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The Treatment of Industrial Services in Statistics

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Abstract:

One of the problems still under discussion in the field of classifications is the treatment of “industrial services”, i.e. maintenance and repair, installation and subcontracting. Much has been written about services in general but literature on industrial services as such is sketchy and often it is discussed in a much broader context or as part of more general issues. This paper tries to summarise the main principles and to bring together some practical rules. It first sets out which kinds of service activities and products are covered and which are their characteristics. Then it will be examined which economic units (transactors) provide these services and to whom and finally it will be explained how to classify services in activity classifications (ISIC and NACE) and in product classifications (CPC and CPA) and how the transaction are to be recorded in different economic statistics.

Remark:

The views expressed in this paper are those of the authors and do not necessarily reflect the policies of Statistics Netherlands.

THE TREATMENT OF INDUSTRIAL SERVICES IN STATISTICS

1. What are services and why are some of them “industrial”?

There have been extensive discussions, both on paper and orally, on the difference between goods and services and thus on the definition of services. On several occasions it was said that a distinction is not necessary as long as the classifications used cover both and as long as a clear description is given for each individual category. Indeed the previous version of the System of National Accounts (SNA) did not make the distinction; it generally treats “goods and services” together.

When revising the SNA and the classifications related to it, the need was felt to at least provide an indication of the difference between goods and services and also to distinguish them from tangible and intangible assets. Arguments were given pro and con several characteristics of services and some of those accepted earlier were rejected in a later stage. Currently one could say that some general characteristics of services are accepted. These could be summarised as follows:

Services bring about a change in the condition of a person or a good as a result of an activity of some economic unit with the prior agreement of the consumer. Services cannot be traded separately from their production and no ownership rights over services can be established.

These characteristics are further worked out in the current version of the SNA when, in chapter 6, it provides a definition of services as opposed to goods. Some of the consequences of these definitions are that:

- services are consumed at the same time they are delivered,
- service activities never bring about new tangible goods and
- services are irreversible.

Seemingly there is a contradiction between the expressions “industry” and “services”. Traditionally the output of an industry consists of transportable goods while services are the output of some service industry. This distinction, however, between providers of goods on the one hand and of services on the other has become more and more blurred. First of all the term “industry” became to comprise all activity categories in the economy, including service activities; secondly also manufacturing industries (the more traditional meaning of the expression “industry”) provide services, them being industrial or other.

For the purpose of this paper “industrial services” are defined as activities which normally are or can be carried out by a producer himself but for economic or technical reasons are externalised, i.e. commissioned to another company. Another limitation is that we will deal with services provided by and to sections A to D in ISIC ¹ NACE ² only. (This includes agriculture, fishing, mining and manufacturing. Construction is excluded because in that segment of the economy subcontracting and repair are organised in a very complicated way.) Thus industrial services are typically rendered by one goods producing company to another. This limits the scope of the subject; it excludes ancillary services bought by companies such as

¹ International Standard Industrial Classification of all economic activities.

² Nomenclature générale des Activités dans les Communautés Européennes.

administration, transport, storage, cleaning etc because other manufacturing industries rarely provide such services. These are not industrial services but business services.

It also excludes services that are usually bought by private individuals, such as serving meals or drinks, even when done in an industrial environment such as a canteen. One could wonder, however, if services by engineers or architects should not be considered industrial services; in fact these are services that could also be performed by the clients themselves, i.e. large industries and construction firms. An architect can even sell his service directly to a private household! Engineers usually don't. Since architects and engineers fall outside our limitations we will not discuss their services here (however, for classification of architectural and engineering activities see under "transactors" below).

None of the restrictions above is, of course, without exceptions. It is very well conceivable that individuals buy industrial services; an example could be that someone has his private printing machine repaired by the manufacturer. On the other hand it will be rare that private people offer industrial services on the market. It may happen, however, that non-manufacturing companies, falling outside our boundaries, using their surplus of the capacity that normally is being used for internal goals, provide industrial services to third parties. In the following some side steps will be made to services to individuals or other users to explain the difference in treatment.

Taking into account the descriptions given above, one could describe industrial services generally as follows:

An industrial service, performed by an economic unit brings about a change in the condition of a good, belonging to another unit. There exists some kind of relationship and prior agreement between producer and consumer of the service. Production and consumption of these services are allied in an indissoluble way. Industrial services never result in new tangible goods. Services are not separate entities that can be stored or traded.

2. Different types of industrial services

Three categories of industrial services can be distinguished: 1) work on a fee or contract basis, 2) maintenance and repair and 3) installation. In the following all three types will be examined and their treatment will be elaborated.

2.1 Work on a fee or contract basis

Work on a fee or contract basis (subcontracting, contracting out, externalisation) is defined as performing a production activity for the account and risk of someone else. A contractor produces goods from materials belonging to his client (the converter) or performs a process that is (completely) prescribed by this client. In the latter case the (sub)contractor may also provide (some of) the raw materials. Important aspect is that the contractor does not own the raw materials and therefore cannot own the end product. He thus cannot sell that product either; he must deliver it back to the owner, his client. The converter (commissioner) has the rights of ownership, of licence, of mark, of model etc and he sells the goods under his name. Another characteristic of subcontracting is that the invoice of the contractor shows a service while his delivery consists of a good.

Contract work is performed in almost all industries, from agriculture to the metal working industry. Sometimes even specialised industries emerged. The main reasons

to contract out (parts of) an industrial process are that the labour force bought is cheaper or that the technology or skills needed are not present in house.

In agriculture contract work concerns mainly labour: i.e. a farmer substitutes the labour force of a contractor for his own labour for a fixed price or for a price by the hour. The contractor may plough some part of the land to be sowed, he may plant new plants or he may fertilise or protect the crop; he may even harvest this crop. In all cases, however, the crop remains the property of the farmer; the contractor is paid for his time and efforts only.

Well-known examples are further found in the manufacturing industries (processing). It is very common that subcontractors do labour intensive production phases, preferably in cheap labour countries (we will come back to this international aspect of industrial services later). It is often suggested that, from a theoretical point of view, a complete production process, be it manufacturing or other, can be segmented into a series of services, each serving the next stage in the process.

In the textile industry it happens often that a manufacturer or designer make the design for new shirts or pants or costumes but has the pieces put together by another company. The first one buys the raw material and ships it to the contractor who puts together the clothing after which these products are shipped back to his client. The work of the contractor can vary from just sewing pieces together to cutting, dying, sewing, finishing (dying, painting, printing), ironing and packing, depending on the contract he has with the converter. However, the crucial character of the contractor's work is that he is not to decide what to make and what material to use. The only choices and decisions he can make are those that make the work or process more efficient; that is how he can increase his profits. The converter makes all the decisions in respect of the end product and the materials used; it may happen though that some raw materials are bought by the contractor on behalf of the converter or that he adds materials on his own account.

The steel industry is another example of processing. Especially casting, forging and finishing work is often performed on this basis. Even though castings and forgings are often mass produced and kept in stock, the majority of them are made to measure or on order. Quite often a contractor does not even know what exactly he is producing; he is given a drawing of the piece the client needs and he makes the best of it. In this case, however, the influence of the contractor on the production process is far bigger than in the textile industry because there is much more technology and knowledge involved. Where in the textile example mainly labour and simple machine tools are involved, casting, forging and finishing industries use highly sophisticated machinery, often even computer guided. Also more often than not the contractor buys the raw materials because he knows better the physical characteristics of the metals he works on than does his client. Since, however, the influence of the converter on shape and quality of the products is by far the most important factor in the end product, it is still he who is considered the manufacturer while the contractor merely provides a service. A similar argument can be given for the production of many other metal parts, which are produced in metal working industries. Simple parts or products are usually mass produced for own account and kept in stock; when more complex parts are made, most of the time they will be made to measure by specialised firms and, depending on who provides the raw material or who makes the more important decisions with respect to design, quality and quantity, it is decided whether it is production of goods or of services.

The fact that the textile and the metal working industries are given as examples does not mean that subcontracting does not occur in other industries. Mammoth contracts occur in the petrochemical industries, where sometime the whole refining process is

subcontracted. In fact contracting out happens in almost all industries: (parts of) production processes are subcontracted to other companies in the same or in different industry groups.

An interesting point for discussion is the question if the contractor brings about a new good. He is supposed to merely render a service but in reality he delivers a good. This point is particularly important in international trade and therefore we will come back to it later. At this point we can only conclude that the characteristics of contract work comply with the definitions of a service and that the contractor brings about the new good. If this were not the case, enormous amounts of double counting would occur. (Double counting occurs only when we look at physical numbers or gross output; value added is not affected.)

Contract work for household is very unusual because rarely a client will provide raw materials; normally he buys a good. This good may be made to measure but because the producer provides the material, the transaction still concerns the sale of a good. Such orders will mostly be placed to specialised shops or to relatively small industrial companies. An exception may be tailor made clothing, where sometimes the fabrics are bought by the tailor but on behalf of, and for the account of his client.

2.2 Maintenance and repair

These services consist of making a diagnosis of what is out of order, planning the action and replacing parts or adding lubricants. The parts added may be charged separately.

Services like maintenance and repair are a logical result of wear and tear; they need to be undertaken regularly to keep the assets in working condition. Maintenance and repair of non-consumer products is performed by either the company who produced the goods in the first place or by specialised repair shops. It is assumed that such repair occurs mainly in the metal industry: production factors such as machines, installations and vehicles need to be maintained and repaired regularly. As in the case of contract work, repair of these articles requires highly skilled personnel and a well-equipped machine room. Specialised (repair) shops often do repair of simple machinery and vehicles. These small shops are often the same as those referred to in the previous paragraph. However, especially when the repair concerns complicated machines, this will typically be done by the manufacturer himself or by a company dedicated by the manufacturer who has all the drawings and specifications.

In the case of maintenance and repair it is easier to accept the important characteristic that no new products came about; it is assumed that the machine remains the same before and after the maintenance or repair; its performance is not changed. (One could discuss if a machine that does not function is the same as one that does but this discussion would go beyond the scope of this paper. In any case, since the HS classifies a broken machine in the same category as a working machine (unless the former is accounted for as waste or scrap), we must accept the convention that no new or different good occurs as a result of maintenance or repair.)

Repair of consumer goods is usually done by repair departments of manufacturing industries, by ordinary retail shops or by specialised repair shops. In general this concerns repair or maintenance of durable household goods.

2.3 Installation.

Installation is placing a more or less complicated set of machinery or equipment at a desired place and changing set ups resulting in the machine or equipment to function in the way it was designed and produced for.

Installation occurs most of the time when the equipment is delivered. Most machinery cannot be placed at their final position without the help of professionals who put together the parts and connect them to each other and to the mains. In by far the most cases the manufacturer provides this service himself as an ancillary activity and in that case the charge for installation is included in the price of the machine or equipment. In some cases the installation is done by different companies, who may or may not be establishments of the producer. In such a case the installation service may be charged separately, usually to the producer of the equipment. (For the treatment of turnkey projects, see below.)

In the case of installation the question of whether or not a new product occurs is not as easily answered as with repair. It could be argued that an operational installation, consisting of different machines, is a different product than each of the elements separately, even different from the sum of the individual elements. The HS cannot be used as reference because installations cannot be shipped as such and therefore are not shown as one item in the classification. In any case the machines to be installed are never owned by the installing company and therefore it must be concluded that we are talking about services and not goods.

Installation of consumer goods is very common. In almost all cases the (retail) company that sells the product does this and rarely is it charged separately to the customer; it is included in the price of the equipment bought.

3. Classification of Industrial Services

3.1 Transactors

The general rule in ISIC and NACE is that units whose principal activity consists of performing industrial services, be it processing, repair or installation, be classified by convention in the same class of the activity classification as units who produce the goods involved. This general rule is expressed in the classification rules in the introduction of both classifications only. Since users of the classifications are not always aware of such rules, it is suggested to mention these service activities also in the explanatory notes, or at least in the indexes. There are, however, some exceptions to these rules: ISIC and NACE created separate groups within agriculture to which all units are classified whose main activity is rendering agricultural services to farmers. NACE did the same in forestry. Installation of equipment that makes buildings function is classified in construction. Separate groups are reserved for maintenance and repair of motor vehicles, household equipment and computers and other office equipment.

A problem may be how to classify units that install complete plants or other buildings such as hospitals, so called turnkey projects. As in the classification of any other unit the rule of the predominant activity plays an important role. In most cases turnkey projects will be awarded to companies which are classified already to a certain industry because they produce goods or services. However, companies do exist whose main activity is putting together and selling complete installations (plants) without producing the elements. In the current situation classification of such units depends on their input in the end product. In virtually all cases the main contractor will use subcontractors, who are themselves classified according to their own activity. If the principle contractor is mainly involved in the design of the building(s), he is to be classified to architects. If his main involvement concerns the technical installation or if he only deals with project management he should be classified to engineering.

Precisely because the output of these industries consists of tangible goods (generally investment goods), it is debatable if their classification among service industries is the best solution.

The distinction between shops that specialise in repair of household goods and companies that belong in the category “general mechanical engineering on a fee or contract basis” may be difficult. Both will take orders of a similar kind and depending on their schedules their main activities may change over time. Also, they may serve both industries and private individuals.

Classification of both partners in processing is complicated and often disputed. From the previous paragraph it may be clear that a contractor is classified to the same activity as those who perform a similar activity as (part of) their own production process. Therefore companies that sew shirts together for a converter are classified in the textile industry and not in a service industry. This is the same for companies that produce parts for further use in larger production processes, for instance machine parts. Such companies are classified to the appropriate industries, whether or not they do this on own account or as (sub)contractors.

More problematic is the classification of the converters. If they contract out only part of the production process, it is not too difficult: they buy raw materials and services and sell end products. It becomes more disputable when one or more contractors carry out the whole of the production process. The converter still buys (all) materials but he has hardly any infrastructure (capital goods) for production; physically the raw materials and even the end products may never enter his premises. He may just have an office with a telephone, a computer and email. It is often suggested that such companies be classified in trade rather than in the industry. An argument to classify (sub)contractors in the manufacturing industry is that (at least in domestic statistics) the whole production process is kept together in one industry class: the converter represents the beginning and the end of the process and the contractor(s) everything in between. In doing so the statistics on a certain category of the economy show the production process from beginning to end and technical coefficients will retain their significance. Also, classifying them in trade would violate the definition of trade, which says that trade involves buying a good and selling it in the same state (except that some minor work may be done to it as a usual combination of activities).

Against this one can argue, however, that the turnover data of that industry will be too high because transactions between converter and contractor (which are both within the same industry) increase the output and input unrealistically; the value added remains correct, however and as long as the output of the contractor is recorded as a service, also the output of physical good remains correct.

3.2 Transactions

The answer to the question how to classify industrial services as products is not very different from the answer to the question where to classify the activities. Both CPC and CPA reserved separate groups or classes for industrial services, be it that CPC puts them all together in one division and CPA keeps them together with the output of goods produced by a particular industry. Long arguments on what is the better way to classify these services have kept working parties busy but a solution or compromise has never been found. The majority in the EU member states consider it convenient to have a product classification with a structure parallel to the structure of the activity classification in order to keep the output of each industry together in one division, group or class. This would facilitate data collection and imputation of missing data because input/output quota's are more easily found and applied. A disadvantage is, however, that the totals on turnover, orders and stocks of these

industries become a mixture of goods and services and that similar services are classified in different places once they are rendered by different industries. A majority in the world group on classifications, therefore, maintains that a product classification ought to be an independent classification based on its own merits, i.e. on the characteristics of the products themselves, industrial origin being only one of them and that the ordering needs not to be copied from an activity classification.

Even though CPC has no specific groupings for products produced in a special industry, each line in it is accompanied by a reference to the industry where the particular good is produced. So by rearranging these lines one could find all products produced by one specified industry, which, theoretically ³, would give the same structure as in the CPA. In the previous paragraph it was explained that specific industry categories were established in ISIC and NACE for some service industries. Since services never lead to the output of goods, it is only logical that no goods are attributed to such activity categories. Therefore both the CPC and the CPA only show services as products against these activity groups.

Service activities that lead to an output of goods are found in construction and engineering. In the case of construction the CPC contains a separate division for buildings and other constructions. The CPA does not contain such a category; a separate classification is used for this purpose. For installations the solution is not so obvious. Typically in the case of turnkey projects (see above) it happens that complete plants or installations are invoiced all at once (be it that payments often are made in instalments, depending on progress made). Current practice is to measure such transactions gross, i.e. to classify the entire amount as sales of an engineering service. It would be worthwhile to engage in a study on the classification of such “services” and to discuss their proper classification based on empirical facts.

4. How to treat industrial services in statistics?

The important issue here is the distinction between normal inputs of goods and the input of services, just because these services lead to the same physical input in the production process as if the goods were normally bought. In principle this treatment does not create problems: the subcontractor charges a service to his client, who enters the same service as input in his accounts (for international transactions see hereunder). The SNA distinguishes between minor and major repair. The former is treated as services but the latter as capital formation. The main reason for this was that major repair often result in an improved performance of the assets which should be capitalised. Unfortunately it is difficult to provide criteria to make the distinction (because of this difficulty the European system ESA suggests to treat all repair gross). The SNA criterion for a good being changed by processing (abroad) is whether they fall in the same CPC 3-digit group! As said above, in the case of subcontracting it is necessary to guard against double counting.

The question may be raised how to distinguish between repair for industrial equipment and household equipment. This is not a type of question one could ask the producer of the service; first of all he does not know our criteria but, more importantly, he is not interested in the difference. (For the same reasons it is impossible for retailers to distinguish foreign from domestic customers or tourists

³ In practice this is not completely true because CPA is more detailed than CPC and NACE is more detailed than ISIC. As a result some goods are attributed to different industries in CPA than in CPC.

from others). Since no simple solution for this dilemma seems to be at hand from the demand side, the only possibility is to use a kind of supply criterion, i.e. the type of supplier. In other words all services provided by retailers or by companies classified to specialised repair shops in ISIC or NACE 526 should be regarded services to private individuals and all other repair as industrial services, in both cases regardless the type of customer in reality. A special case is repair of motor vehicles: companies account for a large part of this repair. The only way to impute this distinction in output data is to make use of input data from these companies; they record these expenses as costs to their production process. It would be interesting to set up studies developing criteria for distinguishing industrial services from consumer services.

5. Industrial services in international trade

It should be noted that industrial services could be rendered between unrelated companies but also between units belonging to the same enterprise. When the latter occurs within one country, the problem should not be too big because in most cases such units will be consolidated anyway. If this is not the case, the normal rules will apply: the transactions between converter and contractor involve services. This treatment can be governed by rules of accounting and statistics. Handbooks like the SNA, which are agreed after intensive international discussions and negotiations are applied in most industrialised countries; this is possible because no other interests are in play. However, when the two units are located in different countries, they are different enterprises by definition and the treatment of the transactions becomes similar to those between unrelated companies. Also, all kinds of external interests play a role. Some of these are customs who have to levy duties on imports, trade organisations, like WTO, who try to liberalise international trade, international trade organisations who protect their particular interests, supranational organisations, like the EU, who stimulates free trade and free competition between member states and probably many more. Among them customs are the most important because in most countries they are the source for the statistical data on imports and exports; most of the national statistical offices depend on data collected and provided by customs authorities. One of the problems with this is that customs do not deal (yet?) with services, mainly because no duties are levied on services crossing the border. This is unfortunate because had there been duties involved, statisticians could have benefited from the many studies by customs authorities on the definitions and characteristics of different services.

As should be clear from the foregoing, all industrial services have a service as well as a good element. Customs are interested in the goods side of such transactions only but statisticians are interested in both. From the customs side the main interest is to identify goods that cross international frontiers and to know some characteristics of them, such as weight, number and value among others. In most countries or trade areas repair and subcontracting are recorded separately. In many cases provisions exist that exempt goods (to be) processed from duties over their real value; in such cases permission is granted to value the good before processing at a certain price and to add to the re-imported good only the value of the processing done to it. The result of such regime is that repair and processing are recorded net; that is: the value of the goods is netted out and only the value of the service remains. When registrations of the goods going out and the goods coming back fall in different accounting periods, special provisions are made (a financial claim is entered in the accounts).

According to the new SNA this method would be correct for minor repair only: no change of ownership occurs and the identity of the goods does not change either; the imports and exports of the goods themselves are ignored in the accounts. Major repair or overhaul, however, is considered an improvement and thus an addition to the domestic stock of capital goods and processing is supposed to add to work in progress. Therefore both should be recorded gross, i.e. including the value of the goods worked on and they should be accounted for as exports and imports of goods. This is clearly an exception to the general rule that foreign transactions are being recorded at the time ownership changes. An important reason for this exception is that the goods undergo an important change in identity. Indeed, such an approach is easier to implement because one can make use of ordinary import and export data without trying to match the same goods before and after processing abroad. At the micro level it is, however, difficult to reconcile with domestic production statistics that record the services only. The solution on the macro level in practice is found in the balancing process while compiling the national accounts.

SNA considers installation as such always as an export or import of services. This becomes complex, however, when the goods to be installed are included in the transaction, e.g. when complete factories or other installations are put together as a sort of turnkey project. These goods will be exported and counted gross by customs and statistics. The final invoice should therefore be split into a goods part and a service (installation) part in order to avoid double counting. This becomes even more complicated when the goods involved come from different countries; that discussion would go beyond the scope of this paper.

Special attention deserves processing in developing countries, where it sometimes became a political issue. Often whole production processes are contracted out to companies in such countries and while they do perform industrial activities and thus are classified in the manufacturing industry, according to the above rules, their output should consist solely of services. This inconsistency has led to discussions among these countries whose domestic product, according to the rule, would show large outputs of services and hardly any goods. Such data would give these countries an image of being service oriented while in reality they may have large manufacturing facilities; they often prefer to consider themselves industrialised.

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