



# **Methodology Report for Socio Economic Variables National Fisheries Data Collection Program**

Athens, 2018

**AGRICULTURE ECONOMICS RESEARCH INSTITUTE (AGRERI)**

**Alkmanos str., 115 28, Ilisia, Athens / T.: +30 210 27 55 086 / E-mail: [info@agreri.gr](mailto:info@agreri.gr)**

**Scientific coordination:** Dr Irene Tzouramani

**Research Associates:** Dr Alexandra Sintori

Dr Angelos Liotakis

**INAGROK partner:** Magdalene Bardounioti

# Methodology Report

## 1. Data source

The methodology used to choose the different sources of data takes into account the Ad hoc contract commitment No. SI2 725 694 Ref. Ares (2016)2440332 - 26/05/2016 "Methodologies for the socio-economic data described in EU MAP". As described in the Ad hoc contract, the ideal survey method is the census. However, special characteristics of the national fleet and limitations such as resources have to be considered in order to choose the appropriate sources of data. The Greek fleet consists of 15 thousands, the majority of which are smaller than 12 meters. As a result, control data, balance sheets or other financial records and books are generally not available. Therefore, economic and social data for fisheries will be collected by sample survey, using face to face interviews and structured questionnaires. The national fleet register will also be used for the collection of some data. Furthermore, for specific variables and fleet segments available control data will be validated with data collected through sample survey using a structured questionnaire. Specifically:

The following economic variables are collected by direct survey using the methodology for the collection of the Activity Variables (See Annex 1) described in Section 2: Fishing activity data:

- Gross value of landings,
- Days at sea,
- Value of landings per species,
- Average price per species.

However, for some fleet segments, namely Demersal trawlers and/or demersal seiners 6-12, 12-18, 18-24 and 24-40, Purse seiners 12-18, 18-24 and 24-40, Vessels using hooks 12-18, Vessels using drift and/or fixed netters 12-18 and Vessels using Pots and/or Traps 12-18, control data is available. The MS will also collect these variables in order to cross check and validate the control data.

The following economic variables are also collected by sample survey, through face to face interviews using a structured questionnaire for socioeconomic data:

- Other income,
- Personnel costs,
- Energy costs,
- Repair and maintenance costs,
- Variable costs,
- Non-variable costs,
- Operating subsidies,
- Subsidies on investments,
- Investments in tangible assets, net,
- Long/short dept,
- Total assets,
- Engaged crew,

- Total hours worked per year,
- Value of unpaid labour (derived from other surveyed variables)
- Energy consumption,
- Unpaid labour

The Economic variables consumption of fixed capital and value of physical capital will be estimated using data from questionnaires (replacement value) as well as data from the National fleet register (mean LOA and number of vessels per fleet segment) as proposed by the PIM methodology (EC study No. FISH/2005/03) and described in Section 4. .

The Economic variables of the fleet variable group, namely Number of vessels, Mean LOA of vessels, Total vessel's tonnage, Total vessel's power, Mean age of vessels, as well as the variable Number of fishing enterprises/units will be estimated using data from the National fleet register.

It should be noted that the variables Income from leasing out quota or other fishing rights, Value of quotas or other fishing rights, Lease/rental payments for quota or other fishing rights are not collected since the Greek management system does not involve quotas or other fishing rights.

The data source of social variables is described in Annex 2.

## 2. Data Collection Scheme

The majority of the economic and social variables of the fleet will be collected using a Probability Sample Survey, since, as mentioned in Section 1, census data are limited and available only for specific variables and fleet segments. Furthermore, data cannot be collected for the large number of vessels of the Greek fishing fleet. The sampling frame and the allocation scheme are discussed in detail in Section 3. The economic variables that will be collected through Probability Sample Survey are the following:

- Gross value of landings,
- Days at sea,
- Value of landings per species,
- Average price per species.
- Other income,
- Personnel costs,
- Energy costs,
- Repair and maintenance costs,
- Variable costs,
- Non-variable costs,
- Operating subsidies,
- Subsidies on investments,
- Investments in tangible assets, net,
- Long/short dept,
- Total assets,
- Engaged crew,

- Total hours worked per year,
- Energy consumption,
- Unpaid labour

As mentioned in Section 2, for the variables Gross value of landings, Days at sea, Value of landings per species and Average price per species for the fleet segments: Demersal trawlers and/or demersal seiners 6-12, 12-18, 18-24 and 24-40, Purse seiners 12-18, 18-24 and 24-40, Vessels using hooks 12-18, Vessels using drift and/or fixed netters 12-18 and Vessels using Pots and/or Traps 12-18 control data are available (Census data). Additionally, according to Section 1, the MS will cross check and validate the control data using collected data obtained through Probability Sample Survey. Therefore the type of data collection for the specific fleet segments and variables maybe census or probability sample survey depending on the outcome of the validation procedure.

Income from leasing out quota or other fishing rights, Value of quotas or other fishing right and Lease/rental payments for quota or other fishing rights are not collected since the Greek management system does not involve quotas or other fishing rights.

Finally, the type of data collection of the social variables is described in Annex 2.

Census will be used only for the variables of the fleet variable group namely Number of vessels, Mean LOA of vessels, Total vessel's tonnage, Total vessel's power, Mean age of vessels, as well as the variable Number of fishing enterprises/units, since for these variables data from the National fleet register will be used.

Census will also be used for the economic variables consumption of fixed capital and value of physical capital, since they derive from PIM that refers to the entire national fleet.

Finally, indirect survey will be used for the economic variable Value of unpaid labour since it derives from other surveyed data as suggested in the Ad hoc contract commitment No. SI2 725 694 Ref. Ares (2016)2440332 - 26/05/2016 "Methodologies for the socio-economic data described in EU MAP" and presented in detail in Section 4.

### 3. Sampling frame and allocation scheme

The sampling method that is chosen for this survey is simple random sampling, in each fleet segment of the Greek fishing fleet, with the exemption of the segments based on the fishing technique: "Vessels using hooks". In these cases, to improve accuracy, a stratified random sampling approach is used, on métier level (LLS\_DEF\_0\_0\_0 and LTL\_LPF\_0\_0\_0, which account for the 99% of the vessels in this fishing technique). It is also important to notice that following Commission Decision 2010/93/EU (paragraph A.1.1), for each vessel for which economic variables are collected, the corresponding activity variables have also to be collected. Therefore, the sample design for the collection of activity variables coincides with the design for the collection of economic variables.

The sample unit is the vessel and it is selected from the Greek vessel registry (target population). The social and economic information will be collected considering as total population the total number of registered vessels in the Greek fleet and not only the active

vessels; therefore the target population and the frame population are the same. This analysis is based on the most recent Greek vessel registry (available at: <http://ec.europa.eu/fisheries/fleet/index.cfm>). The Greek national fleet consists of about 15 thousand vessels. It is highly artisanal in nature, as 14,514 vessels (95% of total) have length less than 12m, use a combination of passive gears and target different species. Moreover, the Greek fishing sector appears highly fragmented, with the vessels scattered along a large coastline and a big number of islands.

Following SGECA 09-02 guidelines, the following clustered segments have been created:

- Segments similar to other segments
- seven small segments have been clustered for sampling purposes and confidentiality reasons, namely:
  - DTSVL0006 is clustered with DTSVL0612
  - DFNVL1824 is clustered with DFNVL1218
  - PSVL0612 is clustered with PSVL1218
  - HOKVL1824 is clustered with HOKVL1218
  - PGPVL1824 is clustered with PGPVL1218
  - FPOVL1824 and FPOVL1218 are clustered with FPOVL0612
- Non-important segments with distinct characteristics
- two segments have been clustered for sampling purposes and confidentiality reasons, namely:
  - PMPVL0006 is clustered with PGPVL0006
  - PMPVL0612 is clustered with PGPVL0612

The number of inactive vessels will be estimated from the selected sample, as there is no a priori information on inactivity.

The sample size in each fleet segment is based on: Population size (N), Variance of the population ( $\sigma^2$ ), Margin of error (e) and confidence level (1- $\alpha$ ). The formula used to estimate the sample size in each fleet segment is (Dattalo, 2008):

$$n = \frac{n_0 N}{n_0 + (N - 1)}, \text{ where:}$$

$$n_0 = \frac{z^2 \sigma^2}{e^2} \text{ and}$$

z, is the z-score, i.e. the number of standard deviations a given proportion is away from the mean

The above formula can be adjusted when the total population is very small, and the n is relatively large ( $n/N > 0.05$ ) (finite population adjustment) (e.g. Thomson, 2002). In such cases, the adjusted sample size ( $n_{adj}$ ) is estimated as:

$$n_{adj} = \frac{n}{1 + n/N}$$

The sample size is rounded upwards, if necessary.

N, is determined by the National fleet registry, while  $\sigma^2$  is based on previous year's estimation of the variable "days at sea". Finally, e, and confidence level are predetermined at:  $e=0.1$  and  $(1-\alpha)=85\%$  (corresponding to  $z=1.44$ ). The only exemptions are fleet segments that include métier with minor significance, where e, is increased to 0.2. This is done to better allocate time and effort, sampling the more important fleet segments in Greece. The significance of the métier is determined by its participation to the ranking of métiers in terms of landings, and effort) (see Table 4C of Annual Report 2016).

As the population in several important Greek fleet segments is very small, two more restrictions are used to determine sample size, when the above formulas result in a very small sample:

- When the vessel population of a fleet segment is greater than or equal to 60, the sample size should be greater than or equal to 30.
- When the population of a fleet segment is smaller than 60, the coverage rate should be equal to 50%.

Finally, to cope with possible on-responses, an extra sample of the same size as the effective sample is selected. An extra unit can be chosen for the unit of the same segment, as geographically close as possible to the effective unit to be substituted (Sande, 1982).

The sample is selected randomly, using random number generator (Thompson, 2002).

All fishing activity variables are collected monthly with the exemption of the capacity group variables. Finally, it is important to mention that the complementary probability sample survey in fleet segments where control data is available will be used for validation.

#### 4. Description of methodologies used for estimation procedures

Economic variables are estimated as follows:

- **Gross value of landings:** the variable is estimated as described in Section 2: Fishing activity data
- **Income from leasing out quota or other fishing rights:** the variable is not collected for reasons already presented.
- **Other income.** In the case of Greece there is no other use of the fishing vessels than for fishing, since other uses require special permits and the fishing vessels do not fill the requirements for such permits. Therefore, the variable other income includes only insurance payments for damage/loss of gear/vessel.
- **Personnel costs.** The variable will be obtained directly from survey. The vessel owner will be asked to estimate the personnel costs of the crew. However, in the case a crew share system is used, rather than fixed salaries the vessel owner will be asked to estimate this share (percentage) and specify if this percentage is on total revenues or on revenues minus costs. In this case the owner will also be asked to specify the costs that are subtracted before estimating the personnel costs. Personnel costs refer to regular and temporary employees. Taxes and employer's and employees' social security contributions are also included.
- **Value of unpaid labour.** The variable refers to the value of labour provided by people delivering unpaid labour and estimates the salary that these unpaid workers would

receive if their work was remunerated. Specifically, the paid and unpaid FTEs will first be estimated. Then the average remuneration per paid FTE will be defined according to data collected from the questionnaires. The value of unpaid labour will be estimated by multiplying the unpaid FTEs with the average remuneration per paid FTE.

- **Energy costs:** the energy costs will be obtained directly from survey. For vessels that the energy cost is not available, it will be estimated from the energy consumption, the type of fuel used and the average price of fuel in the area.
- **Repair and maintenance costs:** the variable will be obtained directly from survey. The variable includes all costs for repair and maintenance of the vessel, the fishing gear and other gear used for fishing (e.g. electronics).
- **Variable costs:** this variable will be obtained directly from survey. The variable includes the cost of daily supplies (for example food and drinking water for the crew), the cost of baits, ice and other sales costs as well as the percentage of middlemen
- **Non-variable costs:** this variable will be obtained directly from survey. This variable includes harbour tolls, interests of bank loans linked to the fishing activity, bookkeeping costs etc.
- **Lease/rental payments for quota or other fishing rights,** the variable is not collected for reasons already presented.
- **Operating subsidies,** the variable will be obtained directly from survey.
- **Subsidies on investments,** the variable will be obtained directly from survey.
- **Consumption of fixed capital.** For the estimation of this variable the PIM methodology will be used (EC study No. FISH/2005/03). Specifically, the degressive depreciation function is used and the capital values are estimated using replacement value, with the assumption that the engine is renovated every 10 years, electronics every 5 years, other equipment every 7 years and hull never. The share of each asset item in the total vessel price is 60% for hull, 20% for the engine and 10% for both electronics and other equipment. The rentals expected in future periods are discounting using a discount rate, which is the interest rate on long terms bond.
- **Value of physical capital,** the variable is obtained using the PIM methodology. To determine the Price per unit, direct survey will be used but also second hand prices or insurance values of the current year will be gathered to cross check the gathered data.
- **Value of quotas or other fishing rights,** the variable is not collected for reasons already presented.
- **Investments in tangible assets, net,** the variable will be obtained directly from survey.
- **Long/short debts,** the variable will be obtained directly from survey, since balance sheets are not available, especially for small scale fisheries.
- **Total assets,** the variable will be obtained directly from survey, since balance sheets are not available, especially for small scale fisheries.
- **Engaged crew,** the variable will be obtained directly from survey. Unpaid labour will not be included in this variable.
- **Unpaid labour,** the variable will be obtained directly from survey.
- **Total hours worked per year,** the variable will be obtained directly from survey.

- The variables of the fleet variable group will be estimated based on the data from the National fleet register.
- **Days at sea**, the variable is estimated as described in Annex 1
- **Energy consumption**, the variable will be obtained directly from survey. In case the energy consumption of the vessel is not available it will be estimated according to energy costs, type of fuel used and average price of fuel.
- **Value of landings per species**, the variable is estimated as described in Section 2: Fishing activity data
- **Average price per species**. the variable is estimated as described in Section 2: Fishing activity data

The estimation procedures of the social variables is discussed in Annex 2. Finally, it should be mentioned that for all variables estimated through a probability sample survey, the Horvitz-Thompson estimator will be used to estimate total values.

## 5. Description of methodologies used on data quality

The majority of the economic data will be collected through sample survey as already discussed in previous paragraphs. Bias and variability indicators will be used as quality indicators. Particularly, for all data collected through probability sample survey the bias indicators provided will be coverage rates and response rates. The variability indicator that will be provided for the collected data will be the CV, which is the most suitable sampling error statistic for quantitative variables with large positive values, a common case in economic statistics.

For data collected through census, the response rate will be provided as the indicator of bias, whereas there is no sampling error and therefore no variability indicator is provided.

It should be noted that the target and the frame population are the same and therefore there is no coverage error.

As far as measurement errors are concerned, the submitted data will be evaluated thoroughly and any outliers will be identified and possibly removed. This evaluation will be performed for every fleet segment using several indicators, like the days at sea, the fuel consumption per day at sea, the number of employees per vessel, the volume of landings and the average price per kilo. Other indicators like the ratio of each cost category (e.g. variable costs, fuel costs, wages and salaries, fixed costs etc.) to the revenues of the vessels will also be used for the evaluation of the quality of the collected data.

Furthermore, in order to achieve high quality of the collected data the data collectors -who will be ichthyologists- will be properly educated and written instructions regarding the collection process will be provided to them every year.

For key economic variables such as energy consumption and energy costs, non-response adjustments will be made using related data (see also Section 4).

It should be noted that the variables Gross value of landings, Days at sea, Value of landings per species and Average price per species for the fleet segments Demersal trawlers and/or

demersal seiners 6-12, 12-18, 18-24 and 24-40, Purse seiners 12-18, 18-24 and 24-40, Vessels using hooks 12-18, Vessels using drift and/or fixed netters 12-18 and Vessels using Pots and/or Traps 12-18 will be provided by the control. However, in order to validate the quality of the provided data the MS will also collect the aforementioned variables through sample survey.

## 6. References

Dattalo, P. (2008). *Sample-Size Determination in Quantitative Social Work Research*. Oxford University Press.

Sande, I.G. (1982). Imputation in surveys: Coping with reality. *The American Statistician*, 36, 145–152.

Thompson, S.K. (2002). *Sampling*. Wiley: New York.

## **Annex 1. Description for the methodology for the collection of activity variables**

The sampling method that is chosen for this survey is simple random sampling, in each fleet segment of the Greek fishing fleet, with the exemption of the segments based on the fishing technique: “Vessels using hooks”. In these cases, to improve accuracy, a stratified random sampling approach is used, on métier level (LLS\_DEF\_0\_0\_0 and LTL\_LPF\_0\_0\_0, which account for the 99% of the vessels in this fishing technique). It is also important to notice that following Commission Decision 2010/93/EU (paragraph A.1.1), for each vessel for which economic variables are collected, the corresponding activity variables have also to be collected.

The sample unit is the vessel and it is selected from the Greek vessel registry (target population, coinciding with frame population). This analysis is based on the most recent Greek vessel registry (available at: <http://ec.europa.eu/fisheries/fleet/index.cfm>). The Greek national fleet consists of more than 15 thousands vessels. It is highly artisanal in nature, as the 95% of them have length less than 12 m, use a combination of passive gears and target different species. Moreover, the Greek fishing sector appears highly fragmented, with the vessels scattered along a large coastline and a big number of islands.

The Greek fishing vessels belong to the following fleet segments:

<b>Fishing technique</b>	<b>Length category</b>
Demersal Trawlers and/or Demersal Seiners (DTS)	VL0006
	VL0612
	VL1218
	VL1824
	VL2440
Drift and/or fixed netters (DFN)	VL0006
	VL0612
	VL1218
	VL1824
Purse seiners (PS)	VL0612
	VL1218
	VL1824
	VL2440
Vessels using active and passive gears (PMP)	VL0006
	VL0612
Vessels using hooks (HOK)	VL0006
	VL0612
	VL1218
	VL1824
Vessels using Polyvalent Passive gears only (PGP)	VL0006
	VL0612
	VL1218
Vessels using Pots and/or traps (FPO)	VL0006
	VL0612
	VL1218
	VL1824

Following SGECA 09-02 guidelines, the following clustered segments have been created:

- Segments similar to other segments
  - seven very small segments have been clustered for sampling purposes as well as for confidentiality reasons, namely:
    - DTSVL0006 is clustered with DTSVL0612
    - DFNVL1824 is clustered with DFNVL1218
    - PSVL0612 is clustered with PSVL1218
    - HOKVL1824 is clustered with HOKVL1218
    - PGPVL1824 is clustered with PGPVL1218
    - FPOVL1824 and FPOVL1218 are clustered with FPOVL0612
- Non-important segments with distinct characteristics
  - two segments have been clustered for sampling purposes as well as for confidentiality reasons, namely:
    - PMPVL0006 is clustered with PGPVL0006
    - PMPVL0612 is clustered with PGPVL0612

The number of inactive vessels will be estimated from the selected sample, as there is no a priori information on inactivity.

#### Sample size

The sample size in each fleet segment is based on: Population size (N), Variance of the population ( $\sigma^2$ ), Margin of error (e) and confidence level (1- $\alpha$ ). The formula used to estimate the sample size in each fleet segment is (Dattalo, 2008):

$$n = \frac{n_0 N}{n_0 + (N - 1)}, \text{ where:}$$

$$n_0 = \frac{z^2 \sigma^2}{e^2} \text{ and}$$

z, is the z-score, i.e. the number of standard deviations a given proportion is away from the mean

The above formula can be adjusted when the total population is very small, and the n is relatively large ( $n/N > 0.05$ ) (finite population adjustment) (e.g. Thomson, 2002). In such cases, the adjusted sample size ( $n_{adj}$ ) is estimated as:

$$n_{adj} = \frac{n}{1 + n/N}$$

The sample size is rounded upwards, if necessary.

N, is determined by the National fleet registry, while  $\sigma^2$  is based on previous year's estimation of the variable "days at sea". Finally, e, and confidence level are predetermined at:  $e=0.1$  and  $(1-\alpha)=85\%$  (corresponding to  $z=1.44$ ). The only exemptions are fleet segments that include métier with minor significance, where e, is increased to 0.2. This is done to better allocate time and effort, sampling the more important fleet segments in Greece. The significance of the métier is determined by its participation to the ranking of métiers in terms of landings, and effort) (see Table 4C of Annual Report 2016).

As the population in several important Greek fleet segments is very small, two more restrictions are used to determine sample size, when the above formulas result in a very small sample:

- When the vessel population of a fleet segment is greater than or equal to 60, the sample size should be greater than or equal to 30.
- When the population of a fleet segment is smaller than 60, the coverage rate should be equal to 50%.

Finally, to cope with possible on-responses, an extra sample of the same size as the effective sample is selected. An extra unit can be chosen for the unit of the same segment, as geographically close as possible to the effective unit to be substituted (Sande, 1982).

## **Annex 1. Description for the methodology for the collection of social variables**

The pilot study for the social variables will be conducted at national level. All social variables, namely Employment by gender, FTE by gender, Unpaid labour by gender, Employment by age, Employment by education level, Employment by nationality, Employment by employment status and FTE national will be estimated based on data collected through sample survey using questionnaires, since alternative data sources for these variables are not available. The social variables will be collected from the same vessels as the economic data during that reference year (2018).

Probability Sample Survey will be used for the estimation of the following variables:

- Employment by gender,
- Unpaid labour by gender,
- Employment by age,
- Employment by education level,
- Employment by nationality
- Employment by employment status,

Indirect survey will be used for the social variables FTE by gender and FTE national, since they derive from other surveyed data as suggested in the Ad hoc contract commitment No. SI2 725 694 Ref. Ares (2016)2440332 - 26/05/2016 "Methodologies for the socio-economic data described in EU MAP".

The social variables will be estimated according to the instructions that will be provided by the PGECON workshop that will be held in 2017.

As far as the FTE National variable is concerned it will be estimated according to the study "Calculation of labour including full-time equivalent (FTE) in fisheries" (FISH/2005/14, 'LEI WAGENINGENUR) . Specifically, a national threshold representing the total number of hours worked, on a standard and yearly basis, by a full-time worker in the fishery sector is first defined. FTE national is then calculated using this threshold. If the annual working hours per crew member exceed the threshold, the FTE equals 1 per crew member (annual working hours > national threshold then FTE national = 1). If the annual working hours per crew member is less than the threshold then the FTE equals the ratio between the hours worked and the threshold (annual working hours < national threshold then FTE national = annual working hours / national threshold). It should be noted that for Greece the threshold is defined at 1.750 hours, according to the Greek legislation (Official Government Gazette No 1181 9/June/2011).

The expected outcome of the pilot study is to identify the appropriate methodology to collect and estimate the social variables included in Table 6 of the multi-annual union programme. Specifically, the socio-economic questionnaire will be updated and reassessed, the instructions for the data collectors and the database will also be updated to include the social variables and the estimation procedures will be validated. Another important outcome of the

pilot study is the identification of difficulties and problems that maybe encountered during the collection of the social variables and their possible solutions.