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Scientific, Technical and Economic Committee for Fisheries (STECF)

Quality aspects of the collection of economic data - methods of calculation of the indicators and sampling strategies

SGECA-09-02

11-14 MAY 2009, BARCELONA

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QUALITY ASPECTS OF THE COLLECTION OF ECONOMIC DATA - METHODS OF CALCULATION OF THE INDICATORS AND SAMPLING STRATEGIES (SGECA-09-02)

11-14 MAY 2009, BARCELONA

SUBGROUP ON ECONOMIC AFFAIRS (SGECA) OF THE SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

STECF OPINION EXPRESSED DURING THE PLENARY MEETING (PLEN-09-02)

13 - 17 JULY 2009, COPENHAGEN

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1. STECF COMMENTS AND RECOMMENDATIONS

STECF recognizes that assessment of quality of data is highly important and which affects end users, who need to be aware of the reliability of data used in their analyses. STECF also recognizes that SGECA 09-02 managed to address all their terms of reference and proposed useful tools to assess the quality of economic data.

STECF reviewed the list of recommendations suggested by SGECA 09-02 and considers that their application will allow MS to better comply with the requirements of the DCF in relation to data quality assurance. Therefore, STECF endorses the SGECA 09-02 recommendations.

In particular, STECF recommends that MS indicate the data collection category that is to be applied for each fleet segment and for each economic variable as listed in Appendix VI of Council Decision 949/08. SGECA 09-02 identified three different categories of data collection scheme that covers all the possible typologies of data collection:

A. Census, which attempts to collect data from all members of a population.
B. Probability Sample Survey, in which data are collected from a sample of a population members randomly selected
C. Non-Probability Sample Survey, in which data are collected from a sample of population members not randomly selected.

STECF notes that this classification will facilitate the comparison of survey methodologies among Member States (MS).

STECF also recommends that MS:

- include in their NPs for the period 2011-2013, a methodological report to describe the sampling strategies. STECF also recommends that MS adhere to the guidelines for the preparation of the methodological report given in Table 4.1.1 below (adapted from the report of the STECF-SGECA 09-02).
- include in their annual Technical Reports, the data quality indicators given in Table 4.2.2 below (discussed under TOR 2 of STECF-SGECA 09-02).

Table 1.1: Methodological report for NP

LIST OF CONTENT	Type of data collection	SPECIFICATION
SECTION 1 - TYPE OF DATA COLLECTION	**A** **B** **C**	A. Census, B. Probability Sample survey, C. Non Probability Sample survey,
SECTION 2 - POPULATION		
Target population (3)	A-B-C	The target population is the population for which inferences are made and is defined in the DCF. MS should explain if there are deviations from the definition given in the DCF. MS should describe the fleet segmentation. A table with numbers of vessels per segment should be

		supplied. Clustering of fleet segments should be described and information should be given on the segments that are clustered, as required by the DCF and following SGECA recommendations. A table should report the segments that have been clustered.
Frame Population (3)	A-B-C	The frame is a device that permits access to population units. The frame population is the set of population units which can be accessed through the frame and the survey data then refer to this population. The frame contains sufficient information about the units for their stratification, sampling and contact.
SECTION 2 - DATA SOURCES		
Data sources/Questionnaire Design	A-B-C	MS should provide a list of data sources used (logbook, sales notes, accounts, etc.) and a description of each. Where a questionnaire is used, a copy of this should be included in an annex to the report
SECTION 3 SAMPLING		
Type of sampling strategy	B-C	MS should describe the selection of sampling units and therefore the type of sampling strategy used (e.g., simple random sampling, systematic sampling, sampling with PPS, multiple stage sampling, etc.)
Further stratification within fleet segment	B-C	MS should describe if fleet segments have been divided into subsets (strata) before the selection of a sample. MS should define what parameters have been used to stratify.
Determination of sample size for each fleet segment	B-C	MS should explain which targets have been used to determine the sample size and why these targets have been chosen. MS should present the sample size by fleet segment in a table, together with the coverage rate (number of vessels in the sample/number of vessels in the population)
Sample evolution over time, rotational groups (4)	B-C	MS should describe any projected changes in sample size over time and should report the number of sample units that will be substituted from one year to another.
SECTION 4 ESTIMATION		
Estimation methods from sample to population	B-C	MS should describe the type of estimators used according to the type of sampling strategy (for example, Horvitz-Thompson or Hansen-Hurwitz estimators) MS should describe estimation procedures, including the nature of any additional information used

Imputation of non responses/ Non-response adjustments (5)	A-B-C	MS should describe the statistical models used, e.g., regression analysis, adjustments of raising factors, etc. Where substitution is applied in cases of unit non-responses, the following information should be provided: method of selection of substitutes and main characteristics of substituted units compared to original units
SECTION 5 - DATA QUALITY EVALUATION		
Evaluation of accuracy	A-B-C	MS should describe the methods to assess the variability of the estimates and to assess the bias derived from non-responses and from the use of models in case of non-probability sampling
SECTION 6 - DATA DISSEMINATION AND PRESENTATION	A-B-C	MS should indicate when data will be available to end users and the time lag with respect to the reference year. Confidentiality problems and the need for clustering of segments in the phase of presentation of the results should be discussed in this section.

Footnotes:

(1) In a census all the units in the population will be contacted in order to collect economic variables. This definition continues to apply when the response rate is less than 100%. In this case, non-responses should be dealt with using appropriate statistical procedures.

(2) Non-Probability Sampling refers, for example, to surveys where data are collected from a panel of vessels who have agreed to supply data on a voluntary basis or from a sample selected on the basis of *a priori* information, or other non-random methods. Technical details on how the sample was selected should be reported. The reason for not using probability sampling should be stated as well as an assessment of how the sampling procedures may affect the estimates. Different types of non-probability sampling, such as "cut-off" sampling (where units below a certain size threshold are not sampled) are described in Eurostat (2009a and 2009b).

(3) The population is clearly defined in the DCF. For economic variables to be collected for active and non-active vessels, the population and the frame (normally based on the Community Fishing Fleet Register) are the same. For economic variables to be collected only for active vessels, the frame may be different from the population. In this case the source of information used to distinguish the frame from the population should be described.

(4) In the case where rotation is applied to substitute non-responsive units, this should be clearly described and the consequences for the estimates should be discussed.

(5) In the case of a census with non-responses, variables should be estimated using models described in the methodological report. Methods used to evaluate the accuracy of these estimates should also be discussed under Section 4- data quality evaluation.

Table 1.2: Indicators of accuracy to be presented by MS in the TR

Type of error	**Type of data collection (1)**	**Accuracy indicators**
Bias	A – B – C	Response rates - unit response rate (2) - item response rate (3)
	B – C	Coverage rates : planned and achieved coverage rates
	C (6)	Representativeness of the sample before and after re-weighting (4): deviations in terms of main characteristics (5) of sampled units compared with the population (for instance hypothesis tests on mean values)
Variability	A	None
	B	Coefficient of Variation (CV)
	C	Variability of the estimates (7)

Footnotes:

(1) A: Census, B: Probability Sample survey, C: Non-Probability Sample survey

(2) unit response rate: the ratio of the number of units for which data for at least some variables have been collected to the total number of units designated for data collection

(3) item response rate: the ratio of the number of units which have provided data for a given variable to the total number of designated units or to the number of units that have provided data at least for some data items

(4) re-weighting could be necessary when the sample is judged not sufficiently representative

(5) technical characteristics (GT, age, etc.), effort and landings, where these data are available for each vessel in the fleet segment

(6) in case of low response rate (<70%), MS should evaluate the representativeness of the sample/census also under A and B

(7) methods to assess such variability should be presented in the methodological report

STECF notes that SGECA-09-02 did not suggest any specific indicator for the assessment of quality for the case of non-probability sampling. This was due to the fact there was no consensus on the indicators that could be used and to the fact that there is no solution readily available in literature to estimate the precision of estimators based on non-random sampling. Therefore, STECF recommends that a scientific study aimed at addressing the issue of quality reporting and at suggesting appropriate methodologies for the case of non-probability sampling

should be carried out. The best way to approach this should be discussed by DG Mare and the STECF Board.

Regarding the issue of clustering fleet segments, STECF note that sampling clustered segments can in practice result in the complete omission of some segments from data collection.

STECF agrees with the method suggested by STECF-SGECA 09-02 to apply different clustering approaches on the basis of the particular characteristics of fleet segments. Some fleet segments are more important in terms of landings/effort/target species than others, and therefore these segments should be treated with more care in case of clustering. For important segments, there exists an evident scientific need to have economic data. STECF agrees that such segments should not be clustered unless strictly necessary in data reporting for confidentiality reasons.

STECF discussed the proposal to identify a specific STECF sub-group (SGECA/DCF), with a permanent chairperson, dealing specifically with methodological issues arising from the implementation of the economic components of the DCF.

STECF recognizes the importance and the need to cover economic issues dealing with DCF but it also considers that SG-RN/ECA is the appropriate working group to address these issues. Economic and biological aspects should be better integrated and therefore STECF considers that economic participation should be stimulated within the SG-RN/ECA.

SGECA 09-02 suggested the following terms of reference for the SGECA/DCF:

1. Propose guidelines for the collection of economic data

2. Propose guidelines for the evaluation of National Programmes and Technical Reports

3. Discuss methodological issues

4. Exchange best practices on data collection methodologies and statistical techniques

5. Propose methods, which ensure comparability of data collected by MS at the regional level

6. Suggest studies and workshops on specific methodological issues.

STECF agrees that the above terms of reference are appropriate, but considers they should be integrated with and addressed by the SG-RN/ECA rather then create an additional specific sub-group.

2. EXECUTIVE SUMMARY AND RECOMMENDATIONS

The assessment of quality of economic data is a relevant issue that has been raised by several working groups and by different bodies (first of all STECF and RCMs). This issue also affects end users that should be aware of the reliability of data used in the analysis.

With the aim of establishing a homogenous presentation of methodologies for the collection of economic data and also with the aim of facilitating the STECF task to evaluate the quality of the data collected by the Member States, the Commission made a number of requests to this SGECA meeting. The Terms of Reference for SGECA-09-02 were very specific and are listed in section 2.1.

During the meeting, in particular, it was possible to critically review and discuss the most frequently applied methodologies to collect economic variables for fleet segments and to propose common approaches to assess data quality. SGECA reached a consensus on a list of recommendations, that will be proposed to STECF for their possible adoption and endorsement. These should allow MS to better comply with the requirements of the DCF in relation to data quality assurance in a more consistent way within an agreed framework as concerns some basic methods and metadata.

The major recommendations of the Working Group are the following:

- SGECA-09-02 suggested that in order to obtain methodology descriptions of a comparable standard among Member States a methodological report should be included in the national programmes. This methodological report should describe the sampling strategies for the three year period in the next NP (2011-20013) to be delivered by March 2010. The methodological report should be included in the NP but should also be available for any end user of the data. Each year MS will provide a Technical Report containing the accuracy indicators discussed under TOR 2 which will be in line with the methodologies described in the NP.

- SGECA-09-02 considered that these methodological reports could then be assessed in a second stage by a specific working group in order to harmonise sampling strategies among MS and eventually develop a common approach and best strategy in specific cases. In this second stage evaluation, specific precision targets or sampling rates could also be proposed.

- SGECA-09-02 discussed the content of the methodological report for each type of data collection and agreed on some general specifications and recommendations (see Annex I).

- In order to assess accuracy of estimates, SGECA-09-02 compiled a table with the prerequisites for the information to be included in the technical report (see Table 2: Indicators of accuracy to be presented by MS in the TR). In this table it is indicated for each of the sampling strategies (e.g. census, probability sampling, non-probability sampling) which information should be included in the technical report, for each fleet segment.

- SGECA-09-02 recommends that in case non-probability sampling is applied, MS describe clearly in the methodological reports the methods used to overcome problems of bias and possible ways to assess the quality of the estimates and their outcomes. Based on this information, SGECA recommends to launch a call for a study to harmonise quality reporting and propose methodology in this specific situation. SGECA-09-02 also recommends that the suggested study on quality indicators for non probability sampling should also address the question of the impact of non random non response on the final estimates.

- SGECA-09-02 recommends that MS should carefully assess the impact of non-response, especially in the case of census with low response rate.

- Regarding the clustering issue, SGECA-09-02 considered that approaches to clustering should depend on the particular characteristics of fleet segments. The group proposed that MS should distinguish between segments considered for clustering as follows: 1. important segments with distinct characteristics, 2. segments similar to other segments, 3. non-important segments with distinct characteristics. SGECA-09-02 recommends a set of guidelines for clustering for each of these three cases.

- Due to concerns raised over the implications for data time series if clustering practices change over time, SGECA-09-02 recommends MS to take this into account when they segment the fleet in order to produce consistent time series over time.

- SGECA-09-02 recommends that MS assess the comparability of economic variables over time, include the results in the TR and discuss inconsistencies in trends.

- SGECA-09-02 recommends that RCM should check for comparability within a region through an analysis of definitions and methodologies. If an RCM notices any inconsistency this should be communicated to STECF.

Furthermore, SGECA-09-02 agreed on the necessity to have a specific STECF sub-group (SGECA/DCF), with a permanent chairperson, dealing specifically with methodological issues arising from the implementation of the economic components of the DCF. The group proposed the terms of reference for this specific sub-group.

3. INTRODUCTION

The new DCF[1] establishes the list of economic variables to be collected for the total fleets and for the fleet segments. It also requires MS to describe the methodologies applied for the data collection and to give information on the quality (accuracy and precision) of estimates.

SGECA 09-02 was asked to give appropriate recommendations and proposals in order to homogenise the presentation of NP and also in order to facilitate the STECF task to evaluate the quality of the data collected by the Member States.

Moreover, the Regional Co-ordination Meetings held in 2008 identified several issues within the new DCF requiring further work or clarification.

To address these requests, the STECF/SGECA 09-02 met in the University of Barcelona, from 11-14th May 2009.

The preparation for the meeting required the compilation of several background documents. A review of existing European Standards on data quality was done prior to the meeting. Questionnaires sent by the European Commission to MS on clustering approaches constituted other reference documentation for discussion.

3.1. Terms of Reference

The specific terms of reference for SGECA-09-02 were as follows:

1. Recommend the best format for describing the sampling strategy for the collection of economic variables in the national programmes.

2. Recommend indicators of accuracy and precision that need to be provided in the national technical report to evaluate the quality of estimates for each economic variable. In this context, the issue of recurrent quality shortcomings observed in the data submission regarding the Annual Economic Report will be discussed. A presentation from JRC on the most common quality checks performed will be made.

3. Propose common approaches to decide whether clustering of fleet segments should take place and suggest statistical methods to evaluate the reliability of the clustering. To this end a

[1] Council Regulation (EC) No 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy.
Commission Regulation (EC) No 665/2008 of 14 July 2008 laying down detailed rules for the application of Council Regulation (EC) No 199/2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy.
Commission Decision (2008/949/EC) adopting a multi annual Community programme pursuant to Council Regulation (EC) No 199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy.

questionnaire will be sent to National Correspondents in order to have an overview of common practices followed by MS.

4. Propose common methods to ensure consistency and comparability of all economic variables when derived from different sources (e.g. surveys, fleet register, logbooks, sales notes).

5. Discuss the general role of SGECA and propose TOR for its future work, in relation to the DCF framework.

6. Any other business.

3.2. Participants

Next there are listed the participants at the SGECA-09-02 meeting. The full details of the participants are presented in Annex 8.

STECF members

Sabatella, Evelina (Chairman)

Hatcher, Aaron

Van Oostenbrugge, Hans

Virtanen, Jarno

External experts

Berkenhagen, Jörg

Bertelings, Heleen

Collet, Isabelle

DeMeo, Michele

Elias, Leonor

Goti, Leyre

Jonsson, Anna

Motova, Arina

Van Iseghem, Sylvie

JRC experts

Guillen, Jordi

Nord, Jenny

European Commission

Calvo, Angel

Cervantes, Antonio

4. METHODOLOGICAL REPORT FOR DESCRIBING THE SAMPLING STRATEGY FOR THE COLLECTION OF ECONOMIC VARIABLES IN THE NATIONAL PROGRAMMES

SGECA was asked to recommend the best format for describing the sampling strategy for the collection of economic variables in the National Programmes of the DCF.

SGECA suggested that in order to obtain methodology descriptions of a comparable standard among Member States, a methodological report should be included in the national programmes. The aim of the report is to provide a clear and detailed description of the data collection methodologies in the MS and it should include information on:

- how the data will be collected and compiled;
- details of sampling techniques, estimation methods and data sources;
- a description of the methods used to evaluate the quality of the estimates.

The next NP will cover a period of three years (2011-2013) and will be delivered by March 2010. In this submission, SGECA suggested the inclusion of a methodological report to describe the sampling strategies for the three year period.

Each year MS will then provide a Technical Report containing the accuracy indicators discussed under TOR 2 which will be in line with the methodologies described in the NP.

MS will have the possibility to amend the NP each year if the methodologies described in the report change significantly.

The methodological report should be included in the NP but should also be made separately available for any end user of the data.

SGECA considered that these methodological reports should be assessed in a second stage by a specific working group in order to harmonise sampling strategies among MS and eventually to develop a common approach and best strategy in specific cases (for example, small scale fisheries). In this second stage evaluation, specific precision targets or sampling rates could also be proposed.

The methodological report should be compiled in line with international statistical standards and should contain all the elements necessary for the proper evaluation and comparison of the sampling strategies used by different MS. SGECA stressed that the methodology descriptions should as far as possible be consistent with the definitions given by EUROSTAT (2009a and 2009b).

SGECA is aware that the current guidelines developed by SGRN already require MS to provide information on the methodologies for the collection of economic data. The group discussed whether the SGRN guidelines are to be considered complete or should be modified. After evaluating the structure of the current SGRN guideline text and tables, SGECA considered that the SGRN guidelines in their current form do not always produce sufficient and comparable

information. Therefore SGECA recommends a review of the guidelines in line with the proposed methodological report (see Annex 1).

SGECA identified three different types of data collection scheme.

A. *Census*, which attempts to collect data from all members of a population. This would include collection of data from administrative records, as well as other cases in which data are derived from sources originally compiled for non-statistical purposes

B. *Probability Sample Survey*, in which data are collected from a sample of a population members randomly selected

C. *Non-Probability Sample Survey*, in which data are collected from a sample of population members not randomly selected.

In its methodological report, the MS should firstly indicate which type of data collection is to be applied for each fleet segment and for each economic variable as listed in Appendix VI of Council Decision 949/08. A table like the one below could be useful in order to illustrate the situation where different types of data collection are used for different segments and different variables.

Table 1: Type of data collection per fleet segment and per economic variable (to be compiled for each supra region)

	Fleet segment (appendix III DCF)				
Economic variable (appendix VI DCF)	1	2	3	4	…
Turnover	A	A	A	B	…
Labour costs	A	B	B	C	…
Energy costs	…				
Repair and maintenance costs					
Other operational costs					
Capital costs					
Capital value					
Investments					
Production value per species					
Financial position					
Employment					
Fleet					
Effort					
Number of fishing companies					

SGECA discussed the content of the methodological report for each category of data collection and agreed on some general specifications and recommendations (see Annex I).

5. INDICATORS OF ACCURACY AND PRECISION THAT NEED TO BE PROVIDED IN THE NATIONAL TECHNICAL REPORT TO EVALUATE THE QUALITY OF ESTIMATES FOR EACH ECONOMIC VARIABLE

In the current DCF, comparability of the quality of the data is limited by poor information provided by the MS in the technical report. This is mainly due to fact that the guidelines for reporting information on quality are lacking or unclear. The group was asked to provide guidelines on what to report in a first step towards the evaluation of the effectiveness of different sampling schemes and homogenising the sampling procedures for economic data around Europe.

The European Statistical System (ESS) standard quality reporting documents (EUROSTAT 2009a and 2009b) were presented and discussed (see Annex II). The group agreed that ESS provides a good framework for the application and presentation of the quality report and the information to be included, but that there is a need for more specific information in order to apply this framework to the DCF. Therefore, the WG compiled a table with the prerequisites for the information to be included in the technical report (see Table 2: Indicators of accuracy to be presented by MS in the TR). In this table it is indicated for each of the sampling strategies (e.g. census, probability sampling, non-probability sampling) which information should be included in the technical report, for each fleet segment.

The table distinguishes two types of error: *bias* and *variability*. Bias can be defined as the result of a systematic error in the survey design. This systematic error results from flaws either in the method of selection of sample units or in the procedures for gathering relevant information; as a consequence, the survey results will tend to be different from the true results. This tendency toward erroneous results is called bias. Systematic error (bias) needs to be distinguished from error due to random variability (sampling error), which results from the use of a population sample to estimate the economic parameters in the reference population. The sample estimates may differ from the true parameters because of random error.

In the process to reach the conclusions as stated in the table, SGECA discussed the following issues:

- Use of CV[2] versus Confidence intervals. The WG agreed that the use of CV is preferred over the use of confidence intervals, because in many cases data are not normally distributed and Confidence intervals would not give extra information.

- Assessment of quality in case of non-probability sampling. The group had in depth discussions on this subject but did not agree on any proposal, as in theory there is no solution readily available to estimate the precision of estimators based on non-random sampling. Some different pragmatic solutions could be used: the ESS suggests to assume probability sampling even in the case of non probability sampling in order to be able to use

[2] The coefficient of variation (CV) is defined as the standard error divided by the expected value of the estimator. It is the standard error in relative (percentage) terms.
The standard error is the square root of the variance of an estimator.

the CV, but the value of this measure is questionable. Other methods to get some indication of the precision of the estimate include e.g. non-parametric tests and regression modelling, but there was no consensus on the outputs that could be used in the quality report. Therefore, the group recommends that in cases where non-probability sampling is applied, MS describe clearly in the methodological reports the methods used to overcome problems of bias and possible ways to assess the quality of the estimates and their outcomes. Based on this information, SGECA recommends the launching of a study to harmonise quality reporting and propose methodology in this specific situation. General terms of reference for this study are included in Annex III. MS should then consider the results of this study when presenting quality indicators in the 2011 technical report on activities performed in 2010.

- The impact of non-response on the statistical outputs. Non-response is likely to introduce a bias and will increase the sampling error. Bias, which is the main problem with non-response, is introduced if non-respondents are significantly different from respondents. The WG recommends that MS should carefully assess the impact of non-response, especially in the case of a census with low response rate. SGECA also recommends that the suggested study on quality indicators for non-probability sampling should also address the question of the impact of non-random non-response on the final estimates.

- Set of precision targets. The group considered that at this stage it is not possible to define target precision levels to be achieved. The group recommends that this task should be addressed by a working group after the presentation of technical reports by MS compiled according to table 2.

A presentation was given on application of sampling procedures and the estimation of different quality indicators (CV and confidence intervals) and the application of a tool (Bethel, 1989) to assess optimal sample allocation among different strata (see Annex IV). The WG agreed that the method to derive the CV is useful and this method was applied to several different test cases (see Annex V). The WG also stressed that the sampling programme under the DCF should be organised in such a way that reasonable estimates can be made for each of the fleet segments. Optimising the sampling scheme in order to minimise the CV of the estimates of national fleet totals is likely to have adverse effects on the quality of estimates for individual segments. Optimisation leads to undersampling of less important fleet segments where there is a large difference in variance in different fleet segments (small-scale versus large-scale segments). Therefore, the WG recommends that the tool for optimisation of the sampling scheme should only be applied to individual fleet segments, not to the fleet as a whole.

Table 2: Indicators of accuracy to be presented by MS in the TR

Type of error	**Type of data collection (1)**	**Accuracy indicators**
Bias	A – B – C	Response rates - unit response rate (2) - item response rate (3)
	B – C	Coverage rates : planned and achieved coverage rates
	C (6)	Representativeness of the sample before and after re-weighting (4): deviations in terms of main characteristics (5) of sampled units compared with the population (for instance hypothesis tests on mean values)
Variability	A	None
	B	Coefficient of Variation (CV)
	C	Variability of the estimates (7)

Footnotes:

(1) A: Census which attempts to collect data from all members of population
B: Probability Sample survey
C: Non-Probability Sample survey

(2) unit response rate: the ratio of the number of units for which data for at least some variables have been collected to the total number of units designated for data collection

(3) item response rate: the ratio of the number of units which have provided data for a given variable to the total number of designated units or to the number of units that have provided data at least for some data items

(4) re-weighting could be necessary when the sample is judged not sufficiently representative

(5) technical characteristics (GT, age, etc.), effort and landings, where these data are available for each vessel in the fleet segment

(6) in case of low response rate (<70%), MS should evaluate the representativeness of the sample/census also under A and B

(7) methods to assess such variability should be presented in the methodological report (see Annex I)

5.1. Quality checks performed by JRC on data sent by MS

JRC presented an overview of the checks that have been carried out in order to evaluate the quality of the data sent to JRC in response to the latest data call (see Annex VI).

The group expressed its general appreciation of the work done by JRC in order to increase the quality of the data and agreed that data quality has improved in the light of the checks done by JRC.

These checks have included the following:

- Consistency of technical characteristics of the national fleets with those obtained from the EU Fleet Vessel Register.
- Consistency between the data delivered in the call and the data sampling plan in the NP
- Identification of improbable/impossible outcomes, e.g., days per vessel > 365
- Identification of significant discontinuities in time series of variables
- Consistency with other sources of information in case of suspicious values
- Completeness of the list of variables for each of the fleet segments
- Consistency of clustering of fleet segments for all variables

Considering that it is the responsibility of the MS to deliver high quality data, the group suggested that MS should routinely apply the checks listed here before delivering data to the Commission.

The WG recommends that in order to facilitate the checking of the data, JRC should provide the statistical appendices and the tables currently used in the AER to the MS soon after the submission of the data. In order to streamline communication between the data analysts and the Commission, contact details of the data analysts should be available for JRC, e.g., by their inclusion in the National programme.

6. COMMON APPROACHES TO DECIDE WHETHER CLUSTERING OF FLEET SEGMENTS SHOULD TAKE PLACE AND SUGGEST STATISTICAL METHODS TO EVALUATE THE RELIABILITY OF THE CLUSTERING

The Chair summarised the results of a questionnaire sent to MS concerning clustering practices and their justification, which vessel characteristics were used as the basis for clustering, the statistical methods used for testing the reliability of clustering, etc.

In total 19 responses were received. Only Malta and Belgium don't cluster (as of 2008). Many MS cluster to a significant extent (in terms of the reduction in the total number of segments reported on). Nine MS cluster for statistical reasons, 12 for confidentiality reasons, and some for both reasons. Most MS cluster before rather than after data collection (12 against 5 MS), results which are not always logically consistent with the reasons given for clustering. Most MS cluster on length (11), then type of gear (5). Eight MS don't apply any statistical analysis to their clustering, 9 do. Segment variance is analysed according to value of landings in 9 MS, according to effort in 9 MS and to capacity in 7 MS.

Summary of questionnaires is reported in Annex VII.

There was a question concerning the criterion of 10 vessels stated in the DCF. The group considered that according to the DCF[3], Member States "may refuse to transmit the relevant detailed and aggregated data only (a) if there is a risk of natural persons and/or legal entities being identified, in which case the Member State may propose alternative means to meet the needs of the end-user which ensure anonymity".

SGECA noted that national confidentiality rules vary (in some MS the limit is 3 units) and that legal rules on confidentiality generally apply to the number of enterprises and not the number of vessels as stated in the DCF. This could create some inconsistencies. MS should explain in their methodological report if segments with more than 10 vessels have to be clustered to protect enterprise data.

SGECA noted that clustering is optional not mandatory under the DCF. It was also noted that sampling clustered segments can in practice result in the complete omission of some segments from data collection. Clustering at the sampling stage results in the loss of information for some segments - this is not the case where results are clustered after data collection for confidentiality reasons. Hence, clustering for sampling and for confidentiality reasons are quite distinct issues.

Concerns were also raised over the implications for data time series if clustering practices change over time. SGECA recommends MS to take this into account when they segment the fleet in order to produce consistent time series over time.

SGECA considered that approaches to clustering should depend on the particular characteristics of fleet segments. In particular, homogeneity of vessels characteristics belonging to the cluster segments will assure data quality. At the same time, SGECA considered that some fleet

[3] EC 199/2008, art. 20,4

segments are more important in terms of landings/effort/target species than others, and therefore these segments should be treated with more care in case of clustering. For these important segments, there exists an evident scientific need to have economic data. SGECA also considered that there is a need for national totals.

Following these considerations, SGECA proposed that MS should distinguish between segments considered for clustering as follows:

1. Important segments with distinct characteristics

2. Segments similar to other segments

3. Non-important segments with distinct characteristics

Importance of fleet segments should be assessed in terms of landings (value and volume) and/or effort. Similarity should be demonstrated using expert knowledge on fishing patterns or on available data on landings and/or effort.

For each of the cases described, SGECA proposed the following approaches for clustering according to the different characteristics of fleet segments:

1. Important segments with distinct characteristics

Such segments should not be clustered unless strictly necessary in data reporting for confidentiality reasons. Data should be separately collected for these segments and included in national totals (unless separate identification is then made possible as a consequence).

2. Segments similar to other segments

Such segments can be clustered for sampling purposes, as well as for confidentiality reasons. The segments merged should be selected according to criteria that should be fully explained and justified by the MS. In particular, the approach to determine similarity should be clearly described by the MS.

3. Non-important segments with distinct characteristics

Such segments can be clustered for sampling purposes, as well as for confidentiality reasons. These segments can be merged with other non-important segments. SGECA recommends that MS avoid clustering these segments with other important segments. MS should explain in the methodological report how the lower importance had been determined and for which reasons the clustered segments have been selected.

SGECA requests that JRC consider the best way to standardise the naming of clustered segments.

7. COMMON METHODS TO ENSURE CONSISTENCY AND COMPARABILITY OF ALL ECONOMIC VARIABLES WHEN DERIVED FROM DIFFERENT SOURCES (E.G. SURVEYS, FLEET REGISTER, LOGBOOKS, SALES NOTES).

The group reviewed the definition of coherence and comparability used in standard documents for quality assurance (Eurostat 2009a and 2009b).

Coherence of two or more statistical outputs is defined as "the degree to which the statistical processes by which they were generated used the same concepts - classifications, definitions, and target populations – and harmonised methods. Coherent statistical outputs have the potential to be validly combined and used jointly. Examples of joint use are where the statistical outputs refer to the same population, reference period and region but comprise different sets of data items or where they comprise the same data items but for different reference periods, regions, or other domains" (Eurostat 2009a).

Comparability is defined as "a special case of coherence and refers to the latter example where the statistical outputs refer to the same data items and the aim of combining them is to make comparisons over time, or across regions, or across other domains" (Eurostat 2009a).

Following these definitions, SGECA considered that the term "coherence" should be used instead of "consistency".

The group observed that different economic variables can be gathered by different statistical processes, for example income could be obtained from official declarations (logbooks or sales notes) and costs of production from sample surveys. Thus, the term coherence is referred to the assessment of the extent to which the data from these different statistical processes can reliably be combined. More specifically in the example above, the validity of the combined use of landings data and costs data for the same fleet segment and time period depends upon their coherence.

SGECA recommends that MS perform checks on the coherence of data, present the results and comment on inconsistencies in the TR.

In order to check for coherence, the group suggests the following approaches:

- Undertake consistency studies that can be used when there are known relationships between different parameters

- Cross checking indicators. For example, the sum of estimates for fleet segments could be compared with statistics on the total fleet from other administrative sources. Economic models explaining relationships between variables could also be used. For example, a case study on AER data showed that the trend of net profit and of capital value moved in different directions for some fleet segments, and this could indicate inconsistencies in data. In such cases, the underlying (theoretical) assumptions of the models should be discussed.

Other technical tests of coherence could be based on reliable data which are available from non-DCF sources or expert knowledge, for example daily fuel cost per vessel or other variable costs.

- Apply methods suggested in the ESS reports (Eurostat 2009a and 2009b) which give a list of examples of technical checks that could be used.

Apart from coherence, comparability of data should be checked. Comparability refers to the extent to which data for the same fleet segment within a region or data for different time periods can reliably be combined.

SGECA recommends that MS assess the comparability of economic variables over time, include the results in the TR and discuss inconsistencies in trends.

SGECA recommends that RCM should check for comparability within a region through an analysis of definitions and methodologies. If an RCM notices any inconsistency this should be communicated to STECF.

8. THE GENERAL ROLE OF SGECA AND PROPOSE TOR FOR ITS FUTURE WORK , IN RELATION TO THE DCF FRAMEWORK

SGECA discussed the future of the working group and proposed that it should continue as an STECF sub-group (SGECA/DCF), with a permanent chairperson, dealing specifically with methodological issues arising from the implementation of the economic components of the DCF. This would encompass economic data collection for fishing fleets, the fish processing industry and the aquaculture sector, as well as ecosystem indicators and transversal variables. DCF-related economic issues raised by the RCMs could be referred by the Commission to SGECA/DCF.

The group considered that all other economic issues (including the Annual Economic Report) should continue to be referred directly to STECF.

While guidelines for the preparation of the economic sections of the NP and TR would fall within the remit of SGECA/DCF, evaluation of the NP/TR should remain the task of SGRN.

General ToR for SGECA/DCF should include the following.

1. Propose guidelines for the collection of economic data

2. Propose guidelines for the evaluation of NP and TR

3. Discuss methodological issues

4. Exchange best practices on data collection methodologies and statistical techniques

5. Propose methods which ensure comparability of data collected by MS at the regional level

6. Suggest studies and workshops on specific methodological issues.

9. REFERENCES

EUROSTAT (2009a). ESS Handbook for Quality Reports. ISBN 978-92-79-07855-2

EUROSTAT (2009b). ESS Standard for Quality Reports. ISBN 978-92-79-07854-5

ANNEX I: Methodological Report for NP

LIST OF CONTENT	Type of data collection	SPECIFICATION
SECTION 1 - TYPE OF DATA COLLECTION	**A**: Census **B**: Probability Sample Survey **C**: Non-Probability Sample Survey	D. *Census*, which attempts to collect data from all members of a population. This would include collection of data from *administrative records*, as well as other cases in which data are derived from sources originally compiled for non-statistical purposes; (1) E. *Probability Sample survey*, in which data are collected from a sample of population members randomly selected; F. *Non Probability Sample survey*, in which data are collected from a sample of population members not randomly selected. (2)
SECTION 2 - POPULATION		
Target population (3)	A-B-C	The target population is the population for which inferences are made and is defined in the DCF. MS should explain if there are deviations from the definition given in the DCF. MS should describe the fleet segmentation. A table with numbers of vessels per segment should be supplied. Clustering of fleet segments should be described and information should be given on the segments that are clustered, as required by the DCF and following SGECA recommendations. A table should report the segments that have been clustered.
Frame Population (3)	A-B-C	The frame is a device that permits access to population units. The frame population is the set of population units which can be accessed through the frame and the survey data then refer to this population. The frame contains sufficient information about the units for their stratification, sampling and contact.
SECTION 2 - DATA SOURCES		
Data sources/Questionnaire Design	A-B-C	MS should provide a list of data sources used (logbook, sales notes, accounts, etc.) and a description of each. Where a questionnaire is used, a copy of this should be included in an annex to the report

SECTION 3 SAMPLING		
Type of sampling strategy	B-C	MS should describe the selection of sampling units and therefore the type of sampling strategy used (e.g., simple random sampling, systematic sampling, sampling with PPS, multiple stage sampling, etc.)
Further stratification within fleet segment	B-C	MS should describe if fleet segments have been divided into subsets (strata) before the selection of a sample. MS should define what parameters have been used to stratify.
Determination of sample size for each fleet segment	B-C	MS should explain which targets have been used to determine the sample size and why these targets have been chosen. MS should present the sample size by fleet segment in a table, together with the coverage rate (number of vessels in the sample/number of vessels in the population)
Sample evolution over time, rotational groups (4)	B-C	MS should describe any projected changes in sample size over time and should report the number of sample units that will be substituted from one year to another.
SECTION 3 ESTIMATION		
Estimation methods from sample to population	B-C	MS should describe the type of estimators used according to the type of sampling strategy (for example, Horvitz-Thompson or Hansen-Hurwitz estimators) MS should describe estimation procedures, including the nature of any additional information used
Imputation of non responses/ Non-response adjustments (5)	A-B-C	MS should describe the statistical models used, e.g., regression analysis, adjustments of raising factors, etc. Where substitution is applied in cases of unit non-responses, the following information should be provided: method of selection of substitutes and main characteristics of substituted units compared to original units
SECTION 4 - DATA QUALITY EVALUATION		
Evaluation of accuracy	A-B-C	MS should describe the methods to assess the variability of the estimates and to assess the bias derived from non-responses and from the use of models in case of non-probability sampling
SECTION 5 - DATA DISSEMINATION AND PRESENTATION	A-B-C	MS should indicate when data will be available to end users and the time lag with respect to the reference year.

		Confidentiality problems and the need for clustering of segments in the phase of presentation of the results should be discussed in this section.

Footnotes:

(1) In a census all the units in the population will be contacted in order to collect economic variables. This definition continues to apply when the response rate is less than 100%. In this case, non-responses should be dealt with using appropriate statistical procedures.

(2) Non-Probability Sampling refers, for example, to surveys where data are collected from a panel of vessels who have agreed to supply data on a voluntary basis or from a sample selected on the basis of *a priori* information, or other non-random methods. Technical details on how the sample was selected should be reported. The reason for not using probability sampling should be stated as well as an assessment of how the sampling procedures may affect the estimates. Different types of non-probability sampling, such as "cut-off" sampling (where units below a certain size threshold are not sampled) are described in Eurostat (2009a and 2009b).

(3) The population is clearly defined in the DCF. For economic variables to be collected for active and non-active vessels, the population and the frame (normally based on the Community Fishing Fleet Register) are the same. For economic variables to be collected only for active vessels, the frame may be different from the population. In this case the source of information used to distinguish the frame from the population should be described.

(4) In the case where rotation is applied to substitute non-responsive units, this should be clearly described and the consequences for the estimates should be discussed.

(5) In the case of a census with non-responses, variables should be estimated using models described in the methodological report. Methods used to evaluate the accuracy of these estimates should also be discussed under Section 4- data quality evaluation.

ANNEX II: The European Statistical System (ESS) Standard for Quality Reports

Introduction

Producers of statistics will have to demonstrate that high quality standards have been applied and achieved through all steps of the statistical production processes.

Furthermore, users of statistics will be guaranteed access to appropriate metadata describing the quality of statistical outputs, so that they will be able to interpret and use the statistics correctly.

The European Statistics Code of Practice provides a broad conceptual framework for viewing quality and sets standards for the European Statistical System (ESS) institutional environment, statistical processes and statistical outputs

Quality Reports

The ESS Standard for Quality Reports (2009) provides recommendations for preparing comprehensive quality reports for the full range of statistical processes and their outputs.

The ESS Handbook for Quality Reports (2009) provides much more detailed guidelines and examples of quality reporting practices.

A key objective of these documents is to promote harmonised quality reporting across statistical processes and across Member States and hence to facilitate cross-comparisons of processes and outputs.

Types of statistical processes

For the purpose of the Standard six types of statistical processes are distinguished.

1. Sample Survey. A survey based on a, usually probabilistic, sampling procedure involving direct collection of data from respondents.

2. Census. A survey, where all frame units are covered.

3. Statistical Process Using Administrative Source(s). A process making use of data collected for other purposes than direct production of statistics.

4. Statistical Process Involving Multiple Data Sources. Different sampling, questionnaire designs and/or sampling procedures are used for different survey segments.

5. Price or other economic index process. Involving complex sample surveys, often with non-probabilistic designs, and the target is complex and model-based.

6. Statistical Compilation. Specifically including economic aggregates like the National Accounts and the Balance of Payments

Process quality components

1. Relevance

2. Accuracy

3. Timeliness and punctuality

4. Accessibility and clarity

5. Coherence and comparability

Relevance

Relevance is the degree to which statistical outputs meet current and potential user needs. It depends on whether all the statistics that are needed are produced and the extent to which concepts used (definitions, classifications etc.,) reflect user needs

Accuracy

The accuracy of statistical outputs in the general statistical sense is the degree of closeness of estimates to the true values.

Timeliness and Punctuality

The timeliness of statistical outputs is the length of time between the event or phenomenon they describe and their availability.

Punctuality is the time lag between the release date of data and the target date on which they were scheduled for release as announced in an official release calendar, laid down by Regulations or previously agreed among partners.

Accessibility and Clarity

Accessibility and clarity refer to the simplicity and ease with which users can access statistics, with the appropriate supporting information and assistance.

Coherence and Comparability

The coherence of two or more statistical outputs refers to the degree to which the statistical processes by which they were generated used the same concepts - classifications, definitions, and target populations – and harmonised methods. Coherent statistical outputs have the potential to be validly combined and used jointly.

Comparability is a special case of coherence when the same data items and the aim of combining them is to make comparisons over time, or across regions, or across other domains.

ACCURACY

A purpose of statistics is to produce estimates of unknown values of quantifiable characteristics of a target population. Estimates are not equal to the true values because of variability and bias.

Variability: the statistics change from implementation to implementation of the statistical process due to random effects

Bias: the average of the possible values of the statistics from implementation to implementation is not equal to the true value due to systematic effects; the bias of an estimator equals the difference between its expected value and the true value

There are sampling errors, and non-sampling errors including

(i) coverage errors,
(ii) measurement errors,
(iii) nonresponse errors,
(iv) processing errors

According to the state of knowledge of the producer, the assessment of bias can be in quantitative or qualitative terms, or both.

(Accuracy) Sampling Errors

Sampling can be of two types: probability sampling, meaning that each unit of the frame population has a known, non-zero probability of being selected in the sample, and nonprobability sampling.

For probability sampling, sampling theory provides techniques for the estimation of the expected value and variance of specific indicators over all possible samples, Therefore, the random variation due to sampling can be calculated. Furthermore, sampling biases are normally zero or negligible so that the variance can be taken to represent total sampling error (subject to full response - see nonresponse errors).

(Accuracy) Sampling Errors - probability sampling

The CV is the most suitable sampling error statistic for quantitative variables with large positive values, which are common in economic statistics. It is not recommended for percentages or changes, where it could easily be misunderstood and it is not usable for estimates that can take on negative values. In these cases a confidence interval is often a better statistic. For key indicators the sampling error should always be expressed as a confidence interval, since this is the most rigorous and clear way of demonstrating sampling variability.

(Accuracy) Sampling Errors - probability sampling

The standard error is the square root of the variance of an estimator. Usually the standard error is not suitable for use by itself since its interpretation is not obvious to the average user.The coefficient of variation (CV) is defined as the standard error divided by the expected value of the estimator. It is the standard error in relative (percentage) terms.

The confidence interval is defined as an interval that covers the true value with a certain probability. In most cases where it is reasonable to assume the estimator follows a normal distribution, the interval that results from taking ± 2* estimated standard error from the point estimate results in a 95 % confidence interval. Taking instead ± 2* estimated CV expresses the interval in percentage terms.

(Accuracy) Sampling Errors - Non-Probability Sampling

When non-probability sampling is applied, random error can not be estimated without reference to a model of some kind. Furthermore, sampling biases may well be significant and need to be assessed as well

The European Statistical System (ESS) considers that probabilistic sample is a prerequisite for most surveys

(Accuracy) Sampling Errors - Non-Probability Sampling

The difference between nonprobability and probability sampling is that nonprobability sampling does not involve random selection and probability sampling does. This means that we cannot know if nonprobability samples are representative of the population. With nonprobability samples, we may or may not represent the population, and we cannot use the rationale of probability theory to verify it.

There are many types of non-probability sampling, which each require their own evaluation depending on the situation at hand (“cut-off, “purposive” or “subjective”)

(Accuracy) Sampling Errors - Non-Probability Sampling

For non-probability sampling it may be reasonable to apply standard error estimators as if the sample is effectively random, using an assumption for the design or some model based approach. This approach has, however, to be complemented with a discussion of possible sampling bias and of possible limitations in the sampling model used.

Technical details on how the sample was selected should always be reported. The rationale for not using probability sampling should be stated as well as an assessment of how the sampling procedures can affect the estimates

(Accuracy) Sampling Errors - Non-Probability Sampling

An alternative approach to be discussed by SGECA:

- Apply regression analysis to estimate economic values, the independent variables being known values (days, landings, ..) and the dependent variables being the observations from our sample

- Estimate the error of the regression as a measure of bias in final estimates

(Accuracy) Non Sampling Errors - Coverage errors

Coverage errors (or frame errors) are due to divergences between the target population and the frame population. Three types of coverage error are distinguished:

(i) undercoverage,
(ii) overcoverage and
(iii) multiple listings

(Accuracy) Non Sampling Errors - Measurement Errors

Measurement errors are errors that occur during data collection and cause recorded values of variables to be different from the true ones. Their causes are commonly categorized as:

• Survey instrument: the form, questionnaire or measuring device used for data collection may lead to the recording of wrong values.

• Respondent: respondents may, consciously or unconsciously, give erroneous data.

• Interviewer: interviewers may influence the answers given by respondents..

(Accuracy) Non Sampling Errors - Nonresponse Errors

Nonresponse is the failure of a sample survey (or a census) to collect data for all data items in the survey questionnaire from all the population units designated for data collection.

The difference between the statistics computed from the collected data and those that would be computed if there were no missing values is the nonresponse error

(Accuracy) Non Sampling Errors - Nonresponse Errors

The extent of response (and accordingly of nonresponse) is measured in terms of response rates of two kinds:

- unit response rate: the ratio of the number of units for which data for at least some variables have been collected to the total number of units designated for data collection;

- item response rate: the ratio of the number of units which have provided data for a given variable to the total number of designated units or to the number of units that have provided data at least for some data items.

(Accuracy) Non Sampling Errors - Nonresponse Errors

The increased sampling errors due to nonresponse can and should be taken into account when computing CVs or confidence intervals.

The remaining and more difficult issue is how to obtain information on nonresponse bias. The basic approach is to compare the response and nonresponse strata with respect to any variables that are available for both these strata.

(Accuracy) Non Sampling Errors - Processing Errors

Between data collection and the beginning of statistical analysis, data must undergo processing comprising data entry, data editing (checks and corrections), sometimes coding and imputation.

Errors introduced in these stages are called processing errors.

Accuracy: Census

The objective of a census is to include all units according to an agreed definition. By definition there is no sampling error in a census but non-sampling errors are essentially of the same types as in sample surveys

Accuracy: Statistical Processes Using Administrative Source(s)

For statistics calculated directly from registers, key types of errors are: (i) Coverage and (ii) Errors in register variables.

ANNEX III: General terms of reference for the study to harmonise quality reporting and propose methodology in the case of non-probability sample survey

Background

The DCF, in the section concerning the economic data of the fleet, requires MS to include in their annual report information on the quality (accuracy and precision) of estimates.

In case of non-probability sampling, the European Statistical System (ESS) suggests assuming probability sampling even in the case of non-probability sampling in order to be able to use the CV, but the value of this measure is questionable. Other methods to get some indication of the precision of the estimate include e.g. non-parametric tests and regression modelling, but, even in these cases, it is not clear which outputs could be used in the quality report to give information on the quality of the estimates.

Another common problem affecting the quality of economic data concerns the non-response that is likely to introduce a bias and increases the sampling error. Assessment of the impact of non-response is important in all the different types of data collection (probability sampling, non-probability sampling and census).

Considering that non-probability sampling and low response rates are rather common in the collection of economic data of the fleets, and also considering that there is very little published information on these questions, a study has been recommended by SGECA 09-02.

The results of this study should be then taken into account by MS when presenting quality indicators in the 2011 technical report on activities performed in 2010.

Terms of References of the study

- Investigate examples of the assessment of the quality of non-probability sampling strategies applied in other sectors which could be adapted to fisheries
- Propose a suitable methodology for the estimation of economic variables in case of non-probability sampling
- Propose indicators for the assessment of the quality of estimates of economic variables in the case of non-probability sampling
- Propose a common format for the presentation of these methodologies in the NP and in the TR in order to harmonise quality reporting
- Propose methods to evaluate the impact of non-response in case of non-probability sampling and also in case of probability sampling and census with low response rates
- Perform a comparative impact on data quality of different sampling strategies (e.g. is sampling preferable to census with low response rate? When a response rate should be considered too low with respect to the reliability of final estimates?).

Duration of the study: 4 months

ANNEX IV: Presentation on application of sampling procedures and the estimation of different quality indicators CV and the confidence intervals and the application of a tool to asses optimal sample allocation among different strata

Coefficient of Variation and Optimal Sample Size

Michele De Meo

Irepa Onlus

Slide 1

In this meeting we have to define *quality aspects of the collection of economic data*, so it is necessary to introduce some simple concepts.

A **unit** is a single individual or object to be measured.

The **population** (or **universe**) is the entire collection of units about which we would like information.

Slide 2

The first idea to obtain information should be to investigate the whole population.

Even if it may be more accurate than a sample, a census takes more time and resources to complete.

In this case, that is if a census is not appropiate, the only possibility is a **sample survey**

Slide 3

Some specification

We can simply define the **sample** as *a subgroup of the population*

While a **useful sample** is only a *sample representative of the universe* !!!!!!

Slide 4

Principal steps in sampling:

Define the population from which the samples will be drawn, that is the *target population*

Decide which data should be sampled

Define the sampling procedure

Determine the degree of desired precision: *coefficient of variation*

Determine the optimum sample size

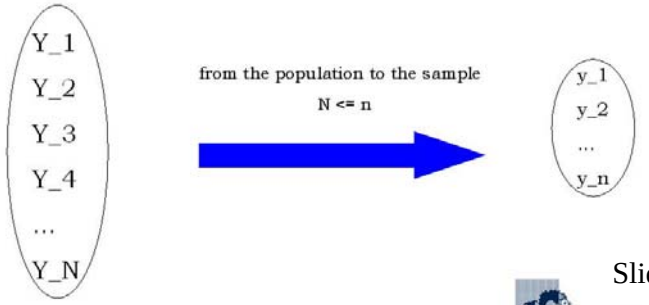
Collect and analyze the data

Evaluate the **quality aspects** of the survey

IREPA

Slide 5

Now we consider some of the previous steps



IREPA

Slide 6

For example, Y should be the fuel cost:

i = vessel code

Y_i = fuel cost for the vessel i

N = population size

n = sample size

We want to estimate $Y = \sum_{i=1}^{N} Y_i$

If we collect information with a simple random sampling, we estimate Y with $\hat{Y}$

$$\hat{Y} = \frac{N}{n} \sum_{i=1}^{n} y_i$$

IREPA

Slide 7

An estimate of a quantity of interest, such as the *total fuel cost*, will generally be subject to sample-to-sample variation, that is the **sampling error** : the error caused by observing a sample instead of the whole population

To evaluate the quality of our data, we have to calculate the **coefficient of variation** of the estimate:

$$cv(\hat{Y}) = \frac{\hat{\sigma}(\hat{Y})}{\hat{Y}}$$

In our example:

$\hat{\sigma}(\hat{Y})$: the estimate of the standard deviation of $\hat{Y}$

$\hat{Y}$: the estimate of the total fuel cost $\hat{Y}$

IREPA

Slide 8

Why the CV is so important?

the higher the level, the lower the accuracy

Than we can observe that the Coefficient of Variation is directly associated to the confidence interval

$$\hat{Y} \pm z_{\alpha/2} \cdot \hat{\sigma}(\hat{Y}) = \hat{Y} \pm z_{\alpha/2} \cdot \hat{Y} \cdot cv(\hat{Y})$$

The confidence interval increases with the coefficient of variation!

Slide 9

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Example

Interval of confidence for the total fuel cost of 15000:

If **CV = 0.02**, than the **real** total fuel cost will be between

15000 - 1.96 * (15000*0.02) = **14412**

and

15000 + 1.96 * (15000*0.02) = **15588**

If **CV = 0.35**, than the **real** total fuel cost will be between

15000 - 1.96 * (15000*0.35) = **4710**

and

15000 + 1.96 * (15000*0.35) = **25290**

Slide 10

IREPA

How to ensure a sample with a specific precision level ???

The Bethel procedure can help you to calculate the optimum sample size in each strata

You can use the R software and the bethel package:

R: **http://www.r-project.org/**

bethel: **http://cran.r-project.org/web/packages/bethel**

(if you download the bethel library, you can find a useful manual on the methodology)

If you use the SAS software, you can downoload the **MAUSS** package (it's free) :

http://www.istat.it/strumenti/metodi/software/campione/mauss/

Slide 11

IREPA

More generally, you can use the survey package, which provides facilities in R for analyzing data from complex surveys:

http://faculty.washington.edu/tlumley/survey/

Slide 12

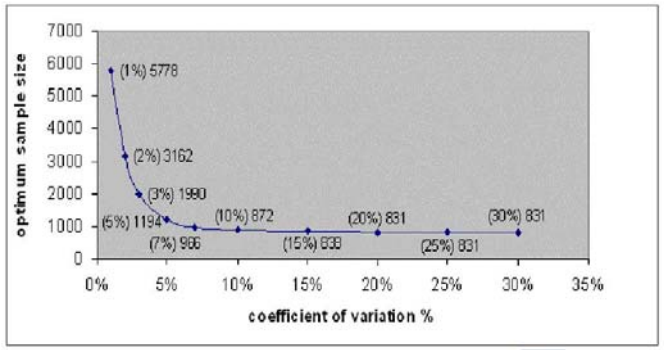
IREPA

Example

statconnDCOM

Slide 13

CV and relative optimum sample size



Slide 14

What about non-probability sampling?

As stressed by the European Statistical System with the **Standard for Quality Reports** :

*"... it can be reasonable to invoke a model implying that a sample is "effectively random" according to some design and **then apply the relevant variance estimation formula** according to that design. It has to be complemented with a discussion of possible sampling bias and of possible limitations in the sampling model used ..."*

Slide 15

Example

You can suppose your model (... **confirmed by the data !!!)**:

$$Y = f(X; e)$$

Where:

Y: fuel cost

X: days at sea

e: the measurement error (for example, normally distribuited)

Than you can estimate the coefficient of variation:

$$cv(\hat{Y}) = cv(\hat{f})$$

Slide 16

ANNEX V: Application of methods to derive quality indicators for the data sampling scheme

A training exercise was conducted during SGECA-09-02 to carry out some simulation to illustrate:

- The calculation of CV
- The concept of CV associated to the interval of confidence
- The calculation of the optimal sample size in the case of multivariate sampling strategies (download of “bethel library” from “R-project” web site)
- The link between precision levels and optimal sample size

Data were asked to experts before the meeting on a volunteering basis. In case experts attending the meeting have access to the economic data collected by the MS, they have been asked to fill two specific templates, one with elementary data and one with data on the fleet. Data related to the following variables have been asked: income, personnel costs, energy costs and repair and maintenance costs.

During the meeting data from Italy, France and Germany were available.

The exercise carried out on these data can be described in the following stages:

- Calculation of the coefficient of variation in Excel spreadsheets
- Calculation of the confidence interval for the estimator of the total
- Assessment of the accuracy of the estimate by analysing the confidence interval
- Application of the "bethel" library in R (download, description, simulation)
- Application of the "bethel" library directly in Excel spreadsheet.

R is not based on an easy GUI (Grafical User Interface), therefore the necessary VBA (Visual Basic for Application) code was used to run R in "background" and then the Bethel library was applied directly in Excel.

In general, for the analysis, the following "tools" were used:

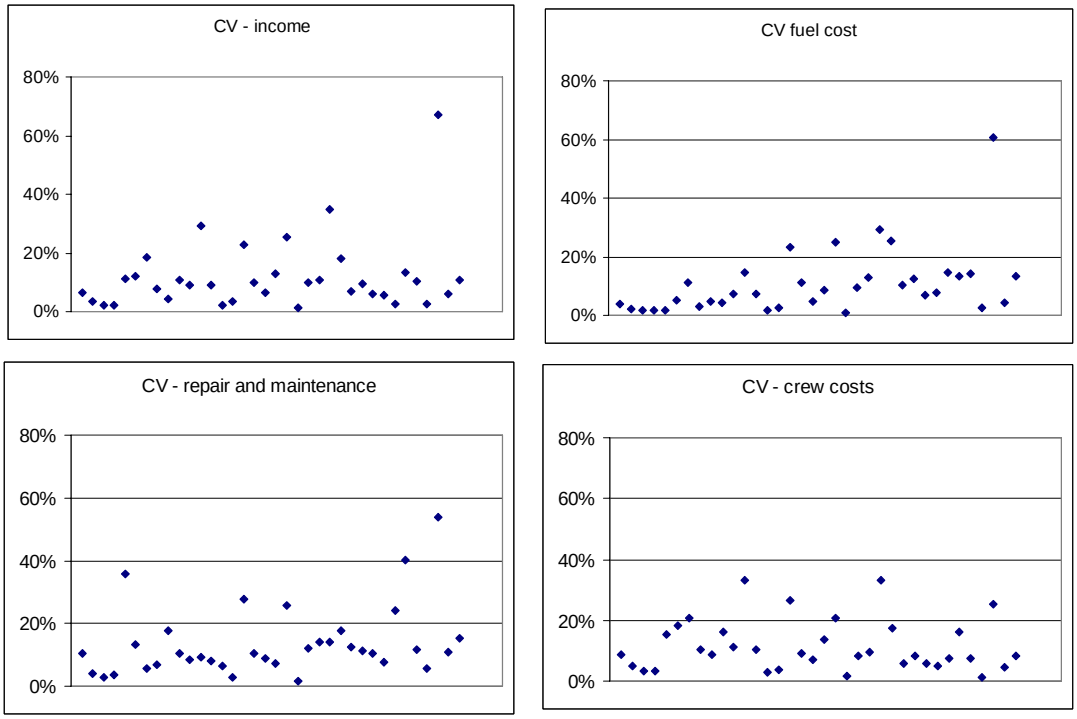
- R software: http://www.r-project.org/;
- Bethel library: http://cran.at.r-project.org/web/packages/bethel/index.html;
- statconnDCOM: http://sunsite.univie.ac.at/rcom/;
- Excel.

Some outputs of the exercises are included in the following tables:

Table 5.1 – Coefficient of Variations for economic variables and fleet segments

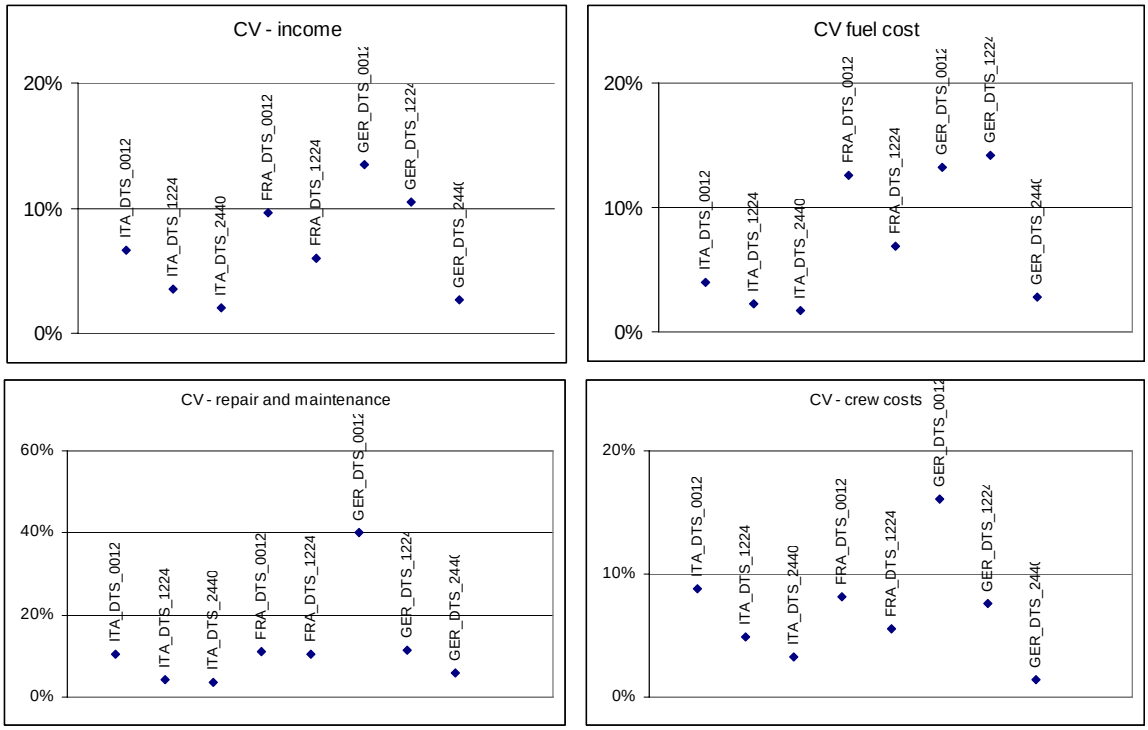
	CV			
	income	personnel costs	energy	Repair and maintenance
ITA_DTS_0012	7%	9%	4%	11%
ITA_DTS_1218	3%	5%	2%	4%
ITA_DTS_1824	2%	3%	2%	3%
ITA_DTS_2440	2%	3%	2%	4%
ITA_TBB_1218	11%	15%	2%	36%
ITA_TBB_1824	12%	18%	5%	13%
ITA_TBB_2440	18%	21%	11%	6%
ITA_OTM_1218	8%	10%	3%	7%
ITA_OTM_1824	4%	9%	5%	18%
ITA_OTM_2440	11%	16%	4%	11%
ITA_PEL_1218	9%	11%	7%	8%
ITA_PEL_1824	29%	33%	15%	9%
ITA_PEL_2440	9%	10%	7%	8%
ITA_DRB_1218	2%	3%	2%	6%
ITA_PG_0012	3%	4%	3%	3%
ITA_LON_0012	23%	27%	23%	28%
ITA_LON_1218	10%	9%	11%	10%
ITA_LON_1824	7%	7%	5%	9%
ITA_PGP_1218	13%	14%	9%	7%
ITA_PMP_1218	25%	21%	25%	26%
ITA_TOT	*1%*	*2%*	*1%*	*1%*
FRA_DFN_0012	10%	8%	10%	12%
FRA_DFN_1224	11%	10%	13%	14%
FRA_DPE_1224	35%	33%	29%	14%
FRA_DRB_0012	18%	17%	25%	18%
FRA_DRB_1224	7%	6%	10%	12%
FRA_DTS_0012	10%	8%	13%	11%
FRA_DTS_1224	6%	6%	7%	10%
FRA_TOT	*6%*	*5%*	*8%*	*8%*
GER_DFN_1224	2%	8%	15%	24%
GER_DTS_0012	13%	16%	13%	40%
GER_DTS_1224	10%	8%	14%	12%
GER_DTS_2440	3%	1%	3%	6%
GER_PG_0012	67%	25%	61%	54%
GER_TBB_1224	6%	5%	4%	11%
GER_TOT	*11%*	*8%*	*14%*	*15%*

Figure 5.1 – Distribution of CV per variable and fleet segments



For most fleet segments the CV is under the 20% limit. Only for very few segments the CV indicates a very poor quality of the estimates in terms of precision and of statistical reliability. The variable with the highest values for the CV seems to be “repair and maintenance”, while the “fuel cost” is the variable with more precise estimates.

Figure 5.2 –CV per variable and fleet segments (trawlers)



The trawler segments show a relative homogeneity in terms of CV. In each country, the segment less than 12 meters is the one with higher sampling errors. Fuel costs and crew costs present better CV than repair and maintenance.

References:

Bethel, J. (1989). Sample Allocation in Multivariate Surveys. Survey Methodology, 15, 47-57.

ANNEX VI: Presentation by JRC on the checks that have been carried out in order to evaluate the quality of the data sent by MS in response to the latest data call

LIST OF CONTENTS

1. INTRODUCTION

As foreseen in Article 10 of Regulation No 1639/2001 amended by Regulation No 1581/2004, the European Commission asked Member States to provide specific economic, effort, capacity and landings data included within their National Data Collection programs.

The data was processed and analysed by JRC and STECF experts to produce the report on the "Economic Performance of EU Fishing Fleets: Annual Report 2009". It was asked for data on capacity; revenues, costs and fuel-use; effort; financial position; employment; landings and prices pertaining to the years 2002, 2003, 2004, 2005, 2006 and 2007 for the EU fleet. Further details on these required parameters and indicators are available on the web page: **https://datacollection.jrc.ec.europa.eu/**.

Data received at the JRC underwent several checks on its quality, in order to detect possible errors and inconsistencies. Later, these data was used to elaborate the AER. However, as of April 2009 member states were still uploading corrected data. Due to these late submissions, errors on the data submitted and missing data the production of the AER was made difficult.

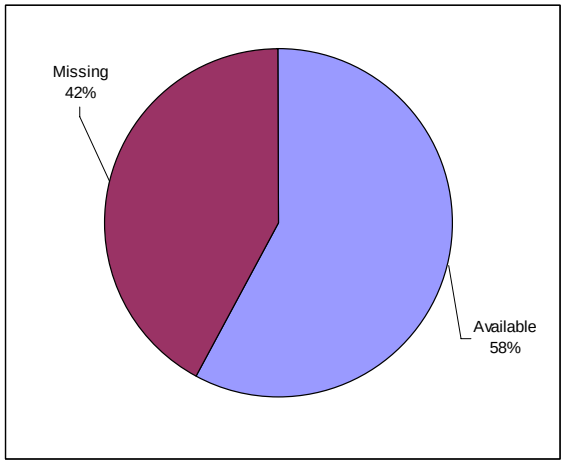
However, following Council Regulation (EC) No 199/2008 Article 19:

Correct execution of the National Programmes and, in particular, adherence to deadlines, quality control, validation and transmission of the data collected, is of high importance. For this reason Community Financial contribution should be made conditional on adherence to the relevant deadlines, on quality control, on compliance with agreed quality standards and on the provision of data. Consequently, a financial sanction system related to non-compliance with these conditions should be introduced.

Thus, data quality and the quality checks should be responsibility of the MS.

As already stated on previous section, late submissions, as well as missing data were two of the main difficulties found on the elaboration of the AER. On figure 1, it can be seen the percentage of data (variable groups uploaded) that was available at the deadline of the data call, which was set to the 15 th of December 2008.

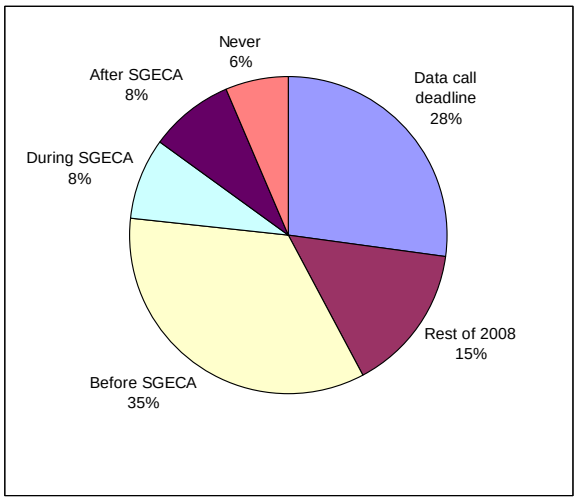
Figure 1: Data uploaded before the Data call deadline by variable group



From previous figure it can be seen that 58% of the data was made available before the data call deadline, and so 42% of the data was missing at that time. The percentage of the data availability has been done considering how many variable groups were uploaded just before the deadline out of the total variable groups requested to be uploaded. The total variable groups were 154; which comes from 7 variables groups multiplied by 22 (20 countries plus Azores and Madeira). It should be considered that this method to calculate the percentage of data available overestimates the actual data available. Because many times, even a variable group is uploaded, not all variables are provided or there are some missing observations. Data on later stages (after the deadline) were submitted and some times corrected and resubmitted. Some data were never submitted.

On figure 2, it can be seen the percentage of the final data (variable groups) that was made available (uploaded) before the data call (and not resubmitted on a later stage), during the rest of 2008, before the SGECA-09-01 meeting, during the SGECA-09-01 meeting (from 9th to 13th of March 2009), after the SGECA-09-01 meeting and the data that was never uploaded.

Figure 2: Final data uploads by variable group



From previous figures it can be seen that of the 58% of the data that was made available before the data call deadline, 30% (more than half of it) was resubmitted again at a later stage. Thus, only 28% of the data submitted before the deadline was final data. So, 72% of the final data was submitted after the deadline or it was never submitted. Furthermore, as just shown, these calculations overestimate the data available.

It should also be stated that the last uploads were done during April. While no country submitted all their data before the Data call deadline. It can also be seen from previous figure that most countries have some unreported data. This makes the analyses of all parameters and specially when looking at aggregated levels (country, sea region and overall EU) very complicated and much more imprecise.

2. QUALITY CHECKS

On these sections there are presented the checks on the data done by the JRC to investigate the existence of errors and missing observations in the data reported.

Once the checks were performed, all the highlighted inconsistencies were individually analysed and consulted with the MS experts when doubts remained.

These checks can be categorized as follows:

- Syntactic checks
- Semantic checks
- Trend checks
- Compliance checks

- Comparisons with the national programmes
- Indicator trend checks
- Comparisons with other data sources
- Clustering checks

2.1 Syntactic checks

The JRC has devised a number of automatic syntactic checks to perform on the data once it has been uploaded to the JRC database. Syntactic checks are carried out without any specific knowledge of what the data contains or its meaning. They only tell us if the data is present or not and in the correct format. These checks automatically reject data that do not confirm to specific restrictions, such as ensuring textual data is validated against defined parameters lists e.g. Species types, FAO code, fishing technique, vessel length, country code etc. In addition, numeric data are checked to make sure they contain numbers and not strings. In the event of errors, a message is sent to the person uploading the data. If there are more than 3 errors found in one dataset then the upload is rejected.

Member States received immediate feedback when attempting to upload their data submissions. The helped Member States identify inconsitencies with there own data, and to fix them without intervention from the datacollection team. Intervention by the datacollection team was generally only required on technical issues with the upload server, and more complex issues regarding the datasets.

These basic Syntactic quality checks and immediate feedback have contributed significantly to the overall improvement of the quality of the data submitted.

2.2 Semantic checks

The JRC has also devised a number of semantic checks to perform on the data after upload. Most of these checks are performed manually, although some are fully or partially automated. Eventually, the aim is for all semantic checks to be performed automatically, however further work is required to define appropriate boundaries. Table 2 lists the semantic checks performed by the JRC and highlights whether further work is needed to redefine the boundaries set.

Table 2: Semantic checks

DATABASE CODE	Restriction	Comments
ALL PARAMETERS	> 0	Checked Manually
NUMBER	< 25 000	Checked Manually
GT	< 700 000	To be redefined

KW	< 1 500 000	To be redefined
DAYS	< 4 000 000	To be redefined
KWDAYS	< 2000 000 000	To be redefined
GTDAYS	< 150 000 000	To be redefined
TOTAL	< 50 000	Checked Manually
FULLTIME	< 50 000	Checked Manually
PARTTIME	< 30 000	Checked Manually
FTE	< 30 000	Checked Manually
BORROWING	< 100	Checked Manually
INVESTMENTS	< 1 200 000 000	To be redefined
LIVE	< 500	To be redefined
INCOME	< 5000 000 000	To be redefined
CREWCOST	< 170 000	To be redefined
FUELCOST	< 1500 000	To be redefined
REPCOST	< 70 000	To be redefined
FUELCONS	< 500 000	To be redefined
VARCOST	< 300 000	To be redefined
CAPCOST	< 100 000	To be redefined
FIXEDCOST	< 100 000	To be redefined
Horse power (KW)	= KW /GT > 1	Checked Manually
Tonnage (GT)	= GT / KW < 1	Checked Manually
Landings (VALUE)	Landings value / income = 0.5 - 1.5	Not checked
Employment (TOTAL)	Number of crew > Number of vessels	Checked Manually
Employment (FTE)	< TOTAL	Checked Manually
Employment (PARTTIME)	< TOTAL and FULLTIME	Checked Manually
Price (LIVE)	= Value of landings / weight of landings	Checked Manually
Effort (DAYS)	Days / vessel < 365	Automatic checks
KWDAYS	= KW*DAYS	Not checked
GTDAYS	= GT*DAYS	Not checked
Crew share (CREWCOST) Fuel cost (FUELCOST) Repair cost (REPCOST) Variable cost (VARCOST) Fixed cost (FIXEDCOST)	< 0.70 % of Income	Automatic Checks

When these checks highlighted questionable submissions, the JRC contacted the national correspondent from the Member State concerned to discuss the submission. In some cases reasonable explanations for the data submitted were provided, while in other cases the national correspondents agreed that the data submitted was incorrect and resubmission is necessary.

The Semantic quality checks also contributed significantly to the overall improvement of the quality of the data submitted.

2.3. Trend checks

The JRC undertook trend checking as part of their quality assessment. These checks were designed to spot unreasonably large differences in the variables from one year to the next. No data was be rejected on the basis of these checks but they were identified as suspicious. The allowed deviation was based on previously submitted data. Table 3 lists the trend checks performed by the JRC.

Table 3: Trend checks

DCR parameter	Methodology	Comments
Number of vessels (NUMBER) Horse power (KW) Tonnage (GT)	Year t / Year t-1 = 0.8-1.2	Partially automated checks
Crew share (CREWCOST) Fuel cost (FUELCOST) Repair cost (REPCOST) Variable cost (VARCOST) Fixed cost (FIXEDCOST) Fuel consumption (FUELCONS)	Year t/ Year t-1 = 0.7-1.3	Partially automated checks
Days at sea (DAYS) Kwdays (KWDAYS) Gtdays (GTDAYS)	Year t / Year t-1 = 0.8-1.2	Partially automated checks
Investment (INVESTMENT) Borrowing(BORROWING)	Year t / Year t-1 = 0.7-1.3	Partially automated checks
Total employment (TOTAL) Fulltime employment (FULLTIME) Part-time employment (PARTTIME) Full time equivalent (FTE)	Year t / Year t-1 =0.7-1.3	Partially automated checks

Again, when these checks highlighted questionable submissions, the JRC contacted the national correspondent. As with the Semantic checks, in some cases reasonable explanations for the data submitted were provided, and in other cases the national correspondents agreed that the data submitted was incorrect and resubmission is necessary.

The Trend quality checks also contributed significantly to the overall improvement of the quality of the data submitted.

2.4. Compliance checks

This check involved comparing the reported number of vessels, kW and tonnage in the DCR submissions from each Member State with the EU Fleet Register.

Table 4 shows a comparison of the number of vessels reported at the DCR and the ones that appear at the EU Fleet Register.

Table 4: Number of vessels reported at the DCR and the EU Fleet Register

Country	DCR	EU fleet register	% difference
Belgium	102	102	0.0 %
Cyprus	529	867	39.0 %
Denmark	1917	2961	35.3 %
Estonia	1021	964	5.6 %
Finland	1425*	3161	54.9 %
France	4661	5177	10.0 %
Germany	2056	1867	9.2 %
Greece	18058	17574	2.7 %
Ireland	1699	1923	11.6 %
Italy	13804	13780	0.2 %
Latvia	877	879	0.2 %
Lithuania	279	250	10.4 %
Malta	1395	1385	0.7 %
Netherlands	831	730	12.2 %
Poland	891	867	2.7 %
Portugal	4047	7416	45.4 %
Azores	641*		
Madeira	126		
Slovenia	350	179	48.9 %
Spain	13310	11896	10.6 %
Sweden	1527	1510	1.1 %
UK	6852	6778	1.1 %

* 2006 data was used due to lack of the 2007 value.

The percentage difference is defined as the difference between the number of vessels reported under the DCR and the number of vessels at the EU Fleet Register divided by the highest of both values.

Table 4 shows the divergences between the number of vessels reported at the DCR and the EU Fleet Register. There are many countries were these divergences are around 1% or less.

However, there are some countries that present much higher, and so worrying, divergences. Between them, Finland, Slovenia, Portugal, Cyprus and Denmark show divergences higher than the 35%. These divergences should be further analysed country by country. However, this may be because of non-active vessels, which would explain Cyprus figures (as detailed on AER section 6.2); while some others could be explained by the use of thresholds to delineate between "commercial active" and "commercially non-active" vessels; other explanations could be the inclusion of a category of "recreational" vessels for fisheries on the EU fleet register.

2.5. National Programmes

This check involved checking for consistency between what it was submitted at the Data call and the NP, for each Member State. So that, all (and the same) data detailed at the NP are really reported; and in the case of possible divergences, this fact was also reported.

2.6. Indicators values Trend checks

The values of several indicators (formed by several variables) were also manually checked for consistency using similar methodologies described in sections 2.3 and 2.2, as there are some indicators that are expected to vary between a certain range.

For example:

- Employment per vessel (FTE/Number) in a fleet segment
- Effort Days per vessel (Days/Number)
- Sum of costs < 0.70 % of Income.

Here, we expect income to be higher than operational costs, otherwise fishermen may decide not to go fishing. Other examples include setting a minimum crew number per fleet segment, minimum gross salary of the crew or a minimum number of fishing days.

2.7. Comparison with other data sources

When suspicious figures were detected other sources were consulted where available (previous AER, official statistics).

2.8. Other checks

A number of other checks were carried out:

Check the use of the same fleet segment criteria over time and over variables submitted.

Analysing some of the data, it seems that there are changes in the codification of the fleet segments, and vessels that were coded one way initially changed to another fleet segment code. Thus, if no more information is provided, it cannot be known if this is just a change in the codes employed or the fishers changed their exploitation patterns.

It was also found that these changes happened during the same year depending on the variable groups reported.

Check that all variables are reported for a fleet segment.

Some missing observations may influence the ability to calculate indicators. For example, both quantities and values of landings for all species should be included in order to get the mean price of all landings. So, any missing observations of these variables may distort the calculation of the indicator.

- Landings quantities and values
- Fuel consumption and costs
- All costs and income to calculate profitability indicators

Hence, depending on the indicator calculated and its aim, when missing some observations, it will have to be chosen whether to exclude the other variable or not. In this sense, if landings for a species are available in quantity but not in value, the landings quantity would have to be deleted of the calculation of the overall mean price. In accordance, if some cost is missing, then it could not be possible to calculate the profitability of the involved fleet segment.

Investigating the variable's coverage over time

It could be also possible that some variables are missing for some periods (normally at the initial periods). Then the interpretation of some indicators can be controversial.

For example, both quantities and values for certain species are missing for several years, as well as data referring to fuel consumption and costs. Then it cannot be possible to compare the evolution of some of these parameters over time.

The existence of clusters

Clusters are employed in order to report data when there are segments with a low number of vessels, and that data could not be reported if not merged due to confidentiality reasons.

However, there is not a common approach between all MS. Some MS do not report the on a disaggregated basis the merged vessel, just the clusters; others report all vessels on the capacity variable group and they use merges for the other indicators; some other also reported the effort variable group disaggregated. Moreover, not all MS clearly indicated the fleet segments that are clustered and the criteria used.

Thus, clusters can hinder the comparability of data among fleet segments and Member States. Hence, it would be advisable that all MS follow similar criteria when reporting data that has been merged and that they clearly specify the clusters done over time.

3 CONCLUDING REMARKS

Data received at the JRC to elaborate the AER underwent several checks on its quality, in order to detect possible errors and inconsistencies. However, due to late submissions, errors on the data submitted and missing data the production of the AER was more difficult and longer.

Data quality and the quality checks should be responsibility of the MS, as stated on the Council Regulation (EC) No 199/2008 Article 19. Hence, the JRC is giving a brief presentation of the checks they have done, in order that MS could include the ones they find necessary.

The checks done by the JRC were:

- Compliance checks (census).
- National Programmes.
- Syntactic checks.
- Parameters evolution.
- Comparison with other data sources.
- Other checks.

ANNEX VII: Summary of questionnaires sent by MS to determine what current practice is followed with regards to clustering segments

N. of Member States that answered to the questionnaires before the deadline: **19**

A3. What is the sampling strategy used to collect economic data? (census, random sampling, etc…)?

Census	Random sampling	Others
1. Denmark (small important segments) 2. Malta, when a small number of vessels (< 40) are present in the segment 3. Germany, for smaller segments 4. Bulgaria 5. Cyprus 6. Estonia 7. The Netherlands, pelagic fleet 8. Portugal: Madeira and purse seine fishery 9. Poland, questionnaire with 30%-40% of response 10. Slovenia, questionnaire	1. Denmark, stratified by value of landing (5 revenue groups) 2. Malta, when more than 40 vessels are present in the segment 3. France 4. Germany, for larger segments 5. Cyprus, inshore fishery 6. Estonia 7. Italy 8. The Netherlands, other segments 9. Portugal 10. Spain 11. Greece	1. Finland, combination of a register survey and a random sampling 2. Germany, Self-selective panel where available and where coverage rate is high 3. Belgium, Pseudo-random trough questionnaires returned on a voluntary basis 4. Lithuania, Pseudo-random trough questionnaires returned on a voluntary basis 5. The Netherlands, cutters using active fishing methods and other trawlers, Panel data 6. Sweden: mixture of random sampling and census 7. Ireland (voluntary nature of survey, historically low response levels)

B1. Number of fleet segments in the 2009 sampling (before and after clustering)

Member State	Before	After
Spain	61	44
Italy	33	23
France	33	24
Finland	15	6
Germany	28	14
Bulgaria	4	4
Malta	*25*	*25*
Belgium	*4*	*4*
Cyprus	8	6
Denmark	27	16
Greece	26	18

Ireland	25	18
Portugal	50	41
Slovenia	15	11
The Netherlands	35	17
Sweden	*27*	*27*
Estonia	15	8
Lithuania	9	5
Poland	11	8

B3. Why do you cluster segments?

Statistical purposes	Confidentiality problems
1. Bulgaria	1. Cyprus
2. Denmark	2. Denmark
3. Ireland	3. Estonia
4. Italy	4. Finland
5. Poland	5. France
6. Portugal	6. Germany
7. Spain	7. Ireland
8. Slovenia	8. Lithuania
9. Greece	9. The Netherlands
	10. Portugal
	11. Sweden
	12. Spain

B4. Do you cluster before or after the collection of data ?

Before	After
1. Bulgaria	1. France
2. Cyprus	2. The Netherlands
3. Denmark	3. Poland
4. Estonia	4. Portugal
5. Finland	5. Slovenia
6. Germany	
7. Ireland	
8. Italy	
9. Portugal	
10. Sweden	
11. Spain	
12. Greece	

B5. Which parameter do you consider for clustering?

Neighbouring vessel length	Same type of gears	Others/Combination of parameters
1. Bulgaria	1. Cyprus	1. France (not specified)
2. Denmark	2. Germany	2. The Netherlands (vessel length, technical characteristics, same type of gear, cost structure)

3. Estonia	3. Sweden	3. Portugal, cost structure
4. Finland	4. Spain	4. Slovenia, Targeting a similar species, using similar gear, neighbouring vessel length
5. Ireland	5. Greece	
6. Italy		
7. Lithuania		
8. Poland		
9. Portugal		
10. Sweden		
11. Spain		

C1 How do you evaluate that the clustered segments are homogenous in statistical terms?

Statistical methods	Others	None
1. Denmark, analysis of variance	1. Bulgaria	2. Cyprus
2. Finland, CV	2. Greece, historical data	3. Estonia
3. France, distance		4. Germany
4. Italy, correlation, average LOA		5. Ireland
5. Portugal, statistical hypothesis test, CV		6. Lithuania
6. Sweden, variability		7. The Netherlands
8. Spain, increase of sample size		8. Poland
9. Slovenia, similar mean (average), variability between the means (averages)		

C2. Which information do you consider to evaluate the degree of variability/variance within and between fleet segment (landings value, effort, vessel capacity, catching capacity, …)?

Landing value	fishing effort	Capacity	Other	None
1. Bulgaria	1. Bulgaria	1. Estonia	1. France	1. Cyprus
2. Denmark	2. Ireland	2. Ireland	2. Lithuania	2. Germany
3. Finland	3. Lithuania	3. Italy	3. The Netherlands	
4. Italy	4. The Netherlands	4. Lithuania		
5. Lithuania	5. Poland	5. The Netherlands		
6. Portugal	6. Portugal	6. Portugal		
7. Sweden	7. Sweden	7. Spain		
8. Slovenia, within segments	8. Slovenia, between segments			
9. Greece	9. Greece			

ANNEX VIII: Contact Details of the Participants

The full list of participants at SGECA 09-02 is presented in the following table:

Name	Address	Telephone no.	Email
STECF members			
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ANNEX IX: Declaration of experts

Declarations of invited experts are published on the STECF web site on https://stecf.jrc.ec.europa.eu/home together with the final report.

European Commission

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Title: Scientific, Technical and Economic Committee for Fisheries (STECF) Report on Quality aspects of the collection of economic data - methods of calculation of the indicators and sampling strategies (SGECA-09-02).

Author(s): Sabatella, E.; Nord, J.; Guillen, J.; Hatcher, A.; Van Oostenbrugge, H.; Virtanen, J.; Berkenhagen, J.; Bertelings, H.; Collet, I.; DeMeo, M.; Elias, L.; Goti, L.; Jonsson, A.; Motova, A. and Van Iseghem, S.

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Abstract
The assessment of quality of economic data is a relevant issue that has been raised by several working groups and by different bodies (first of all STECF and RCMs). This issue also affects end users that should be aware of the reliability of data used in the analysis.

The new Data Collection Framework establishes the list of economic variables to be collected for the total fleets and for the fleet segments. It also requires Member States to describe the methodologies applied for the data collection and to give information on the quality (accuracy and precision) of estimates.

Thus, SGECA 09-02 was asked to give appropriate recommendations and proposals in order to homogenise the presentation of National Programmes and also in order to facilitate the STECF task to evaluate the quality of the data collected by the Member States. Moreover, the Regional Co-ordination Meetings held in 2008 identified several issues within the new DCF requiring further work or clarification.

Thus, this report reflects the reviews and discussions on the most frequently applied methodologies to collect economic variables for fleet segments and the common approaches proposed to assess data quality. SGECA reached a consensus on a list of recommendations that were proposed to STECF for their possible adoption and endorsement. These should allow MS to better comply with the requirements of the DCF in relation to data quality assurance in a more consistent way within an agreed framework as concerns some basic methods and metadata.

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