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Sector Paper:

Commercial and Industrial Machinery Repair and Maintenance

Niall O'Hanlon,
Central Statistics Office, Ireland

1. Introduction

Measurement of output and price development of the *Commercial and Industrial Machinery Repair and Maintenance Services* sector presents a number of challenges. The diverse range of machinery repaired, provision of repair and maintenance services as secondary activities, bundling of repairs and maintenance services with other activities (such as installation) and the relative significance of own account provision of services must all be considered by the compiler.

This paper summarises the activities of France, Japan, Mexico, Sweden and the US as presented and discussed at the 27th Meeting of the Voorburg Group (VG) along with the results of the VG “Survey of country progress”. The paper will address classification issues and challenges to measurement of turnover and price change. A number of recommendations will be made in respect of these issues and classifications which should provide practical guidance to compilers in developing or improving SPPIs for the sector. Of course, decisions which compilers will need to make as to the most suitable approaches to follow will be heavily influenced by availability of data, resources and prevailing market conditions.

The remainder of the paper is organised as follows: Section 2 covers classification of the sector. Section 3 discusses issues relating to the measurement of turnover. Section 4 provides information how Service Producer Price Index (SPPI) data is compiled for the sector. Section 5 gives a brief summary of the conclusions.

2. Classification

The *Commercial and Industrial Machinery Repair and Maintenance Services* sector covers a broad spectrum of services provided almost exclusively to business customers. Commercial and industrial machinery ranges from typewriters to ship engines and therefore repair services can be small routine tasks to large and complex projects. The services outputs are highly heterogeneous.

The services are provided by general and specialised repair establishments or can be bundled with other services such as installation. Repair and maintenance services are often provided as a secondary activity (by an internal or external service provider), complicating the collection of turnover data and pointing toward product level rather than industry level SPPIs.

2.1 Industry Classification

Five industry classifications were considered as part of the mini-presentations: the UN *International Standard Industrial Classification (ISIC, Revision 4.0)*, the *Statistical Classification of Economic Activities in the European Community, Rev. 2 (NACE Rev. 2)*, two variants of the *North American Industrial Classification System (NAICS US 2012 and NAICS Mexico 2007)*, and the *Japan Standard industry Classification (JSIC, Rev.12)*.

Differences in the classification of the sector are evident across countries, particularly in respect of its location within the classification systems. Both ISIC and NACE classify the sector within Section C Manufacturing, while in NAICS and JSIC it is classified under Services.

There is a question as to the appropriateness of classifying the sector as manufacturing. In the context of ISIC this is justified on the basis that the division does only include specialized repair and maintenance activities but also a substantial amount of repair conducted by manufacturers. The classification of the sector within Manufacturing does not pose a problem as long as production and repairs are kept separate. The production or extension of the life of an asset is treated as capital formation while routine repairs and maintenance are treated as intermediate consumption.

Table 1: Classification of sector in ISIC

ISIC 4 Section C: Manufacturing
Division 33 “Repair and installation of machinery and equipment”
Group 331 “Repair of fabricated metal products, machinery and equipment”
Class 3312 “Repair of machinery”

There are also differences in the industry classifications in respect of content. ISIC, NACE and the US NAICS present a single class (3312 in ISIC and NACE, 8113 in NAICS). JSIC presents two separate classes, distinguishing machine repair (split between general and construction/mining) and electrical machinery repair. The Mexican version of NAICS is the most detailed classification with separate classes for each of agricultural and forestry, industrial, materials handling and commercial and service machinery.

Discussion of the sector at the 27th VG meeting suggests that a greater consistency across the international classifications would benefit measurement of this sector.

Detailed descriptions of the industry classifications presented are included under Appendix 2.

2.2 Product classification

The product classifications presented here are the Central Product Classification v.2 (CPC v.2), Classification of Products by Activity (CPA 2008) and the North American Product Classification System (NACPS v.1). Detailed descriptions of these product classifications are included under Appendix 3.

The CPC includes product subclasses to distinguish maintenance and repair of office and accounting machinery, and commercial and industrial machinery. The CPA provides two subclasses to separate the repair and maintenance of general-purpose and special-purpose machinery – the focus being on the type of machinery.

The NAPCS differs in that it is organised around eight different industries in which the machinery for repair and maintenance are used.

3. Turnover Statistics

3.1 Data availability

There is generally good availability of turnover data for the sector. Of the twenty-two countries that responded to the “Survey of country progress”, nineteen compile industry-level turnover and nine of these also compile product-level turnover. The *Commercial and Industrial Machinery Repair and Maintenance Services* sector is relatively small in its contribution to total national output. Interestingly, the sector is concentrated to very different degrees across the presenting countries. The sector far less concentrated in Mexico, where is dominated by micro-units, than in France and Sweden. Sweden appears to show the highest level concentration, with a small number of units producing a larger share of turnover. The Swedish paper notes that the sector is dependent on, and therefore influenced by, market performance in other sectors of the economy.

3.2 Collection of data

A variety of sources are used to compile turnover data for the sector. These include sample surveys, censuses and administrative data – in form of taxation records. Combinations of survey and administrative data are commonly used.

Structural Business Statistics (SBS) type surveys are used to compile annual turnover data. The surveys also collected additional information on additional characteristics including, employment, fixed assets, stocks, investment, costs of purchased goods and services, and other expenses. EU countries are required under regulation to compile data on volume and value of sales at product level for the mining and quarrying and manufacturing sectors.

Sub-annual turnover data is compiled on the basis of surveys which may also include collection of data on a more limited number set of characteristics, such as employment and costs of purchased goods and services.

Sub-annual results are generally published as indices. They provide a short-term indicator of economic performance in the sector and are used in the compilation of monthly/quarterly national accounts.

3.3 Data issues

The presenters noted that *Repair and maintenance of commercial and industrial machinery services* is often provided as a secondary activity. In Sweden this tends to be in the Wholesale and Retail trade and Architectural and Engineering Division. Collection of product level information is therefore desirable. Bundling of repairs and maintenance services with other

activities (such as installation) and the relative significance of own account provision of services must all be considered by the compiler.

The distinction between repairs and maintenance and capital formation (through the production, or extension of the life, of an asset) could be problematic in some cases.

The distinction between inputs of labour and parts was not discussed in detail, but it useful to note the recommendation in the Sector paper for “ISIC 4520, Maintenance and repair of motor vehicles” (Wallace and Murphy, 2012) that these inputs should be recorded separately where possible.

3.4 Recommended approaches

Table 2 below provides an overview of the options for developing or re-developing turnover statistics for the sector. They are ranked according to best, good and minimum approaches.

Table 2: Options for Developing Turnover Statistics for Repair and maintenance of commercial and industrial machinery services

Category	Data Source	Level of Detail Collected	Frequency	Cost	Comment
Best	Survey/Census	Industry turnover <u>and</u> product turnover detail	Annual and/or sub-annual collection	- Most expensive - Largest response burden	- Due to secondary activity issues - cross industry product level detail desirable. - Distinguish where possible between repair and production
Good	Survey/Census	Industry detail <u>only</u>	Annual and/or sub-annual collection	- Expensive - High response burden	Industry level detail may not be sufficient due to secondary activity issues
Minimum	Administrative (tax data, industry association data etc.,)	Industry detail <u>only</u>	Annual	- Least expensive - Little or no respondent burden	Least timely Units may be misclassified to incorrect industry

4. Service Producer Price Indices (SPPI)

4.1 Data availability

There is reasonably good availability of prices data for the *Commercial and Industrial Machinery Repair and Maintenance Services* sector. Of the twenty-two countries that responded to the “Survey of country progress”, twelve compile industry-level prices and one of these also compiles product-level prices.

4.2 Source of SPPI data

Price data for the sector is collected via dedicated SPPI surveys. Given that repair and maintenance services are confined to commercial and industrial machinery the Consumer Price Index cannot be used.

4.3 Target coverage

Price collection in this sector is targeted at business users (B2B).

As previously noted, the services may be provided as secondary activity by establishments classified to other industries such as installation. Establishments classified to the sector may themselves also engage in secondary activities. Industry coverage may therefore include a considerable amount of out-of-scope activity, while product level indices require coverage across a range of related sectors.

4.4 Pricing methods used and main issues arising

Commercial and industrial machinery encompasses a very wide range of machines. The services outputs are therefore highly heterogeneous. Furthermore, the services may be delivered as once-off (unique and non-recurring) transactions, under maintenance contracts or performed by warranty-centres on behalf of manufacturers. Repair and maintenance services will often include parts as well as labour. Consequently a variety of pricing mechanisms are employed within the sector and the compiler must apply appropriate pricing methods in response. It can be expected that a mixture of methods will need to be used to accurately measure price development within the sector. Indeed, each of the presentations referred to use of more than one pricing method.

In the case of once-off transactions, model pricing should be employed. In this approach a standardised product is specified, usually during the survey initialisation process and re-priced over subsequent survey periods. The standardised product or “model” should be representative

of the type of service provided by the reporting unit. Models may need to be updated or replaced periodically to ensure on-going representativeness.

For more routine, repeatable services, priced according to a flat fee, direct use of prices of repeat services can be used. This method has the advantage of representing the ideal use of real transaction prices. Also, it is often relatively easy to employ. Quality adjustment is required where an observed service transaction is modified or replaced.

Scheduled delivery of maintenance under contracted terms (referred to as preventative maintenance contracts) are priced using the contract pricing method. A constant quality service provided in each period and price agreement must cover more than one period. Survey frequency can be adapted in specific cases to reflect the length of contract. Escalator clauses may be a feature of longer term contracts and these must be reflected in the price data used. The compiler must also consider how well the price index calculated using this method reflects price development more generally in the sector.

Where repair and maintenance services are predominately labour based and price is determined by the required worked -time, time-based methods can be used. Care must be taken to adjust for changes in productivity where possible, and changes to the scope of billable worked hours.

4.5 Weights

The type of weights required varies according to the type of approach taken to compile the PPI. Product level price indices are recommended over industry level indices. However, only one reporting country is currently compiling product level indices despite the fact that product level turnover is available in nine countries.

4.6 Recommended approaches

Table 3 overleaf provides an overview of the options for developing or re-developing SPPIs for the sector.

Table 3: Options for Developing SPPIs for Repair and maintenance of commercial and industrial machinery services

Service Type	Pricing Mechanism	Pricing Method	Data type in survey	Quality and Accuracy
Routine, repeatable	Flat fee	Direct use of repeated services	Real transaction prices	High if transactions remain representative and at constant quality
Unique and non-recurring	Often a combination of costs of labour and parts	Model	Estimated by respondent	Good if model remains representative
Preventative maintenance	Contract	Contract	Real transaction prices	Good if transactions remain representative and at constant quality, escalation clauses accounted for. Does the resulting index reflect price development in the sector?
Unique and non-recurring, predominately labour based	Predominately based on working time	Time based	Real or average labour rates	Good if changes in productivity and/or billable hours adjusted for. Real labour rates preferable to average rates

5. Summary of main conclusions

Measurements of output and price development of the *Commercial and Industrial Machinery Repair and Maintenance Services* are well developed. Compilers of these statistics must consider a number of characteristics of the sector which can complicate turnover and price measurement.

International classifications are not very well harmonized; the sector can be classified to manufacturing or services. Different levels of detail exist at industry level and differences are even more pronounced at product level classifications. The CPC includes product subclasses to distinguish maintenance and repair of office and accounting machinery, and commercial and industrial machinery. The CPA classification is focused on the type of machinery repaired while the NAPCS is organised around the different industries in which the machinery for repair and maintenance are used. Greater consistency between the international classifications would aid measurement.

Commercial and Industrial Machinery Repair and Maintenance Service are often provided as a secondary activity. Establishments classified to the sector may also engage in other activities. Therefore collection of turnover data at product level is important. Distinguishing between repairs and maintenance, and capital formation can be problematic. Separation of labour and parts was not discussed in detail and may need to be revisited.

SPPIs for the sector are generally compiled at industry level despite issues relating to secondary activity and good availability of product level turnover data.

The pricing methods employed for different types of repair and maintenance work will influence the selection of appropriate pricing methods. It can be expected that a mixture of methods will need to be used to accurately measure price development within the sector.

Appendix 1 – Overview of international progress

ISIC 3312	Survey Categories	# of Countries
	a. PPI details >= CPC	1
	b. PPI details >= CPC soon	0
	c. Turnover details >= CPC	9
	d. Turnover details >= CPC soon	0
	e. Industry prices calculated	12
	f. Industry turnover collected	19
	1. Detailed turnover and prices well aligned	1
	2. Detailed turnover and prices well aligned soon	0
	3. Industry level turnover and prices aligned	11
	4. Industry level turnover and prices aligned soon	2
	5. Other - no industry coverage for prices and/or turnover, etc.	8

Appendix 2 – Overview of industry classification

ISIC 4.0

C: Manufacturing

33: Repair and installation of machinery and equipment

331: Repair of fabricated metal products, machinery and equipment

3312: Repair of machinery

NACE Rev.2

C: Manufactured Products

33: Repair and installation of machinery and equipment

331: Repair of fabricated metal products, machinery and equipment

3312: Repair of machinery

NAICS United States 2012

81: Other Services

811: Repair and maintenance

8113: Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance

81130: Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance

NAICS Mexico 2007

81: Other Services

811: Repair and Maintenance Services

8113: Agricultural, industrial, commercial and services machinery and equipment repair and maintenance

81131: Agricultural, industrial, commercial and services machinery and equipment repair and maintenance

811311: Agricultural and forestry machinery and equipment repair and maintenance

811312: Industrial machinery and equipment repair and maintenance

811313: Material handling machinery and equipment repair and maintenance

811314: Commercial and service industry machinery and equipment repair and maintenance

JSIC

R: Services nec

901: Machine repair shops, except electrical machinery, apparatus, appliances and supplies

9011: General machine repair shops, except construction and mining machinery

9012: Construction and mining machinery repair shops

902: Electrical machinery, apparatus, appliances and supplies

9021: Electrical machinery, apparatus, appliances and supplies

Appendix 3 – Overview of product classification

CPC Version 2

87120: Maintenance and repair services of office and accounting machinery

87156: Maintenance and repair services of commercial and industrial machinery

CPA 2008

33.1: Repair services of fabricated metal products, machinery and equipment

33.10: Medical and surgical equipment and orthopaedic appliances

33.11: Repair services of fabricated metal products

33.12: Repair services of machinery

33.12.1: Repair and maintenance services of general-purpose machinery

33.12.2: Repair and maintenance services of special-purpose machinery

33.13: Repair services of electronic and optical equipment

33.14: Repair services of electrical equipment

33.15: Repair and maintenance services of ships and boats

33.16: Repair and maintenance services of aircraft and spacecraft

33.17: Repair and maintenance services of other transport equipment

33.19: Repair services of other equipment

33.2: Installation services of industrial machinery and equipment

NAPCS US

8113.1.0: Maintenance and repair and related services for commercial and industrial machinery and equipment

8113.1.1: Maintenance and repair services for agricultural, construction, mining, and oil and gas field machinery and equipment

8113.1.1.1: Maintenance and repair services for agricultural machinery and equipment*

8113.1.1.2: Maintenance and repair services for construction machinery and equipment*

8113.1.1.3: Maintenance and repair services for mining and oil and gas field machinery and equipment*

8113.1.2: Maintenance and repair services for commercial and service industry machinery and equipment

8113.1.3: Maintenance and repair services for manufacturing and metalworking machinery and equipment

8113.1.4: Maintenance and repair services for other commercial and industrial machinery and equipment

8113.1.4.1: Maintenance and repair services for commercial refrigeration equipment

8113.1.4.9 Maintenance and repair services for other industrial and commercial machinery and equipment, nec.

8113.1.5 Cleaning services for commercial and industrial machinery and equipment

*indicates US product on

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