

# IMPLEMENTATION OF QUALITY MANAGEMENT MODELS AND STRATEGIES IN CROATIAN CBS

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## ABSTRACT

*CBS has in recent years started many different activities from the overall area of quality management but there was still a clear lack of a systematic general framework for it. So, main goal was to establish the widely accepted general framework for quality assessment which would in the future enable efficient and sustainable management of quality of the CBS statistical processes and products. Hence CBS accepted Total Quality Management (TQM) approach as the general model for quality management, quality assessment and quality improvement. To support implementation of this model the basic strategic document is developed with following cornerstones explained and described: high quality statistical processes and products; users' satisfaction; professional orientation of the employees; efficiency of the processes; and reduction of the response burden.*

*Further, CBS established database of quality information which is planned to become a key tool for quality assessment, quality documentation and quality reporting for CBS surveys. The database contains the exhaustive list of quality information, which is based on two widely accepted ESS structures, ESMS and ESQRS. There is approximately 100 items included in the database which can be divided in two parts: numerical information (quality indicators) and descriptive (textual) information.*

## 1 Introduction

Croatian Bureau of Statistics (hereinafter: CBS) has a long tradition in producing data of good quality. The whole Statistical System of the Republic of Croatia is oriented towards production of relevant statistics by following quality requirements prescribed by the Regulation on European statistics.

CBS as producer and its users are aware that there are many definitions of quality, taking into account different aspects like:

- fit for purpose;
- satisfying user requirements; or

- getting it right first time

The quality in semantic sense is a very complex term, therefore it can easily be agreed that there is no single definition. The fact is that quality is multifaceted and is different for each user. In order to accomplish statistical quality issues, CBS defined a framework on which to base statistical output quality - ESS dimensions. The European Statistical System (ESS) recommends that statistical quality should be reported to the users in terms of: coherence, accessibility, comparability, relevance, accuracy and timeliness.

Hence the important obligation of the CBS as a central disseminator and coordinator of the official statistics of the Republic of Croatia is to provide high quality and reliability of statistical results. CBS understands the quality policy as a corporate culture with five basic quality pillars (major elements), mutually linked with the modern management tools. These pillars are:

- *Independent national statistics.* Currently CBS provides high level of professional independence of national statistics. This position should be certainly strengthened as only a professional and politically independent and reliable statistics is relevant to the customers.
- *Data users and data providers.* It becomes significantly difficult to achieve a balance between the users of statistical data and information and data requests to provide the data. Therefore, it is extremely important to monitor the extent to which the published statistics meet the expectations and needs of the user and to monitor the burden of the respondents with respect to their obligation to provide data for statistical purposes. Reducing the burden of respondents and assuring the confidentiality and protection of submitted data (which must be used only for statistical purposes) are the fundamental tasks of national statistics.
- *The quality of statistical products and services.* In order to provide good quality of statistical products and services CBS should act in accordance with the standard definition of quality and principles of the European Statistics Code of Practice.
- *Process orientation.* With transparent statistical processes and clearly documented procedures, better quality results and better cost-efficiency can be obtained. Having in mind all statistical quality aspects the CBS has decided to implement Generic Statistical Business Process Model (GSBPM), because it exhaustively describes and defines set of business processes needed to produce official statistics. It provides a standard framework and harmonised terminology to help statistical organisations to modernise their statistical production processes, as well as to share methods and components. The GSBPM can also be used for integrating data and metadata standards, as a template for process documentation, for

harmonizing statistical computing infrastructures, and to provide a framework for process quality assessment and improvement. Based on the GSBPM structure the CBS has carried out analysis how this model can be implemented into the practice of the Croatian statistical system, and on the basis of this analysis prepared a slightly adjusted CBS process model. Adjusted model was then used as a basis for creation of standard template for preparation of survey documentation. This template will hence be used for describing and documenting every statistical survey in a standardised and harmonised way. It will also supplement standard quality reports in determining the level of quality. GSBPM is adjusted to the needs of the Croatian statistical system, designed as a model independent of the data source so that it can be used for the description and evaluation of the quality of the processes based upon surveys, censuses, administrative records and other non-statistical or combined data sources.

- *Human resources development.* Training of employees in order to increase the quality of statistical products and services include several aspects: methodological knowledge, know-how information and promoting exchange of good practice. It is important that employees in the system of national statistics are aware of the content of the European Statistics Code of Practice and that they daily work in accordance with it.

In accordance with the Code of Practice of European Statistics, the goal of CBS is to strengthen confidence in the independence, integrity, accountability as well as on the credibility and quality of the statistics that are produced and disseminated. CBS seek for implementing the best international statistical principles, methods and practices to ensure the production and dissemination of representative, relevant and internationally comparable statistical data. Therefore it is of crucial importance to monitor the quality of data and quality control of all statistical processes that CBS is dealing with. Furthermore, data quality is multi-dimensional concept that applies not only to the statistical accuracy of the data but also the comparability, relevance, punctuality and timeliness, availability and clarity of information.

To estimate which level of data quality has been achieved by statistical survey, it is necessary to study in depth information and procedures applied, and looking to the input and output side of the implemented statistical process. It includes the analysis of the methodology and the implemented statistical production process that means, how the data were collected, statistically treated, processed and analysed. Further include a comparison of results achieved towards the relevant standards with alternative sources of information, prior knowledge or logical expectations. Of course, all these quality aspects are of high importance.

The project 'Technical Assistance in Business Statistics and Quality Documentation' started on the 6 September 2012 with its Kick-Off meeting and it includes four components, of which, first one is regarding quality management and documentation with two main goals: established quality management documentation system and trained CBS staff in activities regarding quality management. With this project component, CBS has started with the preparation and collection of documentation on the quality control of all statistical processes and products in 2013. From the Terms of Reference (ToRs) the full list of activities regarding quality component, as well as their estimated level of completion after the third 6 months implementation period, is listed below:

- Activity 1: Establishing quality management documentation system

1.1 Choosing the best available models for quality management for the CBS quality (80%)

1.2 Defining Data Quality Assessment Methods and Tools (85%)

- Activity 2: Selecting six surveys for testing quality and establishing links to CROMETA

2.1 Establishing quality charters for selected surveys (100%)

2.2 Drafting procedure handbooks for each selected survey (100%)

- Activity 3: Training a number of CBS staff in preparing quality reports

3.1 On the job transferring of knowledge and skills to 20 members of CBS staff (85%)

3.2 Carrying out of one three-day seminar and one three-day workshop (100%)

## **2 Preparatory activities and establishment of the quality documentation system**

The specific tasks implemented during the implementation period were divided in three main activities which are mentioned in introduction and in detailed explained in following sections.

### *2.1. Establishing quality management documentation system (Activity I)*

One of the goals of the project implementation phase is to establish the widely accepted general framework for quality assessment within the CBS and it was obtained by two sub activities described in next two subsections.

2.1.1. The best available models for quality management framework for the CBS quality management documentation system chosen

#### *TQM strategic document*

CBS accept TQM approach as the general model for quality management, quality assessment and quality improvement. To support implementation of this model the basic strategic document is developed in the framework of the project implementation. In the document, the following main cornerstones of the TQM model are explained and described:

- High quality statistical processes and products
- User satisfaction
- Professional orientation of the employees
- Efficiency of the processes
- Reduction of the response burden

For each of these general aims, concrete actions are foreseen and plans for their implementation described. When the first version of the document is finished, it will be given over to broader “public discussion” to get useful comments and suggestions for further development. At the end, the document will certainly need a broad support, especially from the top management of the CBS.

2.1.2. Data Quality Assessment Methods and Tools defined

#### *Glossary of the quality terms*

The commonly agreed and accepted terminology is one of the basic conditions for further developments. Therefore, the first version of glossary of the terms from the quality area was created and approximately 300 terms are included in the glossary. For each English term, the Croatian translation is given together with a short description of the term (in both, Croatian and English).

#### *Database of quality information*

Database of quality information is planned to become a key tool for quality assessment, quality documentation and quality reporting for CBS surveys. The database content is based on the exhaustive list of quality information, which is further based on two widely accepted ESS structures, ESMS and ESQRS. All the information in the database can roughly be divided in two parts:

- 1) *Numerical information* also called the quality indicators. The whole list of quality indicators is divided in two parts: key indicators, which should be mandatory, calculated in all the surveys for which the quality assessment will be performed and supportive indicators, which will be calculated if the survey manager will consider them important for the quality assessment of the particular survey.
- 2) *Descriptive (textual) information*. Also this list can be divided in two parts: Information which are not directly connected to the quality assessment, but aim at describing the important characteristics of the survey and information which refers directly to the survey quality assessment.

To achieve usefulness of this tool, the database itself had to be upgraded with the user friendly application for easy insertion of the information into database and for the user friendly management of the inserted information. The first phase of development was predominantly devoted to the physical creation of the database and development of the user friendly tool for insertion of the information into the database. The second phase is then devoted to the developments of the management tool. At the beginning of this second phase, we hence defined requirements for the output functionalities. These functionalities can be summarized as follows:

- *User authorization*. Each user should have right to edit only specific surveys and view data from any survey. Users must be checked before they start to work with application. This functionality is implemented by using CROMETA web service.
- *Formatting of the quality indicators into the readable (formatted) form*. Application should enable creation of the formatted tables from the values of the indicators. This functionality is especially important for the sub-annual surveys. In these cases the table should summarize the values for the whole year.
- *Filling up the template for standard quality report*. The application should enable automatic transfer from the DBQI into the template for Standard Quality Report. Textual information from the database of quality information should be transferred unchanged, while the indicators should be firstly formatted into the form of tables.
- *Development of the basic analytical tool for comparative analyses of quality indicators*. This tool should enable comparison for the selected reference period and for selected indicator between all surveys. The comparison should be performed only for the level of the whole

survey (no domains included). The tool should hence on the demand provide the list of values of indicators for all the surveys for which the certain indicator is available.

- *Creating XML for the NRME – export from one system to another.* The application should enable automatic transfer from the DBQI into NRME editor as well as vice versa, hence transfer from NRME editor into DBQI. Textual information from the database of quality information should be transferred unchanged, while the indicators should be firstly formatted and then transferred into the NRME editor.

- *Supplementation of the information in the database (Documentation).* The first part of the database, which contains the textual information, should be supplemented with the information which derives from the documentation of the statistical process. The list of items for this part is already prepared and consists from 36 sub-processes while each sub-process is further divided into 4 standard elements.

- *Integration with metadata repository “CROMETA”.* Static lists which were added from CROMETA should be replaced with the dynamic lists retrieved from CROMETA via web services. If any change appears in CROMETA it is automatically updated in the DBQI.

- *Development of the advanced analytical tool for comparative analyses of quality indicators.* The application should enable two types of comparative analyses for the particular quality indicator:

- Analyses through time. By using the starting and ending reference period, selected (from the list of existed reference periods) by the user, application should provide the time series of the selected quality indicator. The series are presented in the form of table as well as in the form of the line chart.
- Analyses between domains. The application should enable two different domain comparisons:
  - 1) Comparisons of the values of the certain indicator, for the certain survey and certain reference period between the indicators values for chosen domain (e.g. response rate for different regions in LFS in 1st quarter 2012). The values are presented in tabular form as well as in the form of bar chart.
  - 2) Comparison of the values of the certain indicator for certain reference period between the different (selected) surveys. The values should be presented in tabular form as well as in the form of bar chart.

So far the first three activities from the list were carried out. The initial testing of these features was already done inside the working group, but the more detailed analyses will be performed by other CBS statisticians in the next period.

#### *Methodological handbook on quality indicators*

Quality indicators are numerical values which should indicate the level of quality attained in the statistical surveys. From the methodological point of view, quality indicators represent the most demanding part of the list of quality information, which are gathered through the survey process. Therefore, some more thorough explanations and guidelines are needed in order to ensure the standardized and harmonized procedure of calculation over all the surveys. In the handbook for each of the quality indicators the following sections are provided:

- Definition of the indicator
- Calculation procedure
- Example(s)

The main goal of the document is to assure the more standardized methodology of calculation of quality indicators in CBS surveys. When the handbook was finalised, the workshop with the survey managers was organized, where the content and the practical usage of the handbook was described.

#### *Standard list of response statuses*

The correct calculation of some of the quality indicators (e.g. response rate, over-coverage rate) largely depends on the correct evidence of the response statuses of the observational units. With the “response status” we here refer to that information about the observational unit, which clearly indicates, what the status of the unit is after the collection phase. Roughly three main groups could be defined: Responding units; Non-responding units; Ineligible units. These main groups can then be further divided according to different reasons. To enable standardized calculation of the above mentioned quality indicators, the standardized list of response statuses is needed, which should be used in all the CBS surveys and could become a basis for standardized procedure of the calculation of quality indicators. Two separate lists were drafted: one for business surveys and one for social surveys.

## *2.2. Selecting six surveys for testing quality and establishing links to CROMETA (Activity II)*

To enable applicability and usability of the tools, developed through the project, all the developments should be carried out with the strong connection to the survey practice. For this purpose it was planned to select six surveys which will serve as pilot surveys.

### *2.2.1. Quality charters for selected surveys established*

All the developed tools for quality assessment should primarily be applicable and usable; therefore, six pilot surveys (one more than required by the Terms of Reference) were chosen in the first phase to test all these tools. The six chosen pilot surveys are:

- Survey on Income and Living Conditions (EU-SILC)
- Monthly Survey on Industrial Production
- Structural Business Statistics of Enterprises (SBS)
- Annual Survey on Information and Communication Technology Usage in Enterprises (ICT-ENTR)
- Final Energy Consumption in Households
- Services Producer Price Indices for Cleaning Activities

The list of pilot surveys can be divided in two groups:

1. The first four surveys are already existing surveys, which are carried out for a long time. Testing in these surveys has already begun. At the moment the survey managers are gathering the required information which will be later inserted into the database. Several meetings with the survey managers were already organised in order to clarify eventual unclear or ambiguous concepts and definitions.
2. The last two surveys are planned to be developed in the other components of the project. These surveys are planned to be included in the testing process in the next phase of the project implementation.

### *2.2.2. Drafting procedure handbooks for each selected survey*

#### *Template for quality report*

One of the functionalities of the database of quality information is also easy and user friendly creation of the CBS quality reports, which should be publicly available at our website. To enable such procedure a standard template, with the list of quality information, which should be part of the quality reports, was created. The list consists exclusively from the items of the

exhaustive list of quality information. The list is for now divided in two parts: information which will have to be part of the report and the information with lower priority for which their inclusion will be decided later through the testing phase. Now, it was further developed by taking into account comments and suggestions for improvements from survey managers of the pilot surveys.

### *2.3. Training a number of CBS staff in preparing quality reports (Activity III)*

#### 2.3.1. On the job transfer of knowledge and skills to 20 members of CBS staff carried out

The core working group is educated permanently through the development of the tools and methods for quality assessment and quality management. Also several meetings with the subject matter specialists were organized, where the main concepts and approaches were described and explained.

#### 2.3.2. One three-day seminar and one three-day workshop carried out for 10 participants

##### *Seminar on Quality Management and Quality Assessment Frameworks*

The three days seminar was prepared for 25 participants attending the seminar, coming from different CBS working areas. At the seminar the following topics were covered:

- Definition of quality both in a generic sense and statistical context;
- Statistical quality and European Statistical System (ESS) quality measures;
- European influences on quality in official statistics;
- History of quality models from start of last century. Linked to statistical quality initiatives;
- Current practices within CBS measured against ESS, as mentioned above;
- History of TQM and key TQM measurements;
- Top 10 quality hassles within participants own business areas;
- Statistic value chain and importance of quality throughout processes; and
- Strategies for improving and maintaining the quality of official statistics.

##### *Workshop on Quality assessment Methods and Tools*

Workshop lasted for three days and all together there were 25 participants attending the workshop, but while some of them participated only some days, there were in average 15-20 person present at the workshop. Participants were from different CBS working areas,

representing subject matter as well as infrastructure departments. At the workshop the following topics were covered:

- Definition of Quality in Statistics and Quality management;
- European Statistics Code of Practice and Quality Assessment. Introduction to methods and tools for data quality assessment;
- Measuring quality of statistical process and products;
- Quality reporting and Eurostat standards for quality reporting;
- Users and user satisfaction surveys; and
- Tools for quality assessment.

### **3 Conclusion and future developments**

As it was in detailed described in this paper, key outcomes of the activities carried out in this period of quality management implementation in CBS were:

- Creation of the first version of the TQM strategic document
- Creation of the first version of the glossary of the quality terms
- First version of the database of quality information developed and tested
- Creation of the methodological handbook on quality indicators
- Creation of the standard list of response statuses
- Survey managers of pilot surveys educated about the main concepts in the field of quality assessment and trained to collect the required quality information
- Seminar on Quality Management and Quality Assessment Frameworks carried out
- Workshop on Quality assessment Methods and Tools carried out

From the previous section, it is clear that good progress has been made for each of these minimum expected outputs of the quality component. There is no reason to expect that this component will not continue to deliver and possibly exceed in some areas, as had already happened with CBS attendance at the seminar and workshops, the activities and outputs needed from the component. Although not specified above as an output, it is also the case that the quality work will also provide a quality database containing a number of agreed quality indicators for the CBS. So, for all outputs there will be full documentation and an active approach to the training of the CBS in the quality procedures developed in the project. It is

recognised that for any training materials the inclusion of practical examples will be very beneficial to the CBS in their learning about quality processes. A clear priority in the development work will be to ensure sustainability. Important within this will be that the resource requirements of the new quality work put in place in this project matches the resources CBS are able to devote to this work.

Further, for the work on quality management in CBS, there is range of reports and data that has to be prepared, often by the CBS, to support the sustainability of the quality work. Clear examples of this are the quality indicators that need to be calculated before being added to the quality database. This will place an overhead of costs on the CBS staff, although this overhead will be highest in the early days of preparing these indicators and then will gradually reduce. It will be important that the CBS ensure that their staffs meets this overhead cost in populating the quality dataset as, if not, the very quality of the indicators themselves will be threatened. An important action by the CBS management in ensuring the sustainability of the quality work is to ensure that the outputs produced by the CBS staff are actively studied by management and have some impact on management decisions concerning the organisation and allocation of CBS resources. So, the outputs from the work in this project on quality will help the management of the CBS in their strategic and operational policy work to identify and address priority quality issues across the statistical activities of the CBS.

In terms of project progress in quality, key outcomes in the last six months include a focus on the development of the Quality Database and its testing through pilot surveys. As it has been noted above, this progress has led to pressure for more development work – especially in terms of outputs from the system. There seems little doubt that whether it will be the Quality Database, the work on TQM strategy, the quality indicator glossary and the methodological handbook, the work of this component is being well received by the CBS. During the remaining period of the project the focus will be on drawing the activities to a close and to the full satisfaction of the CBS.

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