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QUALITY MEASURES FOR ENHANCED QUALITY OF STATISTICS IN THE EUROPEAN STATISTICAL SYSTEM

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ABSTRACT

Much of the methodological work on quality evaluation in the European Statistical System (ESS) has been focused on the implementation of a consistent approach to quality, the use of a common vocabulary, and the development of common tools and methods for reporting on the quality of the output data.

Now, this approach is widely implemented in the ESS and can be used for encompassing evaluation of the statistical production processes and also for issues such as defining quality criteria for the design of European sampling schemes; selective data processing for efficient production of statistics; and the development of user oriented quality profiles.

Additionally, recent activities in the ESS, such as the development of the European Code of Practice have broadened the quality concern to integrity, independence and accountability of national and Community statistical authorities.

This paper sets out the importance of quality measures that can be used for monitoring purposes of these current and future information needs in the ESS.

KEY WORDS: Product quality, process quality, quality monitoring, quality assurance, quality profiles

1. INTRODUCTION

The concept of quality for organisations producing and disseminating statistics has evolved during the last decades. In considering data quality statistical organisations have worked extensively on more operational definitions of quality in particular for assessing the statistical output quality. It has also become obvious that good process quality is a precondition for high output quality and there has also been great attention for identifying, describing and measuring the quality of the statistical processes.

In parallel, users needs for more data and more timely data, and the often reduced resources for producing the statistics has put the focus on reducing un-necessary variability in processes and the setting of quality requirements or quality targets for all processes and sub-processes in order to meet process and product goals (quality, efficiency, costs).

The focus in recent years has increasingly encompassed quality as fitness for use. Most organisations do agree that quality is about the ability of a product or service to satisfy stated or implied needs. The role of statistical data has also grown in importance (like monitoring of policies, economic competition, social welfare etc.) and this has reinforced the needs for ensuring principles like professional independence, impartiality and objectivity, and statistical confidentiality are respected by the bodies producing the statistics.

2. DEFINITION OF QUALITY FRAMEWORKS

2.1 The European Statistics Code of Practice

Building on the Fundamental Principles of Official Statistics, adopted by the United Nations Statistical Commission in 1994 and inspired by experiences of national statistical institutes like ONS, Statistics Netherlands and Statistics New Zealand, the European Statistical System (ESS) in 2005 adopted a

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European Statistics Code of Practice, hereinafter referred to as the Code. The Code complements the ESS quality initiatives and approaches with an institutional dimension and provides a general framework for measuring quality through indicators on the implementation of the Code as well as for communicating its ambition to external stakeholders.

In February 2005 the Statistical Programme Committee (SPC) in which the heads of the national statistical institutes of the European Union Member States and the Director General of Eurostat are represented, endorsed the European Statistics Code of Practice for the national and Community statistical authorities.

The Code was developed by a Task Force of the SPC composed of nine national statistical institutes and with participation of Eurostat following a recommendation of the Statistical Programme Committee of 2003. In parallel, the Council of the European Union in June 2004 invited the European Commission to develop by June 2005 minimum European standards on the independence, integrity and accountability of the European Statistical System, thus creating a momentum for a swift and unanimous endorsement of the Code by the SPC.

In replying to the Council's invitation, the European Commission adopted on 25 May 2005 a Communication and a Recommendation on the independence, integrity and accountability of the national and Community statistical authorities (European Commission, 2005), the latter promulgating the European Statistics Code of Practice.

The Code is a self-regulatory instrument binding the adherents on a voluntary basis. This is underlined by the choice of the legal instrument, a Commission Recommendation which by definition relies on self-initiative and acknowledges the need for a multitude of approaches taking into account the large diversity of the national statistical systems in the European Union Member States². At the same time it establishes a sense of compulsoriness providing an explicit basis for monitoring adherence to the Code and promotes political endorsement associated with a legal act.

The Code has a dual purpose of promoting trust and confidence in statistical authorities and at the same time of reinforcing the quality of the products they produce. To address public confidence in the producers of official statistics, the Code specifies certain institutional and organisational arrangements considered to be influential with regard to the effectiveness and credibility of a statistical authority. At the same time, the Code stipulates a range of principles dealing with process and product quality of statistics based on international and European quality standards, guidelines and good practices.

The Code follows the Council's invitation to develop minimum European standards on the independence, integrity and accountability of the European Statistical System and at the same time goes beyond it. Its ambition goes farther in addressing processes and products rather than limiting itself to the institutional set-up only. It exceeds the Council's invitation as well in terms of level with principles and indicators for some areas being oriented towards highest international and European standards.

The purpose of the Code is in so far calculated for a longer-term development and communication perspective rather than to be fulfilled with its endorsement by the SPC.

The Code is structured around 15 principles. They mirror to a large extent already existing international standards and draw upon the ESS definition of quality in statistics (Eurostat 2003). A set of monitoring indicators specify each principle and provide a benchmark for the implementation of the Code. The principles are grouped into three sections³:

1. Institutional environment

As a pre-requisite for delivering high quality output and for it to be recognized by users, the Code of Practice assigns high importance to the institutional environment covering the following 6 principles:

Professional independence, Mandate for Data Collection, Adequacy of Resources, Quality Commitment, Statistical Confidentiality and Impartiality and Objectivity.

2. Statistical processes

In line with the concept of total quality management, the Code of Practice sets out standards and good practices for the processes underpinning the production of statistics covering the following principles:

Sound Methodology, Appropriate Statistical Procedures, Non-Excessive Burden on Respondents, Cost Effectiveness.

² Information on some important elements on the national statistical institutes' and Eurostat's institutional background have been summarised in Eurostat (2005a)

³ The full text of the [European Statistics Code of Practice](http://europa.eu.int/comm/eurostat/quality) is available in 20 languages on the Eurostat quality website: <http://europa.eu.int/comm/eurostat/quality>

3. Statistical output

Meeting users' needs and compliance with European standards on quality in statistics is covered by the third part of the Code of Practice dealing with the statistical output. The following principles are included:

Relevance, Accuracy and Reliability, Timeliness and Punctuality, Coherence and Comparability, Accessibility and Clarity.

The Code aims at informing users about the trustworthiness of the statistics and impartiality of the authorities having produced them and providing guarantees to data providers for the protection of confidential data and for limiting administrative burden.

As main actors the Code addresses the national and Community statistical authorities and their staff. These comprise the national statistical institutes and Eurostat but as well other national and Commission producers of European statistics. Depending on the organisational set up of official statistics, implementation of the Code implies the involvement of a range of actors at national and Community level. The Code may thus provide a stimulus for strengthening the co-ordination function of the national statistical institute in dispersed statistical systems.

The principles relating to professional independence, mandate for data collection, adequacy of resources and to some extent impartiality and objectivity cannot be addressed in a comprehensive way by a statistical authority alone. Thus, governance authorities, i.e. governments, Ministries, the European Commission and the Council of the European Union are called for to implement the Code by ensuring that their statistical services are professionally organised and resourced.

In terms of statistics covered, the Code addresses the production of European official statistics within the ESS. In line with corresponding European legislation, the statistics covered by the Code are statistics produced and disseminated by national statistical authorities and the Community statistical authority in conformity with Article 285(2) of the EC Treaty. In principle, the Code does not cover the production and dissemination of national statistics nor statistics for European purposes outside the European Community statistical programme. However, in practice a close link between statistics and an overlap with regard to the institutions producing and disseminating them will render a clear delineation difficult and in many cases a potential for confusion from a users' point of view. Thus, a broad recognition of the Code as a source of inspiration for all producers of official statistics would benefit the quality of the statistical systems as much as communication strategies with users.

To match the self-regulatory approach chosen for the implementation of the Code with the requirement of accountability, the Commission announced in its Recommendation to set up a reporting system. During the second half of 2005, national statistical institutes and Eurostat carried out a self assessment against the principles and indicators of the Code. To this end a Task Force of the SPC on the implementation of the Code of Practice had developed a questionnaire as a common basis. Further steps will include peer reviews to validate the results of the self-assessments, targeting of improvement actions at national and European level and to extend the implementation of the Code to data providers, other than the statistical institute. Eurostat will report on the implementation of the Code by the European Statistical System on the [Eurostat quality website](http://europa.eu.int/comm/eurostat/quality)⁴. In addition a high level advisory body will be proposed by the Commission to play an active role in enhancing the independence, integrity and accountability of the ESS.

Since the adoption of the European Statistics Code of Practice, its implementation has been focused towards the national statistical institutes and Eurostat. However, this rather inward orientation of the system will have to be followed by communicating the content of the Code and the degree to which the ESS adheres to it to the users of European statistics. This may involve some standards setting procedure resulting in a label of European official statistics which would allow the users to identify statistics produced in adherence to the Code. However, with timing of this exercise being crucial in order to positively impact on the ESS' integrity and accountability and delineation of European official statistics being not yet fully conceptualised, this is certainly an area that warrants further discussions.

2.2 The convergence of international quality assurance frameworks

The experiences of several statistical offices demonstrate the usefulness of formalised quality frameworks. So far, only few international or supra-national organisations have developed and used these

⁴ <http://europa.eu.int/comm/eurostat/quality>

frameworks to improve the quality of their internal production processes for collecting, processing and disseminating statistical data. International organisations have developed (albeit overlapping) frameworks such as the UN Fundamental Principles of Official Statistics, the European Code of Practice, the FAO ABCDQ and the IMF DQAF. This may lead to different kinds of evaluation. There are needs for further harmonisation efforts in order to minimise reporting burden of national institutions, facilitate exchange of information between international organisations and make efficient use of existing tools for collecting information.

To meet the concerns expressed above, the UN Committee for the Coordination of Statistical Activities (CCSA) decided at its meeting 12-14 September 2005 to launch a project (CCSA, 2005) under the lead of Eurostat, on the use and convergence of international quality assurance frameworks. The project will run for two years and undertake the following activities:

- Mapping of existing quality frameworks looking at their structure, principles and quality dimensions – institutional settings; statistical processes; statistical outputs – and their different uses (basis for defining protocols; framework for collecting indicators). The outcome should lead to a common framework or a set of articulated frameworks and recommendations for the implementation and use of assurance frameworks within international organisations.
- Inventory of different mechanisms in place for the evaluation of statistical systems, like peer-reviews, self-assessments and reviews by external parties. This should lead to common review processes where possible, consistent and shared assessments of institutions, and reusability of exiting information by different organisations.
- Inventory of the different tools and practices for collecting quality metadata from the data providers – quality aspects covered, frequency, terminology used etc. This should lead to a common structure for quality reporting and should minimise reporting burden.
- Informing users on the quality of statistics in a more uniform way through common templates, structures, improving availability, accessibility of quality information for comparisons across countries. This should lead to more harmonised and hopefully better documentation of quality for users.
- Discussion on different approaches with regard to minimum quality requirements/ standards feeding a labelling process for official statistics. This should lead to agreed principles for the process towards a kind of label for official statistics.
- Inventory and share of information on good practices, listing existing documents, linking websites. This should improve the access to documents related to quality and create economy of scale.

3. DATA QUALITY MANAGEMENT

3.1. European Sampling Designs

Concerns have been expressed at different occasions in the ESS on the timeliness of economic statistics, on statistical burden put by EU legislation on countries and respondents, and on the insufficient input for derived statistics such as national accounts. Different approaches can be used to tackle these concerns; approaches that have different properties in term of timeliness, accuracy, cost, and speed of implementation within the ESS and the Member States. One approach is European sampling where samples are designed specifically for producing European indicators. Even though EU sampling encompasses a wide variety of different processes and techniques depending on the domain and the specific solution proposed the pros and cons of EU-sampling are fairly straightforward:

Advantages of EU- samples:

- Timely estimates at the European level when national data are not needed.
- Reduced burden on respondents.
- Differential reporting constraints – small countries can be exempted from some data collections.
- Perfectly appropriate for multinational entities (sample of groups for instance) and cross national issues.

Disadvantages of EU- samples:

- Lack of complete national breakdown.
- Lack of adequate input for some derived statistics.
- Necessity of a strong coordination in the design of the sample.
- Cost of the proposed solution in term of methodological and technical resources.

- Expected resistance of some of the data providers or users not willing to abandon country reliable information.

This puts much emphasis on the coordination among the Member States and where statistical methodologies are to be harmonised sufficiently to allow the compilation of adequate European aggregates (and related national results). The quality requirements in EU sampling systems will necessitate a strong “consistency” of the national statistical processes which require focus on new aspects such as:

- Frame updating and the survey reference period. The frequency and timeliness of updating the survey frames in the countries will strongly influence coverage properties of the EU sample.
- The choice of different sampling methods or different estimators. In some countries there are elements of non-probability sampling and different settings of cut-off thresholds and techniques for the estimation of the proportion of the population below the threshold.
- Distribution of the survey population. The efficiency of different stratification and allocation schemes used at the design phase may vary between countries since the structures of the survey populations are often very heterogeneous.
- Questionnaire and other measurement effects. Different measurement practices in the countries as well as different ways the respondents interpret various questions influence as well the design of the EU-sample.
- Non-response and its treatment. The non-response rates differ between countries and also the characteristics and causes for non-response. Information has to be gathered on the risks for bias and its likely direction.
- Treatment of outliers. Alternative methods of handling outliers could lead to vastly different results.

New statistical techniques have to be explored, for compiling the European aggregates that are more input- harmonised, more cost-effective and more timely than under current arrangements.

3.2 Data processing and operating systems

New technology and methodological developments have led to the possibility to introduce more computerised statistical data controls in order to (i) meet the users’ needs for more timely statistics and to improve internal consistency and amount of detailed information released, and (ii) respond to budgetary reductions for the production of statistics by optimising the quality looking at all stages of the surveys.

These requirements and constraints have led towards a more statistical quality approach where paradata (e.g. process data) are collected for all steps of a survey (from concepts to completion) and used in “real-time” for analysing the successively quality improvements of the aggregates during the data “life-cycle”.

Survey managers have begun to develop charts where the inflow of data and the impact on the estimates can be continuously monitored and used for optimising decisions on quality taking into account time constraints and also response burden. The needs for such management charts have stipulated developments of methods for assessing the:

- seriousness of anomalies detected,
- reliability of the corrections made,
- importance of statistical units (e.g. contribution to the final estimates for a specific domain of study),
- validations of the adjustments done including assessments and fine tune adjustments, and
- reliability of the data and the final estimates.

3.3. Process quality and output quality

In response to the Leadership Expert Group (LEG) on Quality recommendation nr. 15, which stated that “A generic checklist should be developed for a simple self-assessment programme for survey managers in the ESS” (Lyberg et al., 2001), Eurostat granted in 2002 the project “Development of a Self-Assessment Programme (DESAP)” led by the Federal Statistical Office Germany⁵.

DESAP is a generic checklist for systematic quality assessment of surveys in the ESS. It is structured in a process-oriented way which means that it goes along the whole process of a survey from the very early stages (decision to undertake a survey and the survey design) until the final steps (documentation and dissemination). Even though the primary objective is to assess the overall quality of a survey and to

⁵ Project members: Statistics Austria, Statistics Finland, ISTAT Italy, Statistics Sweden and ONS UK.

compile a quality profile covering the ESS quality components, it also provides guidance in the consideration of improvements measures and could facilitate a basic appraisal of the risk of potential quality problems.

DESAP (available on the [Eurostat quality website](#)) is quite widely used in the ESS. For example, within the European Commission funded Pilot Project 1 of Phare 2002 Multi Beneficiary Statistics Programme (Lot 1), ten Beneficiary countries undertook in total 60 self-assessments of the quality of the surveys by the use of DESAP. The main conclusions from this wide implementation of DESAP are:

- The checklist is a valuable quality measurement tool. It provides systematic and comprehensive coverage of all quality components, thereby alerting survey managers to aspects of quality they would not otherwise have considered.
- The checklist should not be viewed in isolation but as a measurement tool within the context of a comprehensive quality management programme. Such a programme includes, amongst other things, development and implementation of a set of survey quality and performance indicators and quality related documentation, procedures for quality monitoring and improvement, and the corresponding quality measurement tools.
- The checklist can be considered as a lightweight, interim quality assessment (every 2 years) complementing more comprehensive reviews that are undertaken less frequently (every 5-6 years).
- The interim assessment should involve completion of the checklist by the whole survey team, including the survey manager and survey service provider. It should be accompanied by review of the quality documentation and indicators and followed by a discussion of the results with senior management.
- The results for a particular survey can be reviewed over time, using the assessment diagram for summary purposes. However, the checklist is not a particularly suitable tool for cross- survey comparisons as it is based on opinions not facts. Cross- survey comparisons depend upon completion of comprehensive quality reports.

It is likely that the DESAP will be considered as a standard tool for self- assessments in the ESS in the future. To facilitate this, Statistics Lithuania has been commissioned by Eurostat to prepare an electronic version of the checklist.

4. DISSEMINATION OF QUALITY INFORMATION

4.1. Quality Profiles for Structural Indicators

As a major step towards disseminating quality information, Eurostat undertook during 2004 to issue so called quality profiles (Hahn, 2004), providing a user-oriented summary of the main quality features of structural indicators, a set of indicators agreed at European political level to underpin the Commission's analysis in the annual report to the Spring European Council. The quality profiles target (sets of) indicators to establish in how far they are suited for the intended policy process drawing upon the quality features of the underlying statistics as well as their relevance. They cover (1) a description of the objective and relevance and give a list of relevant European legislation, (2) an overview on timeliness and coverage and (3) a description of data accuracy and comparability summarised in a grade. To allow for an assessment at one glance of the fitness for use of a structural indicator, the most important quality features are summarised in (4) an overall assessment following a standardised grid. Finally, the quality profiles attempt to describe (5) in how far a single indicator contribute to the quality of the set drawing upon its potential for an integrated policy analysis and include information on (6) the development perspective for improving the quality of an indicator and as far as possible the related costs.

Following a procedure involving user-consultation, Eurostat closely co-operates with national statistical institutes in delivering the quality profile, involving various rounds of expert assessment. So far quality profiles for 23 structural indicators have been released on the [Eurostat structural indicators website](#)⁶ with another 15 quality profiles in the pipeline to be released by the mid 2006. Quality profiles have been very well received by users and are in some areas considered an integral part of the political selection

⁶ <http://europa.eu.int/comm/eurostat/structuralindicators>

procedure of indicators at highest political level. Equally producers in the European Statistical System value them for the assessment process leading in several cases to quality improvements through the establishment of an explicit user-producer-dialogue as well as for granting national statistical institutes and Eurostat a new role in the information market in quality profiling as well those structural indicators stemming from non-official data sources. As a result, Eurostat has extended this approach to cover as well sustainable development indicators, for which first quality profiles will become available during the second half of 2006.

4.2. Metadata about quality for improved interpretability of the published statistics

Today, internet is mainly used for transmission of static information, but flexible tools for ad-hoc visualisation are under its way (from statistical tables to well-designed graphs in the top-layer of information possibly embedded in a story telling environment). These developments generate new possibilities to locate the data itself and the corresponding metadata, which implies new roles of metadata on quality.

In order to assess how the information on quality issues can assist users in the interpretability of data disseminated by statistical institutes, Eurostat launched in 2005 (Eurostat, 2005b) a study of a selected number of National Statistical Institutes websites for dissemination of data and the related quality information. The examination of the websites was done from different view-points:

- the concerns of different kinds of users,
- accessibility, clarity and completeness issues, and
- systematic links with relevant datasets.

Based on the findings from the study, some general recommendations concerning quality assessment information that should be available on a website were formulated:

- Sufficient information on quality issues should be disseminated together with the data (set) under consideration and not be included “vaguely” in a quality report for the general construction of the survey.
- Quality reports or metadata about quality should be structured in a template format in order to facilitate a quick study of the content and not in free-text format, which will require time and effort to find the requested details.
- The quality report should be formatted in a way in order to permit “manipulation” as well as automatic upload of information on Statistical Information Systems.
- The quality information should follow users’ queries, for example when selecting variables or time-series for particular themes of interest only the relevant quality information should follow.
- There should be search facilities on the websites for “quick” and an “advanced” retrieval of quality information that serve all kinds of users and the requested information should be relevant to the exact specification.

5. CONCLUSIONS

This paper discussed recent developments in the ESS emphasising the needs for developing and implementing quality measures for enhanced quality of statistics. Quality measures that ensure the functioning of the statistical organisations and their statistical systems; quality measures that are of operational use for optimising statistical production processes; and quality measures that can assist the users in the interpretability of the data disseminated. This is a direct response to different users needs for more information on Eurostat practices, how data processing affects quality and, above all, how Eurostat assesses the overall quality aspects of the ESS as delivering data to European policy making, ensuring coherence of statistics and thrust in the statistics produced.

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