

Code	Entity	Sample n	Expanded N	ICIGE-S n	ICIGE-S	95% CI	IGP
6	Federico Lleras Acosta Dermatology Centre	56	58.00	51	66.78	63.11-70.42	71.88
32	Central Military Hospital	221	581.72	175	71.50	69.42-73.64	72.11
46	National Health Institute	160	297.07	143	68.68	66.05-71.21	69.36
88	National Cancer Institute	242	658.12	213	72.45	70.66-74.19	74.00

Note. The ICIGE-S uses equal weights as the main specification. Confidence intervals are entity-stratified bootstrap intervals with 2,000 replications.

Source: Authors' own calculations based on DANE EDI 2025 microdata.

Type, scope, and design

This is a quantitative, descriptive, and exploratory study with a cross-sectional observational design based on secondary data. The purpose is methodological: to construct and initially assess a composite index for describing governance and execution capacities in public health entities.

Procedure and index construction

The selected variables had valid ordinal responses from 1 to 5. Each valid answer was transformed to a common 0-100 scale. Thus, 1 equals 0 points, 3 equals 50 points, and 5 equals 100 points. Non-substantive codes 9 and 99 were treated as missing because they do not represent positive or negative intensity of the attribute. No data were imputed.

Each component was calculated as the mean of its items when at least 50% of those items had valid responses. The ICIGE-S was calculated when at least four of the five components were available. This rule avoids deriving an index from too few dimensions while retaining cases with one missing component. Sensitivity was evaluated with alternative rules requiring three and five valid components.

The index construction has four levels: item transformation, component calculation, individual aggregation, and weighted estimation by entity. The notation makes explicit that the ICIGE-S is formative: components are aggregated as conceptual blocks of institutional capacity, not as interchangeable items of a reflective scale.

Let *i* denote the surveyed public servant, *j* the item, *k* the formative component, *e* the entity, *x* the original response, x^* the transformed response, and *F* the final expansion factor. The individual capacity vector is:

$$C_i = (C_{i1}, C_{i2}, C_{i3}, C_{i4}, C_{i5}) \quad (1)$$

where C_{i1} (uno) is alignment and empowerment, C_{i2} is resources and digital capacity, C_{i3} is evidence-based decision-making, C_{i4} is managerial coherence and follow-up, and C_{i5} is operational accountability. The formative aggregation function is:

$$\text{ICIGE-S}_i = f(C_{i1}, C_{i2}, C_{i3}, C_{i4}, C_{i5}) \quad (2)$$

This function does not imply causality among components or the existence of a single latent factor.

Each valid ordinal response was transformed linearly as follows:

$$x^*_{ij} = ((x_{ij} - 1) / 4) \times 100, x_{ij} \in \{1, 2, 3, 4, 5\} \quad (3)$$

Codes 9 and 99 were treated as analytical missing values. For each component, the valid-information proportion was defined as:

$$p_{ik} = |J^{obs}_{ik}| / |J_k| \quad (4)$$

The component was calculated only when at least 50% of its items had valid answers:

$$C_{ik} = (1 / |J^{obs}_{ik}|) \Sigma_{j \in J^{obs}_{ik}} x^*_{ij}, p_{ik} \geq 0.50 \quad (5)$$

The main specification assigned equal weights to the five components:

$$w_k = 0.20, k = 1, \ldots, 5 \quad (6)$$

The individual index was computed only when at least four components were available. Let K_i be the set of valid components for individual *i*:

$$\text{ICIGE-S}_i = (\Sigma_{k \in K_i} w_k C_{ik}) / (\Sigma_{k \in K_i} w_k), |K_i| \geq 4 \quad (7)$$

If all five components were available, equation (7) equals the simple mean of the five dimensions. If four components were available, weights were renormalised and each valid component contributed 25%.

The weighted institutional mean was estimated with FEXPFINAL:

$$\text{mean(ICIGE-S)}_e = (\Sigma_i \in_e F_i \text{ICIGE-S}_i) / (\Sigma_i \in_e F_i) \quad (8)$$

Confidence intervals were obtained through entity-stratified bootstrap. In each replication, cases were resampled within each entity and the following statistic was recalculated:

$$\text{mean(ICIGE-S)}^b_e = (\Sigma^b{}_i \in_e F_i \text{ICIGE-S}_i) / (\Sigma^b{}_i \in_e F_i) \quad (9)$$

The 95% confidence interval corresponds to the 2.5 and 97.5 percentiles of 2,000 replications. This approximation was used because the available file did not include all design identifiers.

The perceived performance index used as an internal contrast was calculated with the same item transformation:

$$\text{IGP}_i = (1 / |G_i|) \Sigma_j \in G_i \, x^*_{ij} \quad (10)$$

The ICIGE-S-IGP association was estimated with the following WLS model:

$$\text{IGP}_i = \alpha + \beta \, \text{ICIGE-S}_i + \gamma' Z_i + \varepsilon_i \quad (11)$$

Equation (11) is interpreted only as an internal contrast, not as external validation. Redundancy among formative components was evaluated with the variance inflation factor:

$$\text{VIF}_k = 1 / (1 - R_k^2) \quad (12)$$

R_k^2 comes from the auxiliary regression of component k on the other four components. Low VIF values indicate that components are not linearly redundant.

Data analysis

Five groups of analyses were applied. First, the availability of information by component and missing values were reviewed. Second, weighted correlations and VIF were estimated to assess redundancy among formative components. Third, entity comparisons were examined through weighted WLS models with HC3 errors and the Kruskal-Wallis test as a non-parametric contrast. Fourth, entity-stratified bootstrap with 2,000 replications was used for confidence intervals. Fifth, sensitivity analysis compared equal weights, PCA weights, the exclusion of each component, and alternative thresholds for valid dimensions (Li, J. 2025).

The association between the ICIGE-S and the perceived performance index (IGP) was deliberately defined as an internal contrast, not as a convergent or an external validation. Both indicators come from the same survey, the same respondents, similar scales, and the same measurement moment. Any association may therefore be inflated by common method variance, respondent consistency, or conceptual proximity between capacities and perceived performance (Podsakoff et al., 2003). Substantive validation of the ICIGE-S requires independent external criteria, such as administrative records on compliance, timeliness, quality, citizen satisfaction measured by users, or health outcomes.

Ethical considerations

The study used only secondary and anonymised EDI 2025 microdata from the DANE. The information analysed did not identify individuals and was used for academic purposes. Because the data were already anonymised and there was no direct contact with participants, the study involved minimal risk. The analysis did not attempt to re-identify respondents or disclose small-cell information.

Results

The index was computable for 582 of the 679 records. Information loss was concentrated in operational accountability and evidence-based decision-making. This pattern is relevant because these questions may not be known by all public servants, especially when decision-making or citizen-relations processes are concentrated in specific areas.

Table 3. Data availability by block

Block	Items	Missing item (%)	Valid block cases	Valid block cases (%)	Valid item range
Alignment and empowerment	7	0.2	679	100.0	677-679
Resources and digital capacity	7	4.2	666	98.1	610-677
Evidence-based decision-making	3	21.9	524	77.2	514-548
Managerial coherence and follow-up	9	15.0	636	93.7	473-647
Operational accountability	4	33.9	484	71.3	411-485
IGP	4	17.5	599	88.2	514-616

Source: Authors' own calculations based on DANE EDI 2025 microdata.

Table 3 shows high availability for alignment and empowerment and resources and digital capacity. Evidence-based decision-making and operational accountability had more missing information, which is consistent with their more specialised organisational content.

The weighted ICIGE-S mean for the four entities was 71.17 (95% bootstrap CI: 70.06-72.27). Scores ranged from 66.78 at the Federico Lleras Acosta Dermatology Centre to 72.45 at the National Cancer Institute. These differences should be read as descriptive and exploratory because complete survey-design identifiers were not available.

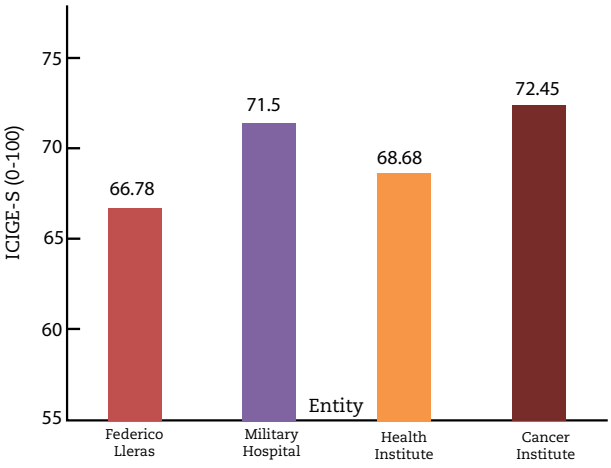

Figure 1. ICIGE-S by entity

Note. Bars show weighted ICIGE-S means; whiskers show 95% bootstrap confidence intervals.
Source: Authors' own calculations based on DANE EDI 2025 microdata.

Table 4. Weighted correlation matrix among components

Component	Alignment	Digital resources	Evidence	Follow-up	Accountability
Alignment	1.000	0.404	0.471	0.546	0.419
Digital resources	0.404	1.000	0.382	0.484	0.364
Evidence	0.471	0.382	1.000	0.688	0.496
Follow-up	0.546	0.484	0.688	1.000	0.658
Accountability	0.419	0.364	0.496	0.658	1.000

Source: Authors' own calculations based on DANE EDI 2025 microdata.

Table 5. VIF of formative components

Dimension	VIF
Alignment and empowerment	1.74
Resources and digital capacity	1.34
Evidence-based decision-making	2.01
Managerial coherence and follow-up	3.21
Operational accountability	1.81

Source: Authors' own calculations based on DANE EDI 2025 microdata.

Correlations among components were positive and moderate. The highest correlation was between evidence-based decision-making and managerial coherence and follow-up (0.688), and the VIF values ranged from 1.34 to 3.21. These results do not suggest severe linear redundancy among the formative components.

Table 6. Pairwise comparisons between entities

Comparison	Difference	95% CI	Raw p	Holm p
32 - 6	4.72	0.46 to 8.97	0.030	0.119
46 - 6	1.90	-2.63 to 6.44	0.411	0.822
88 - 6	5.67	1.56 to 9.79	0.007	0.041
46 - 32	-2.82	-6.13 to 0.50	0.096	0.287
88 - 32	0.96	-1.75 to 3.66	0.489	0.822
88 - 46	3.77	0.65 to 6.90	0.018	0.090

Note. Entity codes: 6 = Federico Lleras Acosta Dermatology Centre; 32 = Central Military Hospital; 46 = National Health Institute; 88 = National Cancer Institute. Holm p-values adjust the six pairwise contrasts.
Source: Authors' own calculations based on DANE EDI 2025 microdata.

The only pairwise comparison that remained below 0.05 after Holm adjustment was between the National Cancer Institute and the Federico Lleras Acosta Dermatology Centre. Other contrasts were not robust after multiplicity adjustment. Given the design limitations, the comparisons should support profiling rather than ranking.

Table 7. Dimensional profile by entity

Code	Entity	Alignment	Digital resources	Evidence	Follow-up	Accountability
6	Federico Lleras Acosta Dermatology Centre	75.81	50.75	64.36	68.62	75.87
32	Central Military Hospital	81.05	59.39	66.70	70.88	74.41
46	National Health Institute	79.99	60.81	60.36	64.54	76.09
88	National Cancer Institute	81.58	63.00	67.71	72.41	76.73

Source: Authors' own calculations based on DANE EDI 2025 microdata.

The dimensional profile is more informative than the overall ranking. Resources and digital capacity had lower values than the other dimensions in all entities. Alignment and empowerment, follow-up, and accountability had higher values. The National Cancer Institute showed the highest overall ICIGE-S and the highest follow-up score, while the National Health Institute had the lowest evidence-based decision-making and follow-up scores among the four entities.

The main result was stable under alternative aggregation rules. The PCA-weighted specification produced a weighted mean of 71.43 and a Spearman correlation of 0.999 with the main specification. Excluding one component at a time changed the mean, as expected in a formative index, but rank consistency remained high.

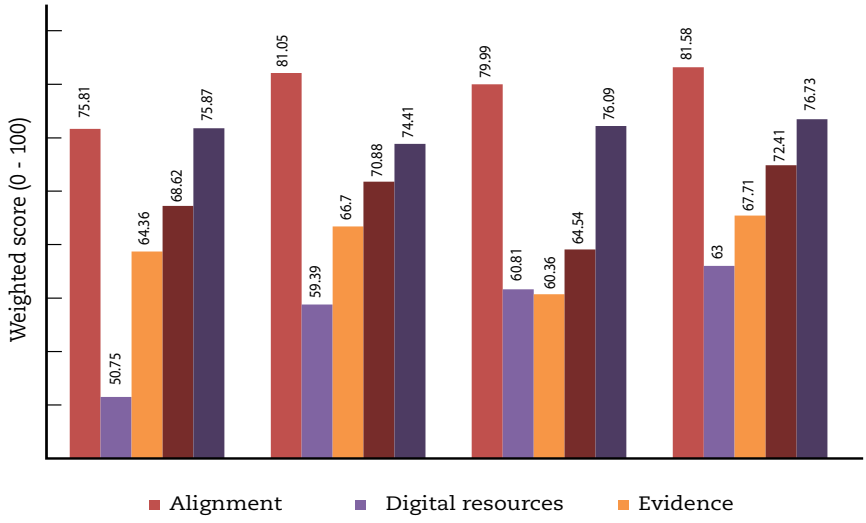

Figure 2. Dimensional profile by entity

Note. Scores are weighted component means on a 0-100 scale.
Source: Authors' own calculations based on DANE EDI 2025 microdata.

Table 8. Sensitivity of the ICIGE-S to alternative construction rules

Specification	n	Weighted mean	Spearman vs. main specification
Equal weights, at least 3 valid dimensions	655	70.26	1.000
Equal weights, at least 4 valid dimensions	582	71.17	1.000
Equal weights, at least 5 valid dimensions	397	73.07	1.000
PCA weights as sensitivity test	582	71.43	0.999
Excluding alignment	582	68.18	0.978
Excluding digital resources	582	73.62	0.958
Excluding evidence	582	72.40	0.961
Excluding follow-up	582	71.21	0.981
Excluding accountability	582	70.44	0.980

Source: Authors' own calculations based on DANE EDI 2025 microdata.

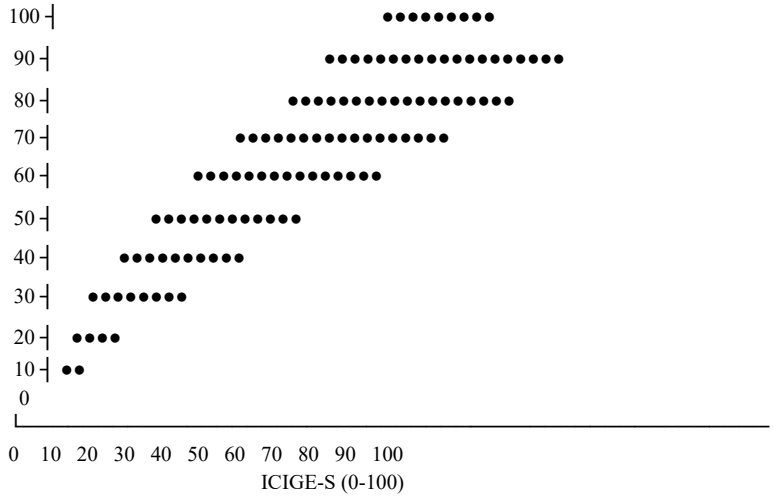

Figure 3. Internal association between the ICIGE-S and the IGP

Note. The figure shows the internal association between the ICIGE-S and the perceived performance index (IGP).
Source: Authors' own calculations based on DANE EDI 2025 microdata.

Table 9. WLS model of IGP on ICIGE-S

Predictor	Coef.	HC3 SE	95% CI lower	95% CI upper	p
Intercept	10.337	4.792	0.944	19.730	0.031
Entity code 32	-3.937	1.691	-7.250	-0.623	0.020
Entity code 46	-4.775	1.774	-8.253	-1.298	0.007
Entity code 88	-2.864	1.764	-6.321	0.594	0.104
Sex = 2	-1.347	1.090	-3.483	0.789	0.216
ICIGE-S	0.937	0.066	0.807	1.067	<0.001

Note. The model uses FEXPFINAL as analytical weight and HC3 robust standard errors. Entity code 6 is the reference category.
Source: Authors' own calculations based on DANE EDI 2025 microdata.

The association between the ICIGE-S and the IGP was high and statistically precise. The coefficient was 0.937 (95% CI: 0.807-1.067; $p < 0.001$). This result is coherent with the index logic, but it is not external validation because both measures come from the same survey and the same respondents.

Discussion

The ICIGE-S offers a transparent way to summarise perceived governance and execution capacity in the four public health entities analysed. Its main value is not to produce a final institutional ranking, but to make visible the combination of capabilities that supports management: orientation, means, evidence use, follow-up, and accountability. This is consistent with recent public-sector literature that treats performance, accountability, and digital transformation as interdependent organisational functions rather than isolated outputs (Guenduez et al., 2025; Haug et al., 2024; Macris et al., 2026; Spanò et al., 2026).

The empirical behaviour of the index supports its use as an exploratory profiling tool. Data availability was sufficient for most records, correlations did not indicate severe redundancy, VIF values were below common concern thresholds, and the PCA-weighted version was nearly identical to the equal-weight specification. These results are important because formative indices should not be judged by high internal consistency alone. In this case, the results show that components are related but not interchangeable.

The analysis also identifies a practical finding: resources and digital capacity were the lowest component across entities. This is relevant because public organisations increasingly depend on data infrastructure, digital skills, and information flows to make timely decisions and provide accountable services (Figueredo & Silva, 2026; Kuch et al., 2026; Ly et al., 2026; Szedmák et al., 2025; Tai et al., 2024). A low score in this dimension can limit the effect of other strengths, such as alignment or follow-up.

The internal association with perceived performance was strong. However, the interpretation must remain cautious. It is reasonable for perceived governance and execution capacity to be associated with perceived institutional performance, but both variables were measured in the same survey. Common method variance and respondent-level consistency may inflate the association (Podsakoff et al., 2003). External validation requires independent indicators.

This study has limitations. First, the available dataset did not include complete operational survey-design identifiers; therefore, the variance estimation is approximate. Second, the index is based on perceptions of public servants and should not be interpreted as an objective audit. Third, the component map was deductive and has not yet been evaluated by an expert panel. Fourth, the analysis covers four public health entities, so the results cannot be generalised to all Colombian public organisations. Fifth, the article assesses initial robustness, not predictive validity.

Future research should test the index in additional entities and periods, evaluate content validity with expert judges, compare the index with administrative performance data, and examine whether changes in components predict changes in service outcomes. Future versions may also explore domain-specific extensions for ethics, organisational climate, and citizen experience, while keeping a clear boundary between capacity, context, and outcome variables.

Conclusions

This study proposed and initially assessed the ICIGE-S, a formative composite index for describing perceived governance and execution capacity in four Colombian public health entities. The index organises 2025 EDI data into five components: alignment and empowerment, resources and digital capacity, evidence-based decision-making, managerial coherence and follow-up, and operational accountability. Its contribution is methodological: it provides explicit rules for selecting components, transforming ordinal items, aggregating dimensions, and testing sensitivity under a formative logic.

The results support the use of the ICIGE-S as an exploratory profiling tool. The overall weighted mean was 71.17. Correlations and VIF values did not show severe redundancy among components, and the index remained stable under alternative weighting and construction rules. The main substantive pattern was that resources and digital capacity had the lowest scores in all four entities. This should not be read as an audit of infrastructure or investment, but it identifies an area that deserves managerial review.

Entity comparisons should remain descriptive. The public-use file does not include all operational survey-design identifiers needed for full complex-design variance estimation. Although the DANE's sampling documentation states that the EDI sample is defined by entity and stratified by hierarchical level, the available file does not allow verification of eligible staff counts or entity-level response rates for the four health entities analysed. Therefore, the observed differences should not be interpreted as definitive rankings, causal effects, or institutional performance evaluations.

The ICIGE-S is not yet a consolidated diagnostic instrument. Its current use is to structure organisational analysis, identify perceived capacity patterns, and support further validation. Stronger uses require additional evidence.

Future research should incorporate complete survey-design information, including operational strata, eligible staff counts, entity-level response rates, and design-based variance estimators. It should also test content validity through expert judgment or Delphi panels, compare ICIGE-S scores with independent administrative or service-performance indicators, and apply the index longitudinally using future EDI waves. Replication in other entities and sectors would help assess whether the index is portable or requires sector-specific adaptation.

Future extensions may include ethics, organisational climate, citizen experience, or integrity risks. These additions should maintain a clear distinction between capacity, context, process, and outcomes. This distinction is necessary to preserve the formative logic of the index.

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Conflict of interest

The authors declare no conflict of interest.

Authors' contribution

Brigid Stefanie Sánchez Alvarado: conceptualisation, formal analysis, research, methodology, writing (original draft); software. Validation, visualisation, writing—original draft, writing—revision and editing.

Jorge Sanhueza Ramher: conceptualisation, formal analysis, writing (revisions based on peer review and editing.

Myrna Landerer Camus: methodology, writing (original draft), writing—revision and editing.

Data, code, and materials availability

The data supporting the results are public secondary microdata from DANE's 2025 Institutional Environment and Performance Survey. The derived processing scripts and recoding decisions are available from the corresponding author upon reasonable request. No identifiable personal data were analysed.

Generative artificial intelligence use

Generative artificial intelligence was used only for language editing, translation support, and formatting assistance during the preparation of the English manuscript. The authors reviewed, verified, and approved the content, data analysis, references, results, and interpretations, and retain full responsibility for the manuscript.

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