# QUALITY IN STATISTICAL SYSTEMS: THE CHALLENGE FOR PUERTO RICO

Sonia Balet and John E.S. Lawrence


## ABSTRACT

*In Puerto Rico, confidence in public data has been deeply compromised. Examination of extant island data demonstrates shortcomings in measuring basic variables that are now crucial in the international context. Demands from researchers, and from governmental and private constituents resulted in Law 209 of August 28, 2003 (The Law). The Law created the Instituto de Estadísticas de Puerto Rico (The Institute) to induce significant changes in statistical production processes and to coordinate the creation of a reliable statistical system for public data on the island. As part of its mandate, The Institute is implementing a quality assurance process that aims to guarantee rights of all constituents to opportune and reliable information. This article summarizes and interprets ongoing initiatives taken by The Institute to meet quality assurance objectives of The Law. It also intends to contribute to broader international conversations on statistical quality and its central role in regaining people's trust in decision-making processes and in supporting public policy.*


***Keywords*** *– Civil Society Participation, Institutional Credibility, Public Policy, Public Statistics, Statistical Quality Assessment, Statistical Quality Criteria.*

## INTRODUCTION

Reliable, timely statistical information is today a legitimate necessity for everyone. Increasingly, its importance in `good' governance is universally recognized. The broad theoretical question we address in this article is how nations respond to societies' needs for trustworthy, accurate, timely, and accessible data for the increasingly wide spectrum of users. The Puerto Rican case is one example of a small island commonwealth contribution to this effort.

World leaders have just endorsed 17 Sustainable Development Goals (SDGs) comprising some 169 targets. "To have a chance of reaching them, we must also meet another goal: improving our data." (Durand, 2015, p.1). "The lack of data on a large number of the SDG goals and targets creates difficulties in terms of identifying problems, and producing and monitoring national and international policies." (Boussichas and Nossek,



**Corresponding Author:** sonia.balet@upr.edu

2014, p. 57). This theme can also be sounded by individual citizens about decisions that affect their own livelihoods, and by their governments in attending to priorities in public policy.

A national statistical system of high quality is thus an urgent national objective. People must have access to appropriate and credible data in order to make, and sustain, a good living and plan their future. Moreover, they must also understand their central responsibility in ensuring veracity in facts and figures they provide to public surveys. However, setting up the necessary networks, in an environment of mutual trust, for data collection, analysis, and information-dissemination systems, is technically and procedurally challenging to governments. Keeping pace with information needs surrounding complex economic and social issues presents several serious difficulties to planners, technicians and other responsible personnel. In light of these issues, many countries and international agencies have substantially advanced their approach to achieve quality in their data systems. Building on prior achievements to attain/maintain high quality in public statistics, nations are working hard to adapt to the new challenges. These are among the main considerations that led to *The Law* (Ley del Instituto de Estadísticas de Puerto Rico, 2003) to reform Puerto Rico's statistics system.

Accordingly, this paper presents a brief review of recent history around international frameworks of statistical activity today. Documented initiatives are presented to demonstrate commitments by different nations and regions to reliable, comprehensible national statistical products, well prepared to internationally accepted criteria, and in tune with the needs of users.

Then based on the authors' understanding of the Puerto Rican case, the remainder of the paper examines and interprets the island's agenda and challenges, within their international setting, around producing and reporting out comparable statistics in a time of critical economic and social turmoil that demands a transformation of basic statistics-producing approaches.

## BUILDING ON INTERNATIONAL EXPERIENCE

During the 1980s the European Statistical System intensified efforts to develop statistical procedures to measure and report performance and transformational events representing the status of European countries across sectors. In 1991 the Conference of European Statisticians of the United Nations adopted fundamental principles *(Principles)* of official statistics. In a momentous step these were sealed two decades later with much wider support when in 2014 the United Nations General Assembly endorsed and adopted an entirely new preamble (United Nations, 2014). The *Principles* propose that statistical systems maintain and support the right of users to full and transparent public information, and declare access to official statistics an indispensable element of a democratic society. Recently, in 2011 the Board of the European Statistical System adopted the Code of Practice of European Statistics (*the Code*) with specific indicators (European Statistical System, 2011).

Both the *Principles* and *the Code* constitute a common quality framework for the European Statistical System and for the international community. Similar and corresponding guidelines have been developed at national levels by several countries/regions. In 2011 the Working Group on Capacity Building, comprising Mexico, Panamá and Paraguay and coordinated by the Departamento Administrativo Nacional de Estadística of Colombia with the technical support of Eurostat, (the Statistical Office of the European Union) and the Economic Commission for Latin America and the Caribbean, developed a regional Code of Good Practice in Statistics (Economic Commission for Latin America and the Caribbean, 2011). This additional Code adopted at the Sixth Statistical Conference of the Americas in November 2011 sets 17 encompassing criteria, and states that: "The guidelines, approaches, standards and good practices, both national and international, are the basis for the development of methodologies and processes for the production of quality statistics."(Economic Commission for Latin America and the Caribbean, 2011, p. 9). These international efforts have endowed countries with a comprehensive structure for organizing national statistical systems. In so doing, they set a vital contextual environment for recent efforts in this direction in Puerto Rico.

## THE PUERTO RICAN CASE

A study by the Center for Business Research, University of Puerto Rico (Alvarez et al 2002), prepared for the Puerto Rico Office of Management and Budget, noted several shortcomings in island statistical processes. Decentralized activities reflected lack of uniformity in definition of terms for analytical purposes, reducing intra-island comparability or conformity with international standards. Almost half of the statistics-producing agencies had no statistics division, less than 20% published via the Internet, and close to 60% had no documentation of methodologies used. As outlined in that report, scarcity of resources and shortages in qualified technical personnel were causal in some of these problems. Recognition of these and other limitations led to awareness of the need for change.

Statistical reform in Puerto Rico began with the adoption of *The Law* in 2003. The Institute began operations four years later, in 2007. During that interim four year period the Board of Directors was named by the Governor with the consent of the Senate, operating procedures were approved, key personnel were hired, and a budget proposal was prepared in view of an assigned amount $2m short of what was specified in *The Law*. In 2006-2007 the selection process for the position of Director took place. Following these events, the Institute began addressing the responsibilities it had been assigned.

The discussion below of the ways in which *The Institute* and its constituencies progressed is divided into four parts. Part 1 sets the stage for defining `quality' of official statistics within the international arena. Parts 2 and 3 deal with actions that *The Institute* took to promote significant changes in the statistical work of government agencies. In particular, Part 2 documents steps taken to convert statistical production into a coordinated system, and lays a foundation for a process of quality assurance. In Part 3 the process of Accreditation of Statistics (Quality Assurance) is detailed in three phases: inventory creation, pre-accreditation and accreditation of statistical production. In addition,

immediate and essential government interventions to support implementation of this process are highlighted. Finally, Part 4 focuses on the coordinating role of the Institute in addressing the effects of an existing structure, uncoordinated since its inception, of 125 statistics-producing and consuming agencies. Part 4 also touches on the importance of this entire initiative given the paucity of accessible and reliable statistics in the currently fragile island context.

## Building on international frameworks

The weakening confidence of users in public data, and consequent decisions, have been driving factors for different countries'/regions' examinations of prevailing concepts of statistical quality. Traditionally, quality was defined in terms of central aspects of statistical inference, in particular by quantifying accuracy and precision of measures in their role of estimators (bias, variance). Since the 1950s, different organizations and agencies have worked to define quality from a broader perspective that focuses on the information needs of all users.

In October 2003, Eurostat published its definition of quality of official statistics (Eurostat, 2003). The definition incorporated the following criteria: relevance, accuracy, timeliness and promptness, accessibility and clarity, comparability and coherence. Various nations such as Canada (Statistics Canada, 2009) and Sweden (Statistics Sweden, 2006) already had developed, or were in the process of developing, a similar definition.

In 2001 the International Monetary Fund (IMF) developed a framework for assessing the quality of statistics published as a working paper (Carson, 2001), and offering several elements: integrity (transparency and monitoring ethical standards), accuracy and precision, methodological rigor, utility (e.g. timeliness, relevance) and accessibility (clarity and documentation). Similarly in the United States, which practices a decentralized production of statistics, the Information Quality Act 2002 (Federal Registry, 2002) requested the Office of Management and Budget to prepare quality guidelines for federal agencies. These required implementation of specific quality criteria, including objectivity (accurate statistics, clear and complete), completeness and usefulness of statistical information.

The overall result has been, with few variants, a multidimensional view reflecting wide international acceptance of what constitutes acceptable quality of statistics of a country. In general, this vision seems to incorporate three interconnected aspects, all of which imply the need for measurement and evaluation of these processes themselves in a self-reflective manner:

- Relevance/utility of the statistical product for users
- Confidence among individuals and groups in public information they can trust, and
- Respect for users' right to access timely, relevant and methodologically sound statistics as a public good

Notable is the understanding that compliance with quality standards is fundamental to winning confidence, not only of people in governance, but of civil society in the aggregate. Consequently, the value of a statistical system today rests on trust it earns through

wide recognition as an untainted production unit useful for users, with a reputation for veracity, methodological rigor, relevance, comparability and punctual and timely accessibility. A system that meets these criteria, gains value and acceptance among key stakeholders, thus strengthening itself, and heightening the potential for effective and enforceable decisions in the realm of public policy.

The commitment has been impressive of countries to enforce the definition of quality measurably, through systematic evaluation of their products. Some of these are instructive for the Puerto Rican case. For example, the Instituto Nacional de Estadística e Informática, the central body governing the National Statistical System of Peru, published a Code of Practice approved by decree in harmony with Eurostat (Instituto Nacional de Estadística e Informática Perú, 2012). Other countries such as Finland (Statistics Finland, 2007) and Colombia (Departamento Administrativo Nacional de Estadísticas, 2015) developed guidance documents or codes to integrate quality criteria processes into statistical products. República de Colombia established a National Statistical System in the 2008 National Strategic Plan for Statistics (Departamento Administrativo Nacional de Estadísticas, 2008). Similarly, in Costa Rica the National Statistical System, and the National Institute of Statistics and Censuses as technical lead agency and coordinator, were created to strengthen both public and private administration ("Ley del Sistema de Estadísica Nacional de Costa Rica", 1998).

## What have we achieved in Puerto Rico?

The insistent demands of government, citizens, the press, and international constituents were a major force for the approval of *The Law*. By this means, Puerto Rico formalized requirements in Article 5, paragraph A, for a reliable statistics system, with explicit responsibilities of *The Institute*. *The Law* invests the duty and power of *The Institute* to establish quality criteria for data collection systems and statistics in government agencies in accordance with the needs of the people.

In 2007, the new Institute concentrated on stating clearly what constitutes quality in official statistics. In 2008 the Reglamento de los Criterios de Calidad de las Estadísticas de Puerto Rico (*The Regulations*), were published as amended, in which a definition of quality statistics was established (Instituto de Estadísticas de Puerto Rico, 2008). *The Regulations* stated that statistical information should be useful, relevant, comparable across time and data series, and characterized by timeliness, statistical accuracy, objectivity, consistency, and universal accessibility. In developing these criteria, *The Institute* unites with global trends to honor the rights of people to access quality statistics in an information society, and the duty of countries to provide them. The disclosure of *The Regulations* marked the beginning of a process of quality assurance of official statistical information in Puerto Rico directed to meeting the need for greater coordination and coherence of statistical production of governmental units.

Table 1 summarizes three broad criteria of quality and their component elements defined in *The Regulations* as follows: C1: Complete, C2: Reliable and C3: Accessible- which in turn are broken down more specifically into eleven sub-components. Table 1 also includes three principles, from the users' perspective, that we propose here as an additional dimension for classification of these criteria: P1: relevance and comprehen-

siveness of statistics, P2: degree of trust from users, and P3: producers' commitment to statistics as a public good, with effective two-way communication between producers and users. These principles aim to highlight the user as the center of focus for governments in determining statistical quality. All users (professional researchers, statisticians, governments, corporate analysts, and the general public) are thus seen as critical stakeholders in the entire process.

***Table 1: Quality Criteria for Public Statistics in Puerto Rico***

***Reglamento de los Criterios de Calidad de las Estadísticas (The Regulations)***

***Instituto de Estadísticas de Puerto Rico (The Institute)***

***Global Principles***

| **Principles*** | **Criteria from the Regulations** | | |
|---|---|---|---|
| | **C1. Complete** | **C2. Reliable** | **C3. Accessible** |
| P1*: Relevance | Pertinent | Coherent | Opportune |
| P2*: Trust | Comparable | Objective<br>Precise and Exact | Well documented |
| P3*: Public Good based on Effective Communication | Useful | Transparent | Punctual<br>Accessible |

Source: Reglamento de los Criterios de Calidad de las Estadísticas, 2008. (Instituto de Estadisticas de Puerto Rico, 2008)

*P1-P3 principles proposed by the authors

The cells distribute the eleven sub-component criteria across both the definition in *The Regulations* (columns) and the policy principles (rows) that we suggest should frame the process. Table 1 allows for distinguishing between areas for policy focus. For example, technical issues can focus on cells P1:C3, and P2:C2, whereas new initiatives utilizing social media for e-governance in dissemination of statistical information could center around P3-C3.

In Article 5, paragraph H, *The Law* directly addresses the aspect of accountability through evaluation, endorsing another crucial aspect of public service. This section of *The Law* assigned to *The Institute* the task of practicing on its own initiative, or at the request of an interested party, audits of compliance with respective rules and regulations, identifying corrective measures and addressing public complaints. It sealed a national commitment to ensure quality as defined by *The Institute* and other established standards.

In line with this mandate, *The Regulations* make clear the intention to use transparent criteria to measure and accredit the quality of statistics from government agencies. *The Institute* also has the responsibility, as the only legally authorized entity, to assess regu-

latory compliance, thus affirming the force of law as it applies to all executive agencies in the Government of Puerto Rico (Instituto de Estadísticas de Puerto Rico, 2008).

## Where are we headed? Accreditation?

As already noted above, traditional decentralization of statistical production processes in Puerto Rico led to difficulties frequently identified by various groups and recognized in *The Law*. For example, in 2010 the U.S. Census Bureau requested the Puerto Rico Center for Collection of Municipal Taxes (CRIM) to prepare a digital list of household addresses. It took the intervention of *The Institute* and the use of its faculties to make CRIM comply, however not in time for the 2010 Census. The 2020 Census will use for the first time in Puerto Rico a digital household list of all households in the island. This crucial step will control non sampling errors and reduce costs.

The Press was an important influence in expressing widespread public concern. In 2014 an editorial in the island-wide newspaper El Nuevo Día (2014) highlighted the lack of reliable statistics and how difficult it has become to make intelligent decisions to achieve sustainable goals around wellbeing of all citizens, and measure program results accurately. Currently, Puerto Rico is one of the few nations world-wide that continues to use the 1968 System of National Accounts for reporting its variables. The editorial also points out the impossibility of keeping the public reliably informed on effectiveness of government initiatives. In light of the critical economic situation in Puerto Rico, such collective dissatisfaction with public data sources and lack of accountability support the conclusion of this article that statistical quality assurance must be seen as both an essential and inevitable process.

Other more structural shortcomings were evident. For example, the decentralized bureaucratic environment was not only a limiting factor to users, but also presented a challenge in itself to the role of *The Institute*. The complexities of such a situation, i.e. a culture of self-evaluation often without explicit criteria, negatively affected implementation of quality assurance procedures. This ultimately slowed down the reforms, which were therefore designed, step by step, in three phases.

Phase I began in 2009-2010, requiring statistics-producing agencies to contribute to creating a national Inventory of Official Statistics. The Statistical System of Puerto Rico is composed of about 125 agencies, 82 of which are major generators or data gatherers regularly contributing to 264 registered official statistics. Agency information is collected through `Statistics for Inventory' forms designed by *The Institute* (Instituto de Estadísticas de Puerto Rico, 2010a).

As in other countries, both executive and legislative actions were necessary to strengthen this process. Governor Garcia Padilla's Executive Order (EO) no. 2013-06 was incorporated by The Institute into its Charter Regulations no. 2013-01 (Instituto de Estadísticas de Puerto Rico, 2009) establishing as public policy the constitutional right of access to public information issued by the State. To this end the EO requires agencies to submit to *The Institute* any statistical publication, which then is made accessible via *The Institute* website (Instituto de Estadísticas de Puerto Rico, 2010b). The `Statistics for Inventory' forms were sent to all government entities and almost all have already com-

plied with submission. One corollary result of these changes has been the identification and production of measures up till then absent from any data collection efforts, such as the Cost of Living Index.

Phase II, detailed in the Policy Letter No. 2011-01 (Instituto de Estadísticas de Puerto Rico, 2011), addressed Pre-accreditation of each agency's Statistical Reports as a preliminary step to final accreditation, as recommended by *The Institute's* Advisory Council which was created in 2009. In its Final Report 2010, the Council stated that for a report series to be pre-accredited and moved forward to Phase III of actual accreditation, all reports submitted to *The Institute* must meet eight requirements. These refer to certain format conventions, agency information and frequency of publications (Alvarez and Pericchi, 2010).

The progress of Phase II continues, albeit gradually. To date around half of the reports registered by *The Institute* have achieved pre- accreditation by fulfilling all eight criteria. The process itself is under evaluation in light of powers granted to *The Institute* to request information by means of more recent legislative action, (Ley para Enmendar la Ley del Instituto de Estadísticas, 2015). A main objective of Phase II is to uncover and address obstacles that agencies face in meeting these requirements. For example, Phase II requires that all reports submitted identify a contact person associated with the preparation of the statistical information. This was initially rejected by some agency personnel mostly for fear of any kind of reprisal. Inter and intra agency conversations have resulted in better compliance and a simpler approach to responding to users' inquiries. Already, these simple changes brought about in Phase II have contributed to a more accessible statistical system.

Phase III will be directed to evaluating how specific individual statistics conform to the quality standards set by *The Institute*. This process is in the early stages of design and implementation, and aims to promote more vigorously a quality culture that is an integral part of the various stages of statistical activity. *The Law* established the creation of a Statistics Coordination Committee (SCC) to promote the flow of information between agencies and deal with common problems. The SCC meets regularly with the management of *The Institute* and constitutes an essential forum for the development of the accreditation process. As a first step of Phase III, the topic of full accreditation was officially presented to the SCC, taking into account the particularities of each statistical product and agency regarding crucial aspects such as costs and resources, among others.

## A combined model: decentralized and coordinated.

As reaffirmed with the recent legislation of 2015, the authority of *The Institute* is pivotal in coordinating the production of statistics across agencies, municipalities and other public bodies. In particular, the obligation is emphasized for all statistical reports to be in compliance with Institute criteria for inclusion in the Inventory of Government Statistics (Instituto de Estadísticas de PR, 2010b) and thus available to the public. Moreover, the legislation directs *The Institute* to develop, with all statistics-producing agencies, a work plan to meet quality requirements such as coherence, reliability and accuracy. This moves the process of Accreditation of Statistics as part of quality assurance into the realm of a mandate in the new legislation. It is clear that legislative intervention has

been crucial in Puerto Rico as in other countries. This synchronization of effort leads to more effective application of good principles, methods and practices, and uniformity in comparing across time, districts, and regions.

The Codes of Practice we have mentioned in this article note the importance of coordination of the statistical activity. In particular the Code of Good Practice in Statistics for Latin America and the Caribbean emphasizes in its initial pages the importance of "a governing body which coordinates and directs the research, production and dissemination of quality statistics using appropriate policies, norms and standards. (Economic Commission for Latin America and the Caribbean, 2011, p.3). The challenge is that in Puerto Rico these approaches must articulate effectively through a decentralized structure that has traditionally operated autonomously, with deeply rooted procedures and methodologies slow to change.

It is no secret that statistical errors and lack of timely statistics are costly. They distort present socio-economic profiles and blur decision making and planning in both the short and long term. Continuing absence of reliable and accurate information on markets and on conditions/relations between social groups, can inhibit constructive exchange of ideas and can lead to poor decisions and growing lack of support from constituents. For instance, an over estimation of inflation in the cost of living index in Puerto Rico for 15 years not only affected decision making but was the base for increasing salaries for some government posts compared to the private sector positions, thus affecting government expenses in light of diminishing economic activity.

In the case of Puerto Rico, currently facing a fiscal and economic crisis, strengthening its statistical system is indispensable. Recent studies, including multiple public statements, although not achieving unanimity in all recommendations and conclusions, demonstrate a consensus on the need for continued reform of the Statistics System of the island to one of greater credibility and usefulness (Centro de Gobernanza Pública y Corporativa, 2014; Krueger, A., Teja, R., & Wolfe, A., 2015).

## CONCLUSIONS

There is still an obvious distance to be traveled. Puerto Rico aspires to a high level of quality by national and international standards, for its Statistical System and the nation's institutions, and has come a long way toward its goal. To achieve this finally however, with a satisfactory degree of confidence, will take accreditation and all the necessary steps to maintain and sustain the quality criteria that this accomplishment requires. Completing the process is a necessary condition for a) regaining public trust in official statistics, and b) supporting data-based decision-making in public policy.

**Sonia Balet** is Professor at University of Puerto Rico, Department of Statistics and Information Systems, and Member, Board of Directors, Instituto de Estadísticas de Puerto Rico. E-mail: sonia.balet@upr.edu

**John E.S. Lawrence** is Adjunct Professor at Columbia University New York, and former Principal Adviser and Deputy Director, Social Development Division, Bureau for Development Policy, United Nations Development Program, New York. E-Mail: JL2323@columbia.edu

The way forward is difficult particularly in face of resource constraints and shortage of qualified statistical skills and expertise. Lessons learned from the Puerto Rican case include the clear understanding that new methods and statistical processes need to be specifically tailored to national and subnational contexts, while ensuring comparability to international standards. Interventions must be paced according to the institutional capacity available, through for example, legislative action, with the support of professional and scientific organizations, and the direct expressions of press concerns.

Demands for good data go hand in hand today with growing awareness of the importance of `good' statistics in intelligent personal and public decision-making. In particular, big data and accompanying analytics require new ways of assuring quality in various dimensions of the statistical processes. People must realize in turn the importance of their participation in providing accurate data in response to surveys and other public methods for data-gathering that will result in timely and accurate information. Moreover, teamwork between people, their agencies of government, and *The Institute* as coordinator provides a foundation for an organized, coherent and relevant statistical system.

Puerto Rico is facing a sustained, critical economic and social situation. The position of the island has been negatively affected by the fragility of its public data. The complexity of the moment requires continued mobilization of all the different constituencies and stakeholders in the search for solutions. The challenge remains to implement effective communication styles and programs that interlace users and producers, thus building a statistical system that supports public policy decisions and meets the rights of people to accessible and relevant information.

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