Chapter 4
Assessment tools and risk management

Introduction

4.1. Chapter 4 introduces the concepts of quality management and quality assessment in the context of the statistical production process. Section 4.A describes the Generic Statistical Business Process Model (GSBPM), the Generic Activity Model for Statistical Organizations (GAMSO) and the Generic Statistical Information Model (GSIM) as important tools that support quality management and assessment. Metadata management is briefly introduced in section 4.B, and methods and tools for quality assessment are discussed in section 4.C, the main part of the chapter. The concept of risk management is introduced, and its relationship to quality management explained in section 4.D. While some basic explanation of the various quality assessment tools is provided, readers will need to consult the respective references for more detailed information on their use.

4.2. The UN-NQAF was developed using existing statistical quality frameworks (see introduction to quality management in section 1.B). It follows the holistic model of quality management, including the statistical system and institutional environment and statistical processes and outputs (see figure 4.1).

Figure 4.1
Quality management framework of the United Nations National Quality Assurance Framework

4.3. Quality assessment as part of quality management. Statistical quality assessment is an important part of the overall quality management system of a statistical organization. It frequently focuses on the statistical products and processes leading to their production, but can also encompass the statistical system and institutional environment. Methods and tools for statistical quality assessment comprise quality indicators (for both products and processes), quality reports, user surveys and external and self-assessments and auditing (internal or external quality reviews), including peer reviews. The assessments may lead to labelling and certification. Use of these methods in an efficient and cost-effective manner requires that they be used in combination with each other. For example, quality reports can be the basis for audits and user feedback.

4.4. Quality management and the GSBPM. The improvement in quality of statistical products requires the improvement of statistical processes. The GSBPM describes and defines the set of business processes needed to produce official statistics, and thereby provides a framework for process quality documentation, assessment and improvement. The GSBPM facilitates the assurance of UN-NQAF requirements (see, for example, requirement 8.7 in the annex). Quality management is defined in the GSBPM as an overarching process that includes quality assessment and control mechanisms. It recognizes the importance of evaluation and feedback throughout the statistical business process. Metadata management is recognized as another overarching process that is closely linked to quality management. Figure 4.2 illustrates the main structure of the GSBPM (the first of a total of three levels).

Figure 4.2
Generic Statistical Business Process Model – statistical production process and quality management

| Overarching processes (incl. quality management and metadata management) |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Specify needs               | Design                     | Build                       | Collect                     | Process                     | Analyse                     | Disseminate                 | Evaluate                    |

4.5. Relationship between the GAMSO and the GSBPM. While the GSBPM focuses on statistical production processes, it does not elaborate in detail on the additional activities (e.g., human resource management, statistical programme management) needed to support production. The GAMSO describes and defines the activities that take place within a typical organization that produces official statistics. It extends and complements the GSBPM by adding additional activities needed to support the production of statistics, thus providing a broader context of corporate strategies, capabilities and support that are important for statistical quality management.

4.6. Using the GSBPM and the GAMSO for quality management. The GSBPM and the GAMSO establish a common language when referring to statistical business processes and activities that take place within a typical statistical organization. In particular, the GSBPM is intended to apply to all production activities undertaken by producers of official statistics that result in statistical outputs. It is designed to be independent of the data source, so it can be used for the description and quality assessment of processes based on surveys, censuses, administrative records and other or mixed sources. One needs to understand all relationships and interlinkages among different activities and intermediate outputs in order to improve the quality of statistical products and processes. The GSBPM also supports the management of reference metadata. After identifying the product or process that needs quality improvement, the GSBPM (and the GAMSO) function as a navigator for users of a national quality assurance framework to ensure they take the most efficient path for assuring data quality at all phases, from specifying needs to conducting evaluations.


27 The GSBPM and the GAMSO are models relevant for all aspects of quality management. However, there are other statistical models, such as the Generic Statistical Data Editing Models (see https://statswiki.unece.org/display/sde/Statistical+Data+Editing), that cover very specific aspects of quality management in great technical detail.
4.B. Metadata management

4.7. Metadata management as a tool for quality assurance. The use and good management of metadata is essential to assure quality and the efficient operation of statistical processes. Metadata management can be facilitated and guided by the use of standard models such as the GSBPM, as stated in the previous paragraph, and the GSIM.\(^{28}\) The GSIM is a reference framework of internationally agreed definitions, attributes and relationships that describe the pieces of information used in the production of official statistics (information objects). It covers the entire statistical process and includes information on objects used in phases of the GSBPM, and ranges from specifying needs to conducting evaluations and assessments. The GSIM supports and is consistent with part A of the Common Metadata Framework,\(^{29}\) which identifies the 16 core principles of metadata management recommended for the design and implementation of a statistical metadata system. One approach would be to assess the compliance of an organization’s metadata management with these 16 principles. Requirements for metadata are important in the UN-NQAF and are reflected in requirements 12.5 and 17.1 and in quality principle 19 on managing metadata.

4.C. Methods and tools for quality assessment

4.8. This section briefly introduces the methods and tools for quality assessment. In general, the use of quality indicators, the production of quality reports and the conduct of user surveys are considered to be the basic level of quality assessment. Self-assessments and audits constitute the next level of quality assessment, while labeling and certification can be looked upon as advanced practices.\(^{30}\)

**Essential tools for quality assessment (basic level of quality assessment)**

4.9. **Quality principles.** Before conducting a quality assessment it is necessary to gain a clear understanding of the quality principles, requirements and elements that are applicable to statistical outputs, statistical processes, the national statistical system as a whole and the institutional environment (see chapter 3 and the annex for details):

(a) The UN-NQAF defines product quality in terms of five quality principles: relevance; accuracy and reliability; timeliness and punctuality; accessibility and clarity; and coherence and comparability;

(b) The UN-NQAF defines process quality in terms of four quality principles: methodological soundness; cost-effectiveness; appropriate statistical procedures; and managing respondent burden;

(c) The UN-NQAF defines quality of the NSS and the institutional environment in terms of nine quality principles: coordination; relationships with stakeholders; statistical standards; professional independence; impartiality and objectivity; transparency; statistical confidentiality and data security; commitment to quality; and adequacy of resources.

4.10. **Quality indicators.** Quality indicators have to be identified (or developed) in order to measure compliance with the respective quality principles and requirements. They are specific and measurable elements of statistical practice that can be used to characterize the quality of statistics. They measure the quality of statistical products or processes from several aspects and, for example, can give an indication of both the output (e.g., timeliness) and process quality (e.g., response rates that can be used as a proxy for accuracy). Quality indicators allow for the description and comparison of quality among different statistics and over time. When quality indicators

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\(^{28}\) GSIM (version 1.2). Available at https://statswiki.unece.org/display/gsim/GSIM+and+standards.


\(^{30}\) See Eurostat, “Handbook on data quality assurance methods and tools”. Available at https://unstats.un.org/unsd/dnss/docs-nqaf/Eurostat-HANDBOOK%20ON%20DATA%20QUALITY%20ASSESSMENT%20METHODS%20AND%20TOOLS%20I.pdf. The list of tools is not exhaustive. For example, countries may also use so-called control panels as a checklist in each of the phases of the GSBPM model.
are used to inform users about the quality of statistics, qualitative statements should be included to help users interpret information on quality and summarize its main effects on the usability of the statistics. Quality indicators are important for process management and continuous improvement, and are reflected in UN-NQAF requirement 8.6.

4.11. Work on defining and developing quality indicators can be undertaken by survey managers, data collection specialists and methodologists, and should also take into consideration input from users. Statistical agencies and units may simply draw from existing lists of quality indicators, including a list of quality indicators linked to the different stages of the GSBPM.31 The statistical agency can also set levels of requirements for the quality indicators in the form of quality targets. The defined targets can then serve as a tool for monitoring quality developments over time.32

4.12. Quality reports. Communicating about the quality of a statistical process or product can be accomplished through the preparation of reports that explain and review the main characteristics of the process and its products. Because of the multidimensional nature of quality, quality reports typically examine and describe quality according to those components or dimensions (quality principles) the agency has used to define its products’ fitness for purpose. The reports are meant to convey the necessary information to enable users to assess the quality of the product. Different user groups should be clearly identified and may be presented with different subsets of quality indicators. While a main target group of a quality report is the users of the statistics, quality reports are also an important monitoring tool for statistics producers and managers. In the optimal case, quality reports are based on specific quality indicators and are presented according to a standard reporting structure to facilitate comparability.33 The need for quality reports is reflected in UN-NQAF requirement 17.7 and in the list of associated elements to be assured (see annex).

4.13. User surveys. User feedback is a crucial element in the set of information needed for a comprehensive quality assessment. The statistical agency should regularly consult with its users about their needs and perceptions of quality, take them into account in the quality assessment exercise and follow up with the users, for example through meetings (e.g., focus group discussions) or in a more formal way by using user satisfaction surveys. Since the main objective of user surveys is normally to collect information on the users’ perceptions and use it as a basis for improvement, their results can provide valuable inputs to the self-assessment and auditing activities described below. There are different groups of users of statistics; therefore, different types of user surveys should be carried out. User satisfaction surveys can take different forms (e.g., standardized questionnaires, qualitative interviews, web-based surveys, etc.). The choice will depend on the type of feedback required and on the resources available. In accordance with UN-NQAF requirement 14.4, user satisfaction should be regularly measured and systematically followed up.

4.14. Role of the quality assurance framework as a tool. An NQAF can be used as a basis on which to develop quality indicators. However, as a tool, it is more directly applicable as a template for self-assessments.

Tools for next-level quality assessments

4.15. Self-assessments and other assessment and auditing practices (internal or external quality reviews), including peer reviews. Based on the information collected by the statistical agency using the tools mentioned above, the quality of the processes and products can be evaluated and eventually labelled. Evaluation can be done in the form of self-assessments, other assessments, audits or peer reviews, which are very powerful approaches that allow organizations to check and review their processes and prod-

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32 Target setting is frequently subjective and may first require the identification of a stable level. Target setting also depends on the objective, such as maintaining the existing level or achieving improvements. However, some targets are set by government ministries or international organizations (e.g., IMF, OECD and Eurostat), particularly with regard to coverage, periodicity and timeliness. Targets are also often set, implicitly or explicitly, with regard to revisions of data (reliability).

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ucts. They can be undertaken by internal or external experts, and the time frame can vary from days to months, depending on the scope. The objective is always the identification of improvement opportunities in processes and products. Therefore, these approaches constitute an important element of the Plan-Do-Check-Act cycle.

4.16. Self-assessments. Self-assessments are comprehensive, systematic and regular reviews of an organization’s activities carried out by the organization (i.e., those responsible for the relevant activities) itself. The results are referenced against a model or framework. Compliance with the Fundamental Principles of Official Statistics has been assessed using self-assessments several times. The choice of the self-assessment tool is a strategic decision, and its scope should be clearly defined. For example, the self-assessment could be applicable to the entire institutional environment or simply to the statistical production processes. Oftentimes, self-assessment checklists are developed to be used for the systematic assessment of the quality of the statistical production process. The self-assessment process can be carried out by staff teams and supported by internal or external experts to explain the framework and facilitate the filling out of the forms used, which is referred to as an “assisted self-assessment”. A self-assessment may be biased and does not necessarily provide a correct and accurate picture. However, a self-assessment based on an established quality framework can be a good way to facilitate systematic quality work. It establishes the quality framework and quality thinking in the organization and allows for the identification of weak points and actions to improve them. Use of self-assessments is one of several tools reflected in the elements to be assured under UN-NQAF requirement 8.2 (see annex). Box 4.1 contains further details on the establishment of a checklist and a scoring system that can be used for self-assessment.

4.17. Other internal or external assessments. Assessments can also be conducted by an internal group not responsible for the assessed statistics, or by an external

Box 4.1
Development and use of specific checklists with a scoring system

The annex to this Manual provides a detailed list of elements that need to be assured in order to comply with the principles and requirements set out in chapter 3. The list provides a comprehensive, universally applicable, generic checklist from which different self-assessment checklists can be derived. For the UN-NQAF version of 2012, a checklist including a scorecard was made available. The Expert Group intends to develop a similar checklist and to give guidance on its application, including on a scoring system. Typically, scoring systems may indicate full, partial or non-compliance with individual requirements and elements to be assured, which allows for both aggregation to a total score and scores for different parts. Checklists and scoring systems should take into consideration the fact that data quality is multidimensional and that there is no ranking among the individual quality principles. The quality principles should be applied in a balanced way depending on the specific situation. The significance of scoring should not be exaggerated; equally, or even more important, are comments regarding why requirements were met, were only partially met or were not met.

See https://unstats.un.org/unsd/dnss/docs-nqaf/NQAF%20CHECKLIST%202013_28aug-FINAL.xls.
party. IMF, using its Data Quality Assessment Framework, has undertaken assessments under the Reports on the Observance of Standards and Codes data module. The Reports are considered an assessment of a country’s main statistical products and the underlying NSSs/institutions that produce/disseminate these products. Eurostat and some of the United Nations regional commissions implement assessments of NSSs as well.

4.18. **Quality audits.** A quality audit is a systematic, independent and documented process for obtaining evidence and determining the extent to which quality requirements are fulfilled. In contrast to self-assessments, audits are always carried out by a third party that is either internal or external to the organization. Internal audits are led by a team of internal quality auditors who are not in charge of the process or product under review. External audits are conducted either by stakeholders or other parties that have an interest in the organization, by an external and independent auditing organization or by a suitably qualified expert. Audits and reviews are normally preceded by a self-assessment as well as documentation of the processes and products in question.

4.19. **Peer reviews.** Peer reviews are a type of external audit carried out by others working in the same field (a peer), in this case typically by an external expert or team of experts in statistics, such as colleagues from another statistical agency or country. Contacts can be established through professional forums and associations. Normally, peer reviews do not address specific aspects of data quality but instead examine broader organizational and strategic questions. They are typically systematic examinations and assessments of the performance of one organization by another, with the ultimate goal of helping the organization under review comply with established standards and principles, improve its policymaking and adopt best practices. The assessment is conducted on a non-adversarial basis and relies heavily on mutual trust between the organization and its assessors, as well as on their shared confidence in the process. Like other external assessments and audits, peer reviews are normally preceded by a self-assessment. The UN-NQAF provides a suitable framework for peer reviews as well as for self-assessments. The need for periodic reviews is reflected in UN-NQAF requirement 8.7.

**Labelling and certification**

4.20. **Labelling and certification.** The results of the assessment can be compared to defined standards and requirements. This is often referred to as the labelling or certification layer and helps to enhance trust and credibility in official statistics.

4.21. **Labelling.** The labelling of statistics conveys a message about the extent to which a set of quality standards are met. It can be attached to statistics or a producer of statistics. In the European Statistical System, the labelling of European statistics is based on compliance with the European Statistics Code of Practice. The attachment of a label requires a procedure to guarantee that the message is appropriate and true. The label as such may be brief, for example “official statistics”, and in this case would need to be accompanied by explanations regarding its interpretation.

4.22. **Certification.** Certification is an activity that assesses whether a product, service, process or system (e.g., a quality management system) complies with requirements defined by an internationally recognized standard or other formal criterion. It attaches a kind of “label” because the standard is internationally recognized as a guaranteed level of quality. It is conducted by an external independent certification body that can be located at the national or international level. The result of a successful certification is that the certification body, such as ISO, awards a certificate to the organi-
zation. The ISO standards are general and apply to any organization. They supplement but are not alternatives to frameworks such as the UN-NQAF, which are specifically developed for statistical agencies. There are examples of national statistical offices that have been ISO certified.\(^{37}\) Certification to ISO standards is an advanced method and tool of process quality management. It requires documentation, quality reports, quality indicators, self-assessments and audits. There are significant benefits, but also costs, associated with certification. Unrelated but similar in its approach to this certification process is the certification of statistical agencies and statistical outputs by the NSO, as described in box 4.2.


4.D. Risk management

4.23. Risk management and the production of statistics. Traditionally, risk management has been applied within financial management, security and safety. Over recent years, the scope of risk management has been extended to modernization and other development programmes and projects, and finally to the production of statistics.\(^{38}\) Risk management is normally developed in line with recommendations from national authorities and may be mandatory. It is especially important for risk management to be closely coordinated with quality management activities (see annex for the elements to be assured under UN-NQAF requirement 8.8).

4.24. Definition of risk. Risks are linked to objectives and are usually expressed in terms of risk sources and potential events that can affect the achievement of the objectives. The level of risk linked to a source is defined as the product of the likelihood or probability of the event and its consequence or effect on the objective. Objectives can be defined as compliance with the NQAF, or more specifically as compliance with each quality principle, such as assuring statistical confidentiality and data security (principle 7) or assuring accuracy and reliability (principle 15).

4.25. Identification of risks in the statistical production process. The risk of errors in some statistics can be linked to risk sources such as the quality of the source data, the methodology (e.g., sampling), the production system and the working processes linked to data collection, processing, analysis and dissemination. Accordingly, risk

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\(^{38}\) See, for example, “Guidelines on risk management practices in statistical organizations”, available in English and Russian, and accompanying training materials, prepared by the Modernization Committee on Organizational Framework and Evaluation under the coordination of the High-level Group for the Modernisation of Official Statistics. Available at https://statswiki.unece.org/display/GORM.
management can be described as quality assurance for the different phases of a statistical production model (i.e., the GSBPM) in terms of mitigating risks to quality at those phases. For each risk source, the likelihood of deviations/events and their consequences on the final statistics are considered. Possible critical risks are identified and addressed with an action plan to reduce them. Such risk analyses are particularly relevant for cases in which errors can have great impact, such as the consumer price index, statistics on foreign trade and population statistics.

4.26. Risk management has many similarities to quality management. The approach is a bit different, but risk and quality management frameworks are complementary and should not operate independently of each other. Risk management is often promoted or even mandatory for public institutions in some countries. The implementation of risk-based thinking is one of the requirements of ISO 9001:2015. Enterprise risk management is guided by the integrated framework of the Committee of Sponsoring Organizations of the Treadway Commission. A coordinated approach to quality and risk management is cost-effective and facilitates the involvement and support of management.

39 See www.coso.org/Pages/default.aspx.