Statistical Regulation Planning, Standardization and Normalization Division (DIRPEN)

Quality assurance framework of the National Statistical System (NSS) (Version for comments)

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INTRODUCTION

The National Administrative Department of Statistics (DANE) as coordinator and regulator of the National Statistical System (NSS) of Colombia, has among its functions, to assure the quality of the statistical information produced by the members of the NSS, aiming at the coherence and comparability of the national information.

This process implies for DANE, to establish and promote compliance with international quality standards of organizations such as the Statistical Office of the European Union (EUROSTAT); the Organisation for Economic Cooperation and Development (OECD) and the United Nations. These standards are aimed at generating relevant, timely, accessible and coherent statistics that respond to the needs of the System users. Likewise, DANE has the function of promoting the production of statistics that allow obtaining useful information for decision-making, being an input also for the formulation, monitoring and evaluation of public policies on behalf of national and international organizations.

The NSS has stood out for its strength and robustness and currently has more than 500 statistical operations that are produced by approximately 107 entities at the national level 56% economic, 34% sociodemographic and 10% environmental. Of these statistical operations, 56% are produced from administrative records; 22% by sampling, 13% by means of derived statistics and 9% from censuses (DANE, 2017). Furthermore, the implementation of the instruments defined in Article 160 of Law 1753 of 2015 in the last two years has consolidated the NSS and has allowed the country to have the necessary elements for the assurance of statistical quality.

Within the framework of quality assurance, as of 2010 the United Nations has promoted the use of national quality assurance frameworks in order to describe three key aspects: How is quality assured? What are the quality challenges that the country faces? And, how does the country plan to introduce new quality assurance procedures? According to the United Nations (2010), a national quality assurance framework fulfills the same function as a quality management system (QMS) in the standards of the 9000 series of the International Organization for Standardization (ISO).

According to ISO 9000: 2015 Quality management systems - Fundamentals and vocabulary, a QMS is the set of standards defined by an organization in order to guarantee and control the quality thereof, with the objective of satisfying its customers. In this sense, the National Quality Assurance Framework of the NSS is conceived as a guide document that sets forth the policies, standards and instruments that both guarantee that the statistics in the country are produced

under quality standards and provide a higher level of confidence for the users thereof.

The document is divided into three sections. The first one exposes the concept of statistical quality together with the attributes that allow defining it within the framework of the NSS. The second section describes the policies, standards, guidelines as well as evaluation and diagnostic tools that constitute the Statistical Quality Assurance Framework of the NSS. And the third section presents the correspondence table between section three of the *Generic National Quality Assurance Framework* proposed by the United Nations and the documents that constitute the Statistical Quality Assurance Framework of the NSS.

I. STATISTICAL QUALITY

Statistical quality in the framework of the NSS is understood as a *set of properties that the process and the statistical product must have in order to satisfy the users' information needs* (DANE, 2017). According to Statistics Canada (2009), the quality of statistical information has a multidimensional nature, hence it should be considered from the interrelation of dimensions or attributes that allow, on the one hand, evaluating the quality of the data and, on the other, the procedures used to produce them.

Statistics Canada uses six attributes (relevance, accuracy, timeliness, accessibility, interpretability and coherence) while the OECD defines seven attributes (relevance, accuracy, credibility, timeliness, accessibility, interpretability and coherence), and EUROSTAT adds four more to those defined by the OECD (Punctuality, Transparency, Comparability and Comprehensiveness) (Matus, 2007).

Following the recommendations of these institutions, DANE as the regulator of the NSS has adopted eleven of these attributes and has defined them as follows [1]:

Accessibility: Ease with which statistical information can be located and obtained by users. It considers the way it is provided, the dissemination means, as well as the availability of metadata and support services for their query.

Coherence: It refers to the extent to which the concepts used, the methodologies applied and the results produced by the operation are logically connected.

[1] The concepts that were adopted by DANE can be consulted a the following link: http://sen.dane.gov.co:8080/senApp/module/conceptosModule/index.html

Comparability: It is the characteristic that allows the results of different statistical operations to be related, aggregated and interpreted among themselves or with respect to some common parameter.

Continuity: It refers to the assurance of the permanent production of the statistical operation, based on the adjustment of the resources, as well as on the regulatory support.

Credibility: It is the confidence that users place in statistical products, based on the perception that they are produced in a professional manner in accordance with appropriate statistical standards, and that the policies and practices are transparent.

Accuracy: The extent to which the results of the statistical operation approximate and correctly describe the quantities or characteristics to be measured.

Interpretability: Ease with which the user can understand, use and analyze the data; taking into account the scope thereof.

Timeliness: It refers to the time that elapses between the occurrence of the phenomenon of study and the publication of statistical information, in such a way that it is useful for decision making.

Precision: The property of estimating the reality of the phenomenon of study with a minimum random error.

Punctuality: It is the fulfillment of the calendar established for the publication of the results of the statistical operation.

Relevance: It refers to the extent to which statistics satisfy the users' information needs.

Transparency: Condition under which the producer of statistics makes available to users the metadata that allow knowing the development of the statistical operation.

These attributes have been included in the requirements for the quality evaluation of the statistical process defined by DANE (Technical Standard) and, therefore, are a fundamental part of the definition of **Official Statistics** that incorporates as one of its two conditions that the statistical operation that generates it has passed the evaluation of the statistical quality established for the NSS[2].

[2] The other condition set forth in Article 2.2.3.2.1. of Decree 1743 of 2016 is that the statistical operation that generates it is incorporated to the National Statistical Plan.

II. STATISTICAL QUALITY ASSURANCE FRAMEWORK OF THE NSS

According to the United Nations (2010), the basic elements of a statistical quality management system were defined in 1994 by the United Nations Statistical Commission with the promulgation of the ten fundamental principles of official statistics for the national statistical systems[3]. By means of Article 2.2.3.2.2. of Decree 1743 of 2016 our country adopted these principles providing the NSS with the conceptual basis for the use of reliable and impartial statistics.

In a complementary manner, DANE as the coordinator and regulator of the NSS has made available to the entities that make up the System a set of documents (Policies, Standards, Guidelines as well as Evaluation and Diagnostic Tools) in order to continuously promote, manage and improve the quality of the statistical operations carried out in the country. This set of documents constitutes, in this way, the Statistical Quality Assurance Framework of the NSS, which are harmoniously intertwined and will guide the entities in the **statistical quality assurance** objective.

A. Policies

The main statistical policy instrument of Colombia is the National Statistical Plan (PEN), which is issued for a term of five years and has the purpose of maintaining and increasing the supply of quality official statistics, in order to know the economic, socio-demographic and environmental reality of Colombia. The PEN 2017-2022 is the current plan and was approved by the National Advisory Council of Statistics (CANE) on April 27, 2017[4].

The PEN 2017-2022 was developed through a joint construction process with all entities that are part of the NSS and is structured in four chapters[5]. The first contains the reference framework that includes the regulatory and conceptual elements. The second presents the diagnosis that describes the statistical production of the country, listing the strengths and weaknesses identified. The third lists the objectives and the nine strategies outlined by the PEN. The fourth

[3] The Fundamental Principles of Official Statistics were developed by the Conference of European Statisticians in the early 1990s and adopted in 1992. In 1994, the United Nations Statistical Commission also adopted them, including some minor amendments in the preamble. The United Nations Statistics Division has conducted two evaluations (2003 and 2011) of the application of the Fundamental Principles (United Nations, 2013).

[4] It is important to highlight that within the framework of the SEN, the CANE was created as a consultative entity whose purpose is to promote and facilitate the coordination of the members of the System.

[5] The PEN in force can be consulted at the following link: http://www.dane.gov.co/index.php/plan-estadistico-nacional-pen

presents the action plan for the next five years. The PEN 2017-2022 also contains the inventory of the 510 statistical operations that are developed in the NSS and that are produced by more than 100 public and private entities of the national level.

As an instrument to guarantee the assurance of statistical quality, the PEN 2017-2022 has as one of its objectives that at least 50% of statistical operations have a favorable concept in the quality evaluation of their production process for year 2022.

B. Standards

Decree 1743 of 2016 establishes the passing of the statistical quality evaluation as a mandatory requirement to consider a statistic as official. To this end, DANE, with the technical support of the Colombian Institute of Technical Standards and Certification (ICONTEC) and based on the experience acquired by DANE in the evaluation of the quality of the statistical process that has been carried out systematically as of 2006, prepared the Technical Standard for the Quality of the Statistical Process. Quality requirements for the Generation of Statistics - NTCPE 1000: 2017 (DANE Resolution 1418 of 2017)[6].

The objective of the NTCPE 1000: 2017 standard is to establish the requirements in order to evaluate and certify the quality of the statistical process of the entities that are part of the NSS. This standard is applicable to statistical operations performed by census, by sampling (probabilistic or non-probabilistic), or from administrative records. As an instrument to guarantee the assurance of statistical quality, the standard is the reference that the entities that are part of the NSS and DANE will use to verify, evaluate and be certain that the minimum activities for the generation of quality statistics are being carried out.

In addition to the NTCPE 1000: 2017 standard, DANE issued the *National Code of Good Practices of the National Statistical System*[7] in October 2017. This document is a self-regulatory instrument whose responsibility and scope of application cover all the members of the NSS. Furthermore, it is aimed at promoting the identification of strengths and improvement mechanisms that allow the production and dissemination of statistics in the country to be strengthened. The framework for application and use of the Code focuses mainly on the production and dissemination of all the statistical information produced and disseminated by all the members of the System.

[6] The Technical Standard can be consulted at the following link: http://www.dane.gov.co/index.php/norma-tecnica-de-la-calidad
[7] The Code can be consulted in the following link: https://www.dane.gov.co/files/sen/bp/Codigo_nal_buenas_practicas.pdf

As an instrument to guarantee the assurance of statistical quality, the Code will be the instrument that the entities that were certified under the NTCPE 1000: 2017 standard will use in order to guarantee the continuous improvement of the statistical process during the five years of validity of the quality certification. In this way, the certified entities will present an annual declaration that will include a self-assessment exercise pertaining to the compliance with the *principles* and the activities carried out in order to maintain the quality of the statistical process.

C. Guidelines

The guidelines prepared by DANE are documents that include national and international recommendations on how things should be done in the development of processes and methods used to generate statistical information. Among the guidelines generated by DANE is the document *Guidelines for the Statistical Process in the National Statistical System*, whose purpose is to guide the entities of the NSS in the activities required for the generation of statistics by census, by probabilistic or non-probabilistic sampling, or from administrative records (DANE Resolution 1419 of 2017)[8].

This document describes the phases, sub-processes and fundamental activities that will facilitate to those responsible for statistical operations the design, analysis, control and replicability of the statistical information produced. As an instrument to guarantee the assurance of statistical quality, the Guidelines are the basic guide so that the entities of the NSS can standardize statistical production and dissemination processes, which contributes to the comparability, integration and interoperability of the statistical information developed in the country.

D. Tools for evaluation and diagnosis

In order to ensure the quality of statistics, the NSS has two tools: The evaluation and certification of the quality of the statistical process and the diagnosis of the quality of administrative records. Through these two tools, it is aimed to verify the compliance with the statistical quality attributes presented in section I of this document and that are a fundamental part of the NTCPE 1000: 2017 standard, of the *National Code of Good Practices and the Guidelines for the Statistical Process.*

Evaluation and certification of the quality of the statistical process

The evaluation and certification process determines the degree of compliance of a statistical operation with the quality requirements established in the NTCPE 1000: 2017 standard. In this way, in this process requirements are evaluated in five

[8] The Guidelines document can be consulted at the following link: http://www.dane.gov.co/index.php/lineamientos-para-el-proceso-estadistico

phases identified by DANE for the production of information: 1) Detection and analysis of requirements; 2) Design and tests; 3) Execution; 4) Analysis; and 5) Dissemination. In order to perform the compliance evaluation, DANE appoints an appropriate team of qualified professionals consisting of the following: Lead evaluator, Independent Experts Commission (Thematic expert, Expert in statistical processes and Statistical expert) and a support group (Database analyst and statistical professional).

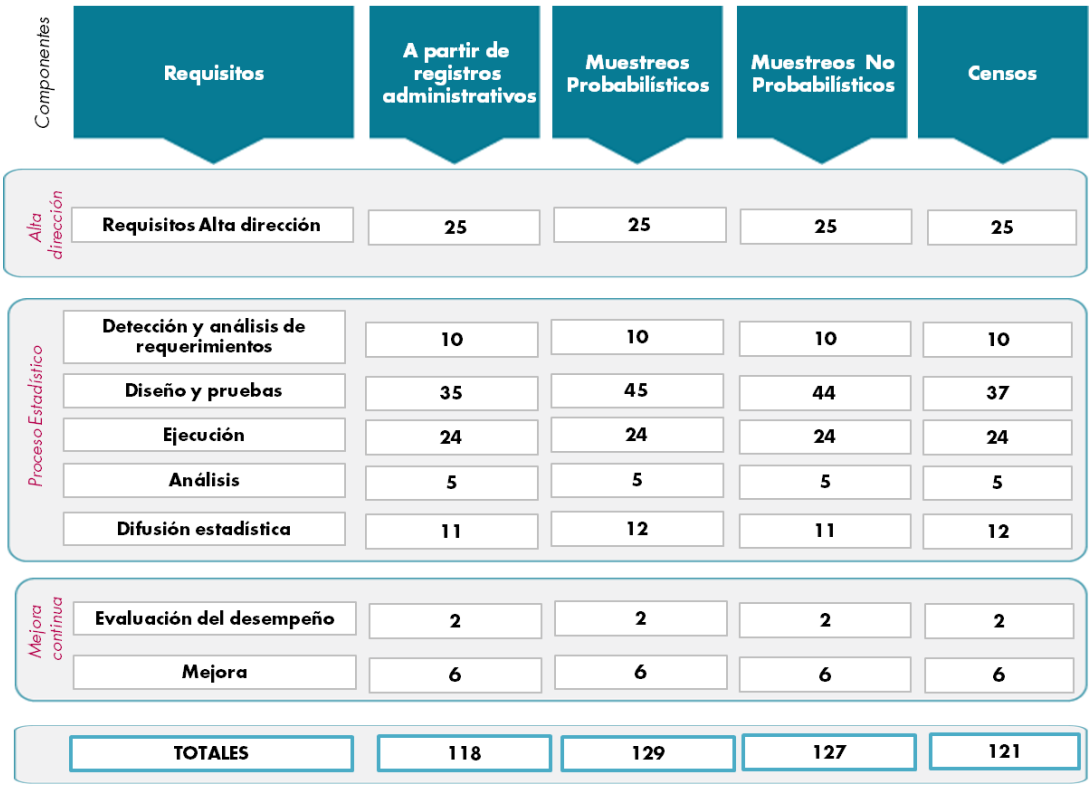
Table 1 below presents the components that are subject of the evaluation of the statistical process and the number of requirements to be evaluated according to the type of statistical operation.

Senior management requirements: It evaluates the commitment of the entity's senior management with respect to the production of the statistical operation. These requirements are contained in Chapter 4 of the NTCPE 1000: 2017 standard.

Statistical process requirements: It evaluates the five phases of the statistical process (detection and analysis of requirements, design and tests, execution, analysis and dissemination of results) with respect to the documentation of the statistical operation, allowing establishing the degree of compliance, confidence and transparency in the statistics produced. These requirements are contained in Chapters 5, 6, 7, 8 and 9 of the NTCPE 1000: 2017 standard.

Continuous improvement requirements: It evaluates the identification of improvement processes in the statistical process and the implementation thereof. These requirements are contained in Chapters 10 and 11 of the NTCPE 1000: 2017.

Table 1. Number of quality requirements established according to the type of statistical operation for the evaluation of each component



Source: DIRPEN - DANE

Components	Requirements	From administrative records	Probabilistic sampling	Non-probabilistic sampling	Census
Senior management	Senior management requirements	25	25	25	25
Statistical process	Detection and analysis of requirements	10	10	10	10
	Design and tests	35	45	44	37
	Execution	24	24	24	24
	Analysis	5	5	5	5
	Statistical dissemination	11	12	11	12
Coninuous improvement	Performance evaluation	2	2	2	2
	Improvement	6	6	6	6
	TOTALS	118	129	127	121

The process of evaluation and certification of the quality of the statistical process is carried out in four stages:

i) Evaluation scheduling: in this stage, DANE selects and prioritizes the statistical operations to be evaluated by means of the emission in the first quarter of each year of the Statistical Quality Evaluation Plan (PECE[9]) of the following year. In order to select the statistical operations that are going to be linked to the quality evaluation process, the inventory contained in the PEN 2017 - 2022 is taken as the main input.

ii) Evaluation planning: In this stage the entity that produces the statistical operation submits the information and the thematic, technical and operational documentation of the statistical operations to DANE. Based on this information, DANE defines the evaluation team and the evaluation plan for the statistical operation.

iii) Evaluation execution: In this stage three activities are carried out: the documentary review, the on-site review and the delivery of the evaluation report. In the first activity, the evaluation team reviews the documentation submitted by the NSS entity under evaluation in order to determine the compliance of the statistical process according to the evaluation criteria. In the second activity, the evaluation team reviews the compliance with the requirements for certification in the facilities of the NSS entity under evaluation.

And in the third activity, the evaluation team prepares the evaluation report, which records the main technical characteristics of the statistical operation evaluated, the technical scope of the evaluation performed, the strengths, and the opportunity (ies) for improvement made evident in each of the phases of the statistical process, as well as the non-compliant items and the previous certification opinion, which may or may not be favorable.

iv) Certification decision: At this stage DANE summons the Certification Committee, which will make the decision of granting (or not) the certificate of compliance. The Certification Committee will be the party responsible to make the decision as to certify (or not) the statistical process of the NSS entity under evaluation. The decision is made, considering the information recorded in the evaluation report and other information available. The decisions made by the Certification Committee can be, as the case may be:

- Grant the certification.
- Not grant the certification.
- Expand the scope of the certification.

[9] For its acronym in Spanish

- Not expand the scope of the certification.
- Reduce the scope of the certification.
- Suspend the certification.
- Reactivate the certification.
- Withdraw the certification.

Diagnosis of the quality of administrative records

The diagnosis of the quality of the administrative record is a three-stage process (characterization, review and analysis as well as results of the diagnosis) that allows determining the condition of the record with respect to a set of elements of statistical quality. This diagnosis is based on the quality attributes indicated in section I herein, which are analyzed through a matrix organized into two components: the administrative record environment and the administrative record process. The stages that guide the process of diagnosing the quality of administrative records is as follows:

i) Characterization of the administrative record: This stage aims to collect information with respect to the main characteristics of the administrative record of both the environment and the process thereof by carrying out three activities: awareness raising to the producing entity, implementation of the characteristics form and the collection of documentation.

ii) Review and analysis: In this stage, from the database review sheet and the diagnostic matrix, a quantitative and qualitative analysis of the administrative record is performed.

iii) Result of the diagnosis: in this stage the socialization is made of the results pertaining to the diagnosis of the administrative record and the strengthening plan is prepared and agreed upon.

III. MATRIX OF THE NATIONAL QUALITY ASSURANCE FRAMEWORK OF THE NSS

Based on the Statistics Canada report that contained a review of the program with respect to national quality assurance frameworks, in August 2010 the United Nations Statistical Commission formed a group of experts whose task was to develop a generic matrix for it to become the input for countries that may wish to formulate their own national quality assurance framework or improve an existing one.

In 2012, the Statistical Commission approved the Matrix for a Generic National Quality Assurance Framework and encouraged countries to use it. The Matrix

prepared by the Group of Experts is divided into five sections: a) context; b) concepts and frameworks; c) guidelines for quality assurance; d) quality evaluation and presentation of reports in this regard; and e) quality and other management frameworks.

According to the United Nations (2012) the generic matrix was conceived so that its use is voluntary and it is not intended to replace the quality frameworks that are being used by the national statistical office of a country. In this sense, DANE has developed a correspondence table between section three of the Matrix that contains nineteen principles or guidelines related to quality assurance and the documents that constitute the Statistical Quality Assurance Framework of the NSS.

Thus, table 2 shows the documents of the Statistical Quality Assurance Framework of the NSS and the legal framework (Articles 160 of Law 1753 of 2015 and Decree 1743 of 2016) that allow guaranteeing compliance with the nineteen quality guidelines.

Table 2. Correspondence between the Generic National Quality Assurance Framework and the Statistical Quality Assurance Framework of the NSS

Quality assurance guideline	Legal framework	PEN	Technical standard	National Code of Good Practices	Statistical process guidelines
3a. Management of the statistical system					
[NQAF 1] Coordination of the National Statistical System	X	X		X	
[NQAF 2] Management of relationships with users and data providers		X	X	X	
[NQAF 3] Management of statistical standards			X	X	
3b. Management of the institutional environment					
[NQAF 4] Guarantee of professional independence				X	
[NQAF 5] Guarantee of impartiality and objectivity			X	X	
[NQAF 6] Guarantee of Transparency			X	X	X
[NQAF 7] Guarantee of confidentiality and the security of statistics			X	X	
[NQAF 8] Guarantee of the commitment to quality			X	X	X

Quality assurance guideline	Legal framework	PEN	Technical standard	National Code of Good Practices	Statistical process guidelines
[NQAF 9] Guarantee of the sufficiency of resources		X		X	
3c. Management of the statistical processes					
[NQAF 10] Guarantee of methodological rigor			X	X	X
[NQAF 11] Guarantee of effectiveness with respect to costs		X	X	X	
[NQAF 12] Guarantee of Strictness in the execution			X	X	X
[NQAF 13] Management of the burden that it means for the respondents			X	X	
3d. Management of statistical products					
[NQAF 14] Guarantee of pertinence or relevance		X	X	X	X
[NQAF 15] Guarantee of accuracy and reliability			X	X	X
[NQAF 16] Guarantee of timeliness and punctuality			X	X	X
[NQAF 17] Guarantee of accessibility and clarity			X	X	X
[NQAF 18] Guarantee of coherence and comparability			X	X	X

Source: Prepared by DIRPEN - DANE based on the Matrix for a Generic National Quality Assurance Framework.

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