

Miscellany

Finnish–Hungarian–Swedish cooperation over methods of environment statistics: Time series and waste statistics

The co-operation over the development of environmental statistics between the Central Statistical Offices of Finland, Hungary and Sweden started in 1981. The first agreement covered the period 1981–1985, and has now been followed by a second, for 1986–1988. The co-operation is also included in the work programme of the Conference of European Statisticians at the U.N. Economic Commission for Europe.

The co-operation covers the most important areas of common interest in the environmental and methodological fields. It is directed by the heads of the three Central Statistical Offices. The practical work is carried out by a working group of six members, which has conducted three meetings. At the first meeting in 1981, detailed reports of all methodological work on environmental statistics done in the three Offices were presented. The second meeting in 1983 considered the two topics of (a) quality assessment and reporting in environmental statistics and (b) statistical description of air quality. The three papers on air quality were later published by the Central Statistical Office of Finland (1983) and also by the E.C.E. in the series *Statistical Standards and Studies* (1984).

The present note refers to the papers presented at the third meeting of the working group (Stockholm, November 1985). The meeting covered the topics of time series in environmental statistics and of waste statistics. Each country has contributed one paper on each subject. Short summaries of the papers including the results of the meeting are given for each subject. The full papers are included in: *Reports on Environment Statistics*, PM MI 1986: 4, issued by Statistics Sweden in the English language. The table of contents of the publication is the following:

- Introduction to the papers on time series
- Trend analysis for background air quality data (Finland)
- Presentation of time series in environment statistics (Hungary)
- Time series in environment statistics—Some methods and applications (Sweden)
- Introduction to the papers on waste statistics
- Developing waste statistics in Finland—Classification and practical applications
- Waste statistics in Hungary
- Waste statistics in Sweden—Review and some methodological problems

Time series analysis in environment statistics

Time series are very common in environmental statistics, whenever it is required to follow the development of a phenomenon. Time series are used in the study of natural, economic and social factors influencing the state of the environment, as well as in the study of qualitative and quantitative changes in environmental media. Environmental time series have a number of quite special characteristics, including

- frequent measurement errors
- suspected outliers
- missing data
- large numbers of variables and stations
- spatial correlation
- interest in explaining the past, and special difficulties to forecast the future due to interacting influences
- superposition of natural and anthropogenic effects
- short measurement periods at some stations.

Other aspects, like seasonality, are similar to those of traditional (economic) time series.

This combination of factors is unusual. In particular, the need to handle both spatial and temporal aspects has to be emphasized.

The papers relating to this section reflect various ways of dealing with some of the problems. In the paper from Finland, a variety of approaches to the analysis of a few particular air quality series are presented. For most methods, good standard computer programs are available. The statistical tools for trend analysis are then grouped by their ability to handle seasonal/non-seasonal and normal/non-normal data.

The Hungarian paper deals with data presentation as a simple way of time series analysis. In particular, the combination of summary tables with detailed accompanying diagrams is a useful model for such presentations. The Swedish paper reports on new methodological developments: a non-parametric trend test, where the correlation of subsequent monthly values can be included, and a comparison of a median-based analysis of variance with the general linear methods technique. These are discussed in the setting of water and air quality series.

Waste statistics

Waste statistics are in a state of development where both complicated classifications and data collections from many different sources have to be discussed. There is also no established format for waste statistics.

However, much work is going on in this area. The Finnish paper gives a thorough penetration of how to define and classify waste, with special regard to the problem of distinguishing between waste and reusable material. The borderline between “waste proper” and “reusable waste” is often vague and ambiguous.

What is reusable or not depends, for example, on available technology. Moreover, a theoretical definition is not enough. Respondents to any survey need practical guidance. This is one of the experience from the Finnish pilot survey on waste in the plastic industry. Analysis of the results shows that rough estimates could be obtained through a stratified sample. However, enterprises as well as the administration need more detailed data which cannot be obtained through a sample survey.

In Hungary, regular statistics are available on household waste, liquid municipal waste, hazardous waste, and surveys are performed covering agricultural and industrial waste. There is also a government programme on waste and secondary material utilization, which includes statistical evaluations. In most surveys, there are problems with coverage. Difficulties also occur with the definition of waste and with reuse. The lack of a unified classification makes the coordination of different data sources a complicated exercise.

Statistics Sweden is only to a small extent engaged in waste statistics. The available information, which has been collected by the Environment Protection Board, refers to household waste and hazardous waste. In the Swedish paper, it is argued that statistics should contain information on the material content of waste as well as information on the economic activities that generate the waste.

During the discussion, it became clear that waste statistics could be established in two main ways—by a material balance approach and through surveys of waste generators. The choice of approach will of course affect the data collection, but no preference can be given to either one of the two approaches on a priori grounds.

It was agreed that a conceptual framework for waste statistics could be obtained by a synthesis of two types of classification: One, in terms of waste proper, reuse and disposal; and the other in terms of the economic activities from which waste is generated. The first type of classification is illustrated in the Finnish paper and the second in the Swedish contribution. Both approaches can be combined in matrix form. The type of waste refers to the material aspect of waste.

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