

Chapter 4. Waste management

This chapter presents practical guidance as well as main issues and challenges for compiling SPPI for Waste management service activities (ISIC 37-38).

4.1. Waste management (Denis Gac, INSEE)

4.1.1. Industry description (ISIC 37-38)

Divisions 37 and 38 of the ISIC classification system combined, broadly cover waste management service activities. ISIC division 37 – Sewerage, includes: the operation, maintenance and cleaning of sewer systems or sewer treatment facilities; the collection, transportation and treatment of human, industrial and rainwater; the emptying and cleaning of sewerage from cesspools and septic tanks, sinks and pits; and the serving of chemical toilets. Division 38 - Waste collection, treatment and disposal activities; materials recovery, includes: the collection treatment and disposal of waste; and materials recovery.

In many countries, public entities, often local government, have traditionally provided a significant proportion of waste management activities although increasingly these are being provided by private operators. For example in France, the private sector now accounts for two-thirds of municipal waste management activity. In some cases the activities are funded through taxation and outsourced by government to private operators, while in other cases consumers purchase services directly from private operators. These models of service provision will require different pricing methods.

The provision of certain activities (such as the collection and disposal of household waste) is usually well regulated by government and this may make price collection relatively straightforward. On the other hand, business enterprises providing waste management services often provide a range of activities spanning across, and beyond, the two divisions (for example activities classified to ISIC division 36 - Water treatment).

Pricing mechanisms may differ significantly between activities and by type of service producers and therefore considerable effort is required in the design of the surveys, particularly at the industry research and respondent initialisation stages.

4.1.2. Classification aspects

4.1.2.1. Industry classification

The international industrial classifications are broadly comparable although they provide varying levels of detail (see annex A). The NACE, NAICS and ANZIC classifications all follow the organization of ISIC divisions 37 and 38 in that they distinguish between the collection (ISIC 381) and the treatment and disposal of waste (ISIC 382), as well as the recovery of materials (ISIC 383). Note that under the JSIC classification, waste management services are organised according to the source of the waste (domestic or industrial).

The classifications differ however in the treatment of remediation services. Both the ISIC and NACE classify remediation services separately under division 39 - Remediation activities and other waste management services, while they are included with waste management under a combined subsector in both the NAICS (5629 - Remediation and Other Waste Management Services) and ANZIC (2922 - Waste Remediation and Materials Recovery Services) classifications.

4.1.2.2. Product classification

There is greater variation among the international product classifications, both in terms of content and detail. In particular, both the CPC and NAPCS classifications focus

on waste management service activities although the NAPCS does provide some limited detail on recyclable materials.

The CPA, on the other hand, covers both services and goods, and contains a detailed list of products covering waste materials, recyclable materials (goods) and secondary metals under group 38.3 - Materials recovery services; secondary raw materials. The outputs of the waste management industries, (such as recycled metals) are significant as they may offset service fees.

It is not clear therefore if only the service activities provided should be included in the SPPI, or if transactions of recyclable materials are also relevant. The question of goods *versus* services was raised with the Technical Subgroup of the Expert Group on International Social and Economic Classifications (TSG) during the review of the CPC. However, there was not complete agreement that waste and secondary raw materials were the only categories of tangible outputs. There can be multiple transactions from recyclable materials collection businesses to sorting businesses, to wholesalers of recyclable materials, and to processors. While some of these transactions are margin activities, others involve processing and the treatment and the basis for measurement is not as clear (Murphy, 2011).

4.1.3. *Scope of the survey*

Ideally, SPPIs for waste management service activities should include the changes in fees received by the various institutional sectors providing these services. Governments often provide waste management services in respect of the collection and disposal of non-hazardous household and commercial waste or recyclable materials. They may also provide landfill, incinerator or other disposal facilities. Where the provision of waste management services are outsourced by government to private enterprises, these transactions are within scope of the SPPI.

SPPIs for waste management service activities should distinguish between different end users of these services as they are likely to involved different prices and pricing mechanisms. Contracts between government and private enterprises for the outsourcing of these activities are likely to be complex and cover a number of years in contrast to activities provided to households over a one year period which may be priced according to published lists.

CPA division 38 - Waste collection, treatment and disposal services; materials recovery services, includes business enterprises with highly complementary activities. Service producers may be involved in several activities of the industries forming the division, often across the different stages of the waste-management process. This provides a strong argument for the compilation of indices covering all of the activities of the division including the recycling of materials. On the other hand, it may also be the case that producers of specialised recycling services do not engage in waste collection activities and derive revenue from recovering recyclable raw materials. This is particularly true of household-waste incineration plants, an aspect that can significantly influence the price of incineration services.

4.1.4. *Industry vs. Product based SPPI*

Product based SPPIs are preferable for the deflation of national accounts. In practice however, the required weighting data (such as turnover at product level) is rarely available to compilers. These data are more typically available at the industry level

meaning that compilers are more likely to target the compilation of industry based price indices. Whilst this industry based approach is more practical, it has the disadvantage that it will miss relevant secondary activity of those establishments classified outside the waste management divisions. This disadvantage could be a significant issue in the case of services relating to sewerage.

The supply of water and sewerage activities is often offered by the same business enterprises as they share many related activities. Sewerage activities provided by business enterprises classified to division 36 - Water collection, treatment and supply, will not be included in an industry based SPPI.

4.1.5. Sample design

Ideally, sampling of the waste management divisions should be carried out using probability proportional to size (PPS) with turnover as the size measure. Samples are usually drawn from business registers. If additional data is available to the compiler, perhaps from the regulation of the provision of service activities, these could be used to supplement the information held on the business register.

The divisions may be heavily concentrated, with a small number of larger business enterprises responsible for a sizeable portion of output. These larger service producers could be selected with certainty. As it is possible to distinguish between a numbers of very different types of activities within each division, compilers should check to ensure that these activities are adequately represented in the sample.

In France, more than 60 units are included in the sample. All of these units produce service activities than span at least two industries. As activities are delivered regionally, it is important to ensure that the sample is representative of this industry characteristic. Industry representative organisations can provide useful information on the regional organisation of the industry.

4.1.6. Collection of information and specification of the service

As previously noted, pricing mechanisms may differ significantly between activities and by type of service producers. Many of the types of activities produced may be subject to regulation and this will impact both on the delivery of services and the availability of relevant information on them. It is essential therefore that considerable effort is applied to the research and respondent initialisation phases of the survey. Each component of the waste management industries should be separately reviewed and evaluated.

The selection of products for price collection should be conducted in consultation with the respondents so as to ensure that they are representative of the service activities produced. In France, a visit is made to each respondent to identify, in detail, the activities they produce. These are identified according to the following detail:

38.11 Collection of non-hazardous waste

- Collection from households and equivalents
 - traditional collection
 - selective collection (sorted bags or voluntary drop-off points)
 - collection at waste dumps
- Collection from economic activities
- Management of transfer facilities

- Waste materials (scrap metal, cullet)
- 38.12 Collection of hazardous waste
 - Collection of hazardous industrial waste
 - Management of transit centres or facilities
 - Collection of hazardous or infectious hospital waste
- 38.21 Treatment and disposal of non-hazardous waste
 - Treatment of household waste and equivalents
 - Management of sorting facilities for household waste and equivalents
 - Operation of class-2 storage centres for HW
 - Incineration of household waste
 - ~ Ash, incinerators residues
 - Collection of waste from economic activities
 - Management of sort centres
 - Management of class-2 storage centres
 - Management of class-3 storage centres
- 38.22 Treatment of hazardous waste
 - Specialised incineration
 - Management of class-1 storage centres
 - Co-incineration in cement plants
 - Treatment of infectious hazardous medical waste
 - Decontamination, remediation of contaminated facilities and soil
- 38.3 Energy by-products
 - Energy recovery (kW, hot water, methane)
- 81.29 Street cleaning

4.1.7. Main pricing methods

A variety of pricing mechanisms are employed by producers of waste management services. Service provider type (government, business enterprise), service consumer type (government, household, enterprise) and service type, all influence the way in which specific transactions are priced.

If household waste collection or sewerage services are included as part of a package of services provided by government, and funded by taxation, then transaction prices cannot be observed. On the other hand, if households pay per collection or pay by weight, it is likely that these services are already included in the CPI and can be easily incorporated into the SPPI.

If government outsources the provision of waste management services to private operators then the relevant contracts can be used for ongoing pricing. However, care must be taken to determine whether the contracts are identical over time, with the same collection area and the same frequencies. Collection areas may widen because of the inclusion of new neighbourhoods in the collection route. It is also important to separate collection activities from treatment and disposal activities.

4.1.7.1. Waste collection

For the collection of household waste, it is important to note that the service produced cannot usually be segmented. Waste collection effectively consists of collecting all waste left by households for collection (such as glass, organic, paper), and not just a single type. Consequently, tracking the price per volume (such as metric tonne) may not provide an adequate solution, despite its very frequent use as an indicator by private-sector operators.

In France, households are not charged on the basis of the waste they have had collected, but according to the “cadastral rental value” of their dwellings, which also serves to assess other local taxes. Some local communities are attempting to introduce “pay-as-you-throw” (“PAYT”) as an incentive to increase recycling and curb waste generation, since the price to pay is no longer a flat rate, identical whatever the quantity of waste left to collect.

Where a “PAYT” pricing method is employed, it is possible to determine a unit price for the service provided although the resulting index would not take into account various quality effects such as the introduction of different collection procedures for recyclable and non-recyclable waste.

If private operators are contracted by government to provide waste management services it could be possible to measure prices based on the contracts for this outsourcing. However, it is necessary to determine whether the contracts are identical over time, with the same collection area and the same frequencies. Collection areas often widen because of the inclusion of new neighbourhoods in the collection route. One way around this problem is to measure the price of a collection hour for a given arrangement, typically one truck and two collectors. When a contract is drawn up, its value may be pegged to population size and to cost indices, typically for fuel and gross wages. However, when using a time based method it is important to note that as collection equipment becomes more sophisticated it cannot be assumed that productivity remains constant.

The price per resident could provide a stable unit-price, if the characteristics other than the collection area have not changed radically.

Recycling incentives often lead to changes in the collection process. For example, services have developed to include not only: *i*) the collection of unsorted waste; but also *ii*) the collection of bins at voluntary drop-off points for glass, paper/cardboard, and plastics; and *iii*) the collection of sorted waste (organic, plastic, paper etc.). As waste collection becomes increasingly segmented into different services (according to the type of waste), the observed prices should reflect this market segmentation; an average “price per specified weight” for all materials combined may no longer produce an adequate measure of price development.

4.1.7.2. Waste treatment and disposal

For waste treatment and disposal, the most appropriate solution appears to be price per quantity. Characteristics that should be taken into account include:

- Type of waste (solvent, grease, paint, radioactive material etc.);
- Format (liquid, unsorted/bulk, etc.);
- Quantity (50 g, 10 metric tons);
- Waste disposal process (storage, landfill, incineration, etc.).

4.1.8. *Quality issues*

Improvements to the quality of service produced may require quality adjustment. The overall quality of waste collection and treatment services is not determined solely by the buyer and seller, but also by the regulatory standards concerning health, pollution, and the environment. It is important that all changes in the quality of services produced are identified and adjusted for where necessary.

For example in France, authorities are involved in regulation, setting pollutant emission standards, defining the procedures to be implemented, and setting guidelines for local policies such that compliance with EU Directives is achieved. The following targets have been set according to “Le Grenelle de l’Environnement”:

- Reduce household-waste production by 7% per year;
- Increase recycling of materials and organic substances in order to raise the share of recycled household waste and equivalents from 24 % in 2004 to 35% in 2012 and 45% in 2015;
- Reduce incineration volume by 15% between 2009 and 2012.

Changes to collection processes must be monitored and accounted for. A current trend that can be observed is the separation of waste-collection flows, thereby increasing total collection activity. If unit prices are tracked at a too broad level, changes in the collection process cannot be accounted for. In some localities, for example, a twice-weekly collection of unsorted waste may be changed to one collection of unsorted waste and one collection of sorted waste.

4.1.9. *Weighting and aggregation*

The extent to which suitable weights can be identified for the compilation of SPPIs for waste management services will be largely dependent on the market structure within a country. In particular, the relative importance of government as a service provider will determine the completeness of traditional sources of weights (such as structural business statistics or the national accounts). Secondary sources of weights such as the volume of waste produced or disposed of to estimate weights across institutional sectors could also be employed (Murphy, 2011).

4.1.10. *Specific aspects*

The overlap in production of water and sewerage services may present challenges to the compiler if it is not possible to separately identify prices for the services. Furthermore, it may be difficult to directly measure the price development of waste management services produced by government. Where these services are outsourced to business enterprises the contract price method can be employed.

As previously noted, it is not entirely clear how the transactions of the output of recycling of some waste should be treated in the compilation of SPPIs.

4.1.11. *Overview of national methods*

Korea

In Korea, the SPPI for waste management is limited to the collection and disposal of human, non-hazardous, hazardous and construction waste. Local governments are responsible for the collection and treatment of sewerage, although these services may be

sub-contracted to private enterprises. Prices for waste collection, treatment and disposal are market-determined, except in the case of landfills owned by local governments, for which rates are determined by regulation.

For human waste collection & disposal services, list prices of local governments or their licensed agencies are used. These services cover the cleaning the septic tanks of houses and buildings, and the transportation of the sludge generated, to treatment facilities. The fees for the cleaning of septic tanks are determined by local government regulation.

For business waste collection and disposal services the contract pricing method is employed. Prices are collected for the collection, treatment and disposal of general business waste, construction waste and some hazardous waste. Collection of prices for each stage of processing was attempted. However, this was not successful as contracts usually involve a single price for all the stages of processing combined.

United Kingdom

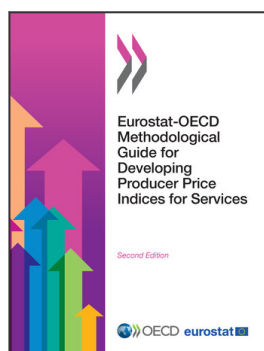
In the U.K., the SPPI for waste management covers sewerage, waste disposal and recovery of sorted materials services. Services are typically provided under long-term contract agreements where price and delivery are well-specified for a number of periods. This facilitates the use of the direct use of repeated services method. Sewerage prices are specified either per cubic meter or according a formula specified under regulation. For waste disposal services prices are specified per household, per tonne or per cubic meter.

Atypical price movements are queried with respondents by telephone. Where service transactions undergo change in quality, direct comparison, direct quality adjustment, or imputation may be employed.

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