**TWINNING PROJECT**

**Support to Development Process in the State Statistics Service of Ukraine with the Objective to Enhance its Capacity and Production**

**Ukraine**



**MISSION REPORT**

**on**

*Component 11: Capital and direct investment*

**Activity 11.3: Extrapolating survey results on total population, reviewing methodological support**

Mission carried out by Andrius Čiginas and Tomas Rudys,

Statistics Lithuania

26 - 28 May 2015

Version: Draft

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**List of Abbreviations**

ToR Terms of Reference

SSSU State Statistics Service of Ukraine

SL Statistics Lithuania

# Executive summary

The activities of component 11.3 will support SSSU in analysis of the survey data including editing and non-response (non-reporting) issues. These tasks and estimation (extrapolation) approaches, proposed for the sample survey on capital and direct investments, are based on various strategies of incorporation of auxiliary information.

The overall purpose of the mission was:

* Analysis of data obtained from the sample survey; processing of non-reporting; data imputation.
* Reviewing methodological support for extrapolating survey results on total population.

The activities in this mission included:

1. Discussions on a modelling and construction of the sampling design of the survey.
2. Discussions on the roles of a survey statistician and subject matter specialists (economists) in a secondary data editing and estimation process.
3. Practical work with the data of the first quarter of the survey: detection of outliers and their treatment; dealing with non-response; estimation; analysis of auxiliary information available.
4. Discussions on the sample survey organization: levels of a statistical output; response burden; sources of auxiliary information.

The next activity 11:

# 1. General comments

This mission report was prepared within the Twinning Project „Support to Development Process in the State Statistics Service of Ukraine with the Objective to enhance its Capacity and Production”. It was the second mission of SL experts to be devoted to the Capital investment within Component 11 of the project. The mission is aimed at preparing the sample data for estimation and inferences from them.

The concrete objectives of the mission were:

* share SL and EU practices in sample data quality;
* propose estimation strategies relevant for SSSU.

The views and observations stated in this report are those of the experts and do not necessarily correspond to the views of EU, SSSU or SL.

# 2. Assessment and results

The assessment was carried out in accordance with the topics:

* 1. Revision of the pilot sampling design of statistical survey on Capital Investment.
  2. Data editing and its coordination.
  3. Non-response treatment and the use of auxiliary information in estimation.

## 2.1. Revision of the pilot sampling design of statistical survey on Capital Investment

During the study visit of the specialists of SSSU to SL on 9-11 December 2014 (and after the visit), pilot sampling designs were constructed simultaneously by methodologists of SSSU and experts of SL. To get comparable results for the year 2015, these two designs were planned using the same population frame (about 80.000 enterprises) as it is assumed in preceding methodology of the quarterly survey. Additionally, in order to estimate an impact of 600.000 `small’ enterprises, an experimental sample was designed by the methodologists of SSSU.

Principal steps of the sampling design construction were reviewed in the meeting, and corrections were made in a new methodology of the survey.

# 2.2. Data editing and its coordination

Procedures of detection of outliers in the sample data were discussed. Experts of SL gave examples how survey statisticians and subject matter specialists can cooperate in improvement of sample data quality. Possible solutions are discussed also in the case of inadequate (too large) sampling weights.

Experiments were performed with real data of the first quarter of year 2015.

**2.3. Non-response treatment and the use of auxiliary information in estimation**

Considering the survey data of the first quarter, quite a high non-response rate is observed. In this case, a standard reweighting can lead to significant non-response bias. Therefore, discussion of the participants turned to the use of historical auxiliary information: imputation of it - for large enterprises; calibration methods - for other enterprises.

Analysis of annual data on investment of the previous year showed that, for the part of estimation domains, the sample data are well explained. Therefore, the auxiliary information should improve the survey results applying, for instance, ratio estimators.

1. **Conclusions and recommendations**
2. Methodological basis for the sampling design of the quarterly survey on investment was improved. It was pointed that the corresponding annual survey is a good (and, in fact, unique) source of auxiliary information for the sample planning. Therefore, one can recommend much later change of the annual survey from `census’ to a sample survey, because several years of practice with the quarterly sample survey are needed.
3. There were organizational problems to collect the first quarter data of `small’ enterprises. One more strategy, to evaluate an impact of these enterprises in the near future, is a more detailed analysis (larger samples) from different economical activities in different quarters.
4. Further consultations with users of the statistical output are needed, in order to have estimation domains no more detailed than 3 digits of NACE for some of economical activities.
5. Simple rules, based on empirical quartiles, usually help to detect outlying observations. The list of outliers can be shortened (data quality improved) after an iterative cooperation of survey statisticians and the subject matter division. The so-called macro-editing is also a part of this cooperation. Here, in some separate cases, a special treatment of large survey weights is necessarily. Moreover, since quite a good auxiliary information (from the annual survey) is available, it is worth to think about statistical rules which incorporate it.
6. In the case of non-response, the specialists on investment should impute historical data for large enterprises. For other enterprises, calibration methods can be applied to derive non-response adjusted weights. Here auxiliary data is again from the annual survey.
7. The linear correlation between the quarterly data and the annual data of previous year is sufficiently strong in about a half of estimation domains (NACE activities). Perhaps, one can expect even more after the secondary editing of the data. Moreover, it follows from a testing of hypotheses, that intercepts are statistically zeroes in the linear dependencies. Therefore, ratio estimators can be applied.

## Activities before the next mission

Before the next mission, the following problems left important:

1. Estimation of an impact of the `small’ enterprises.
2. Use of the auxiliary information in the secondary data editing. The editing in a preparation to apply estimators which use the annual data.
3. Calibration or other techniques for non-response treatment.
4. Quality of estimates for other survey variables.
5. Estimates and their quality in geographical regions. Special estimation approaches for two particular regions.

# Annex 1. Terms of Reference

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**European Union Twinning Project**

**Support to Development Process in the State Statistics Service of Ukraine with the Objective to Enhance its Capacity and Production**

**Twinning No.: UA/13/ENP/ST/38**

**Terms of Reference**

for a short-term mission to the State Statistics Service of Ukraine

*Component 11 Capital and direct investment*

*Activity 11.3 Extrapolating survey results on total population, reviewing methodological support*

26-29 May 2015

**General information**

Statistics Denmark in partnership with INSEE France, Statistics Lithuania, Statistics Finland, Central Statistical Bureau of Latvia, is leading the EU-Twinning project on “Support to Development Process in the State Statistics Service of Ukraine with the Objective to Enhance its Capacity and Production” in Ukraine. The beneficiary is the State Statistics Service of Ukraine.

This activity is implemented under the Component 11 Capital and direct investment.

**Main purpose:**

* analysis of data obtained from a sample survey; processing of non-reporting; data imputation;
* reviewing methodological support for extrapolating survey results on total population

**Participants:**

Statistics Lithuania:

A. Čiginas

T. Rudys

SSSU:

I.Petrenko, Acting Director, Production Statistics Department

O.Myslinsky, Head of Division for Statistics of Capital investments and fixed assets, Department for Statistical production

O.Khmelyova, Chief -economist at the Division for Statistics of Capital investments and fixed assets, Department for Statistical production

I.Kladchenko, Chief -economist at the Division for Statistics of Capital investments and fixed assets, Department for Statistical production

A.Tovchenko, Head of Division of mathematic processing methods and analysis of statistical data, Department for Statistical infrastructure

G.Tykhonov, Chief -economist at the Division of mathematic processing methods and analysis of statistical data, Department for Statistical infrastructure

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**European Union Twinning Project**

**Support to Development Process in the State Statistics Service of Ukraine with the Objective to Enhance its Capacity and Production**

**Twinning No.: UA/13/ENP/ST/38**

**MISSION PROGRAMME**

Working meetings between the EU experts (Statistics Lithuania) and experts of the Production Statistics Department & Department for Statistical Infrastructure (SSSU) within the framework of the Twinning Project “Support to Development Process in the State Statistics Service of Ukraine with the Objective to Enhance its Capacity and Production”

26 – 28 May 2015

**Component 11 Capital and direct investment**

**Activity 11.3 Extrapolating survey results on total population, reviewing methodological support**

**Experts:**

**Mr Andrius Čiginas (Statistics Lithuania)**

**Mr Tomas Rudys (Statistics Lithuania)**

**Date: 26-28/05/2015**

**Working language: Russian**

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| --- | --- | --- |
|  | **Morning** | **Afternoon** |
| **Monday**  **25/05/2015** |  | 12:45 Arrival to Kyiv (Boryspil airport)  Reservation in the Hotel Rus:  # 1732853 |
| **Tuesday**  **26/05/2015** | **10:00 Arrival to the SSSU**  At the entrance to the SSSU you will be picked up by Kateryna Zhulay, Protocol Department  **10:00 – 13:00**  Analysis of data obtained from a sample survey; processing of non-reporting; data imputation. | 13:00 - 14:30 Lunch  14:30 – 16:30 To be continued |
| **Wednesday**  **27/05/2015** | **10:00 Arrival to the SSSU**  At the entrance to the SSSU you will be picked up by Kateryna Zhulay, Protocol Department  **10:00 – 13:00**  Analysis of data obtained from a sample survey; processing of non-reporting; data imputation (*continuation*).  Reviewing methodological support for extrapolating survey results on total population. | 13:00 - 14:30 Lunch  14:30 – 16:30 To be continued |
| **Thursday**  **28/05/2015** | **10:00 Arrival to the SSSU**  At the entrance to the SSSU you will be picked up by Kateryna Zhulay, Protocol Department  **10:00 – 13:00**  Reviewing methodological support for extrapolating survey results on total population (*continuation*).  Discussion on the activities and steps to be taken to switch capital investment survey to a sample basis.  Debriefing and recommendations. | 13:00 - 14:30 Lunch  14:30 - 16:30 To be continued |
| **Friday**  **29/05/2015** |  | **19:35 Departure from Kyiv (Boryspil airport)** |

**Participants:**

Statistics Lithuania:

Mr Andrius Čiginas

Mr Tomas Rudys

SSSU:

I.Petrenko, Director, Production Statistics Department

O.Myslinsky, Head of Division for Statistics of Capital investments and fixed assets, Department for Statistical production

O.Khmelyova, Chief -economist at the Division for Statistics of Capital investments and fixed assets, Department for Statistical production

I.Kladchenko, Chief -economist at the Division for Statistics of Capital investments and fixed assets, Department for Statistical production

A.Tovchenko, Head of Division of mathematic processing methods and analysis of statistical data, Department for Statistical infrastructure

G.Tykhonov, Chief -economist at the Division of mathematic processing methods and analysis of statistical data, Department for Statistical infrastructure