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Revisited Sector Paper on:

ISIC Rev. 4 5210 Warehousing and Storage

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1.0 Introduction

In the past, the Voorburg Group paid only little attention to the warehousing and storage sector. Only in 2004, two papers on SPPI's for warehousing and storage were compiled by the United States of America¹ and New Zealand², with the US only describing refrigerated warehousing and storage, but New Zealand covering cargo handling as well. Regarding turnover, there was no paper on this sector so far. Hence, turnover will be covered for the first time in this revisited sector paper.

This revisited sector paper identifies the challenges associated with classification of warehousing and storage, collection of turnover data, and developing producer price indices. The paper provides some options, highlights challenges and notes the implications of the choices that must be made when endeavoring to develop or revise turnover statistics and price deflators for warehousing and storage.

In order to facilitate this paper, a survey was conducted among the member states of the Voorburg Group to track their practices in the field of turnover/output and SPPI statistics for the warehousing/storage sector. 19 countries replied; all survey turnover data; 13 already offer SPPI data, two are in the development phase, one country calculates the warehousing/storage SPPI, but does not publish, and, finally, three countries do neither offer nor develop an SPPI for this industry.

References are included throughout this revisited sector paper to previous work of the Voorburg Group and other sources. Changes in the conditions for the market of the presented sector occur in a rather slow time; so, this revisited sector paper presents the Voorburg Group's previous work in combination with new developments in the consistent framework of the Sector Paper introduced in 2006 with the content development framework.

2.0 Classification

Warehousing and storage services are always classified as transport supporting services – no surprise, as storage means transportation in the 4th dimension, i.e. the bridgeover between the time the good is transported to the warehouse and the time it is further used. Often, warehousing and storage is an important secondary activity of companies classified elsewhere in the transport and logistics sector. Data from Germany³ shows that companies from the sector “warehousing and storage” account only for about 28% of the turnover with the product “warehousing and storage”; the rest of the turnover is achieved by companies from other sectors of the transport industry, especially freight forwarders. On the other hand, the companies with their primary activity in warehousing and storage – i.e. companies that belong to the industrial sector “warehousing and storage” – realize

¹ Lucier (2004).

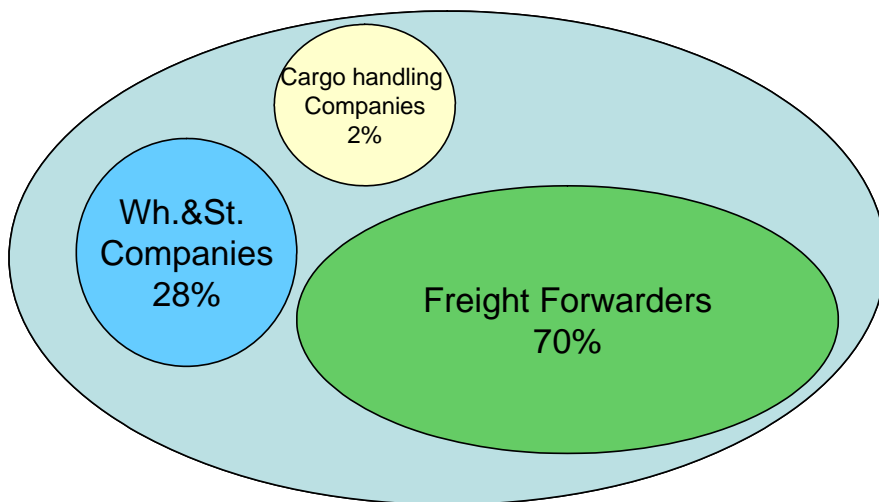
² Parbhu (2004).

³ Unpublished pre-survey for establishing the SPPI; the SPPI weighting scheme is based on this survey. Data was surveyed for the year 2004.

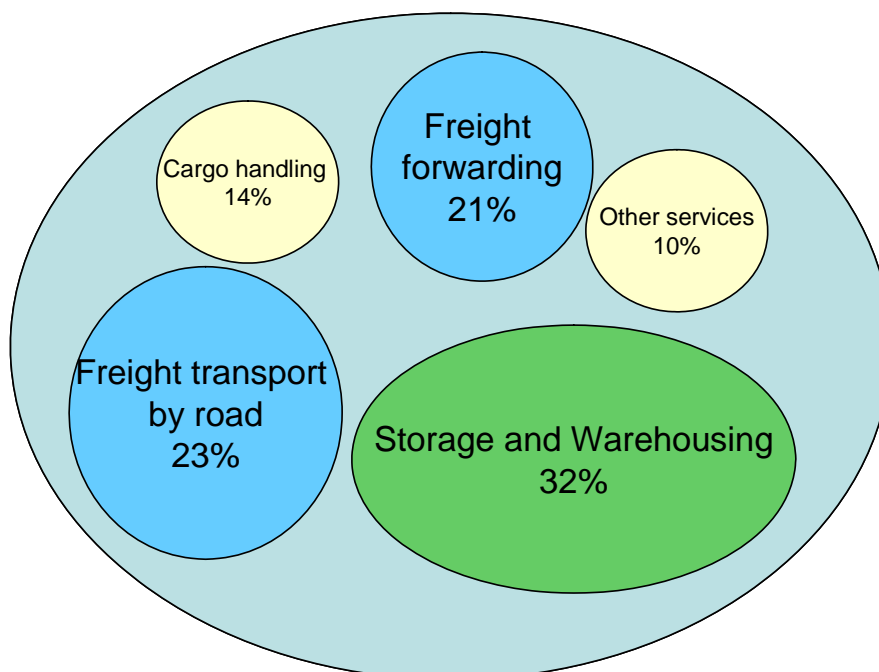
only 32% of their overall turnover with warehousing and storage activities, the rest belonging to other transport and logistics activities (see figure 1). So, the “industry” view on warehousing and storage will be certainly different from the “product” view, a characteristic special to this service category. Hence, it is worth taking a look at both industry and product classifications.

Figure 1.

Industry of origin of companies offering the product „warehousing and storage“ (turnover percentage, Germany, 2004)



Products offered by „warehousing and storage“ companies (turnover percentage, Germany, 2004)



2.1 Industry Classification

Most industrial classifications used by Voorburg Group participants are comparable in the area of warehousing and storage at some level of aggregation. ISIC Revision 4 describes “warehousing and storage” in group 521, class 5210 with no further breakdown. Together with support activities for transportation, it forms division 52. It is the same with the European version of ISIC, NACE rev 2, even regarding the enumeration.

Other regional and national industry classifications based on ISIC make finer delineations. For example, NAICS, as configured for the United States and Canada, puts the services into group 4931 (warehousing and storage), further broken down by general warehousing and storage (49311), refrigerated warehousing and storage (49312), farm product warehousing and storage (49313), and other warehousing and storage (49319). ANZSIC, used in Australia and New Zealand, defines an own division for warehousing and storage services (53), which is identical with the group (530) and subdivided into two classes: grain storage services (5301), and other warehousing and storage services (5309).

So, a major difference between the classification systems mentioned above is the detail of breakdown. It depends on the national standards and requirements whether a NSI should catch the detail in its statistics or not. Appendix A.0 shows the details and explanations of the classifications discussed.

2.2 Product Classification

In general, product classifications in use throughout the world follow a comparable approach by describing different types of warehousing and storage services. The degree of detail, however, can differ largely. CPC classification and its derivatives are often used by the NSI’s when developing SPPIs while, for turnover, the industry-based ISIC classification and its national derivatives are more common to be used (the publication of sub-sectors, however, is a rather rare event). Let us take a closer look on the product classification systems. The following is a brief presentation of the details used in the CPC, Version 2.0, CPA 2008, used in European countries, and NAPCS for North America.

CPC 2.0 Product Structure

- 6 Distributive trade services; accommodation, food and beverage serving services; transport services; and electricity, gas and water distribution services
 - 67 Supporting transport services
 - 672 Storage and warehousing services
 - 6721 Refrigerated storage services
 - 6722 Bulk liquid or gas storage services

6729 Other storage and warehousing services

CPA used in European Countries is very similar to CPC and again highlights only pure warehousing and storage activities. It offers more detail by adding an own category for grain storage services.

- 52 Warehousing and support services for transportation
 - 52.1 Warehousing and storage services
 - 52.10 Warehousing and storage services
 - 52.10.1 Warehousing and storage services
 - 52.10.11 Refrigerated storage services
 - 52.10.12 Bulk liquid or gas storage services
 - 52.10.13 Grain storage services
 - 52.10.19 Other warehousing and storage services

In comparison to CPC and CPA, the North American Product Classification System (NAPCS) is very detailed (in its US and Mexican version) and provides a representative overview of the services offered by the sector. It is not just about storage itself, but also about auxiliary services for storage and all the range of services logistics providers offer. The following service products are described:

49311 Warehousing services

- 1.1 Bundled warehousing services
- 1.2 Storage services for goods
 - 1.2.1 Storage services for bulk liquids and gases
 - 1.2.2 Storage services for dry bulks
 - 1.2.3 Storage services for climate-controlled goods
 - 1.2.4 Storage services for boxed, palletized, and other packed goods, except climate-controlled
 - 1.2.5 Storage services for intermodal containers
 - 1.2.6 Storage for automobiles
 - 1.2.7 Storage for project cargo
 - 1.2.9 Storage for other goods

49312 Fulfillment services

49319 Related products

- 9.1 Handling services for goods
 - 9.1.1 Handling services for bulk liquids and gases
 - 9.1.2 Handling services for dry bulks
 - 9.1.3 Handling services for climate-controlled goods
 - 9.1.4 Handling services for boxed, palletized, and other packed goods, except climate-controlled
 - 9.1.5 Handling services for intermodal containers
 - 9.1.6 Handling services for Automobiles
 - 9.1.7 Handling services for project cargo
 - 9.1.9 Handling services for other cargo
- 9.2 Packing services for goods

- 9.3 Transformation and enhancement services for goods
 - 9.3.1 Blast and slow freezing services
 - 9.3.2 Blast freezing services
 - 9.3.3 Fumigation of agricultural products
 - 9.3.4 Liquefaction and regasification of natural gas
- 9.4 Packaging and labeling services
 - 9.4.1 Promotional packaging services for goods
 - 9.4.2 Labeling services
- 9.5 Operations and supply chain management consulting and implementation services bundle
- 9.6 Operations and supply chain management consulting services
- 9.7 Rental of land for nonresidential use
- 9.8 Rental of nonresidential space in buildings or other facilities
- 9.9 Transportation of goods by road
- 9.10 Insurance brokerage and agency services
- 9.11 Rental of intermodal containers
- 9.12 Freight transportation arrangement services (e.g. freight forwarding)
 - 9.12.1 Domestic freight transportation arrangement service
 - 9.12.2 International freight transportation arrangement services
- 9.99 Other related products

NAPCS is a very interesting classification as it is a mixture between the product-based and the industry-based approach. It tries to list all products that are offered by a certain industry including those products that are typically offered by other industries, but play a role as secondary activities of the industry described. This can be seen from remarks like “Same as product 3 on 4882 list” in the service definition – the same product appears in different industries. Hence, NAPCS represents a good starting point for identifying all services offered by an industry, regardless of its state as primary or secondary activity.

While CPA and CPC are rather rough service product classifications, NAPCS is very detailed. When compiling statistical data in such a detailed structure, it has to be secured that the sample size is large enough to get confident numbers. Especially for SPPIs, the countries tend to publish only few, but robust sub-indices, often based on CPC or CPA. For a comparison of CPA, CPC, and NAPCS, see appendix table A.1.

Practices in the field of storage and warehousing services vary across countries. However, to the extent possible given by market conditions, it is recommended to develop product classifications that map to the generally accepted breakdowns included above. This will increase international comparability but also separate products and product groups based on different measurement variables and practices.

3.0 Turnover Statistics – Recommended Development Options

As noted in the introduction, the Voorburg Group has not previously addressed turnover practices for warehousing and storage services. The recommended development options presented here are based on a survey of 19 countries producing turnover statistics in advance of the 2010 Voorburg Group meeting in Vienna, Austria.

The fees for warehousing and storage services – forming the revenue and adding up to the turnover to be measured – are laid down in contractual agreements. They can be just measured straight forward. Additional expenses have to be included in the turnover figure as well.

We can distinguish three purposes of turnover measurement:

- structural business statistics (SBS): should provide a comprehensive overview of the industry and its companies. Turnover is just one variable to be measured besides others like number of employees, number of companies, investments etc. Absolute figures are published. Frequency: low, normally yearly. Publication date is often several months after the end of the reporting period. Industry-based statistics.
- short-term statistics (STS): should give an idea of the current direction of the economy. Often, only an index figure is given for turnover development. Details are not of high importance, but timeliness matters: publication data soon after the end of the reporting period. Frequency: high (monthly or quarterly). Industry-based statistics.
- Statistics on service product turnover: important data source for the weighting schemes of SPPI's. It details the service products and requires sector knowledge for the design and completion of the survey. Frequency: low, in some countries only every five years if at all. Ideally product-based statistics.

A main challenge when collecting turnover for warehousing and storage is the high importance of secondary activities to companies in this sector, as well as the influence of companies from other sectors offering these services as well. This phenomenon holds implications for the three types of statistics mentioned:

- For SBS and STS, both industry-based: The turnover that is measured says nothing about the size of turnover of the warehousing and storage service product itself, because many secondary activities are included. Interpretation of SBS figures on such an aggregated base is a hard task, because influences from the development of other service products may disguise the real state of warehousing and storage services.
- For service product turnover: In order to get a complete picture of the market, it is a must to include warehousing and storage services which are other sectors' secondary activities. So far, only few countries offer that statistics; in the survey conducted for this paper, the main "alien" sectors identified by these countries that offer these services as secondary activities are ISIC (4) 5229 "other transportation support activities" and 4923 "freight transport by road". When combining the compilation of SBS and service product statistics, it is important to

identify the sectors with important secondary production for the service product, in order to produce valid estimations of the service product overall turnover. These implications are true for all industries, but are especially important for warehousing and storage, where secondary activities play a major role.

To calculate turnover figures, the surveyed NSI's use censuses, surveys and administrative data. Which technique is used depends largely on three factors:

- Purpose (SBS/STS/service product turnover)
- Frequency
- Size of the responding entities.

The rule is: the lower the frequency and the larger the size of the responding entities, the more likely a census is employed; especially for SBS data. This is likely for service product turnover data as well, because their frequency is rather low (annually to five years; however, Hungary, as an exception, collects this data every quarter with a survey, but the results are not published). On the other hand, STS data is normally calculated with surveys or using administrative data; especially turnover of small entities is often estimated with administrative data.

Especially when publishing very detailed data, it is a must to check that the assignment of the respondents to the sector is correct. Most NSI's that use surveys or census for measuring turnover do this by asking for the activity of the responding companies. Other ways for ensuring are cross-checking with other statistics and the business register, company profiling, asking experts, or checking the annual reports of the companies. Checking administrative data is more complicated. In addition to the methods mentioned before, the NSI's may apply the following procedures:

- Combination of information from different administrative data sources: companies are listed in different registers like the business register, tax register, social security files etc. Most of them have an indicator for the sector which the company belongs to. By combining the information, it is more likely to identify misclassified companies.
- Data in the registers is improved by personal visits of the companies and surveys for re-classification. Those surveys are done when the classification system changes.
- Combination of sample and administrative data: While information about all companies is derived from registers, some of them are sampled in a representative way and checked for their activities and other data. Then, the administrative data can be adjusted by the figures from the sample survey.⁴

A big problem with the use of administrative data is that it has not been designed to obtain statistical economic indicators. E.g., data from the tax authorities in Germany has the following weaknesses:⁵

- Definition of "turnover" is different: e.g., the tax authority includes sales of assets which are not included in what turnover statistics want to measure.

⁴ Currently, Germany is planning to apply this approach for the 2011 population census.

⁵ see Kaumanns/Schelhase (2007), p. 769ff.

- Large corporate groups with many small subsidiaries are treated as one company by the tax authority; hence, turnover gained by sales between those subsidiaries is not counted - a mistake in terms of turnover as an economic indicator.
- Turnover for which no tax is paid is quoted, but often in doubtful quality.

When using only administrative data, NSI's must be aware of weaknesses like that and find fitting remedies.

For developing turnover statistics, the NSI's may follow the approaches listed in the table below. The category tells the quality of the achieved data – not every statistics need a “best”. If “speed” is the major requirement for data (e.g. for STS), then a “Good” solution may do. And, of course, response burden and resources at hand are important factors to consider when choosing the appropriate method.

Table 1: Options for Developing Turnover Statistics – warehousing and storage activities⁶

Category	Data Source	Level of Detail Collected	Frequency	Cost	Comments
Best	Survey/Census	Industry turnover <u>and</u> product turnover detail;	Sub-annual collection (monthly or quarterly)	- Most expensive - Largest response burden	- Allows greatest flexibility to identify specific revenue streams, residential and non-residential allocations can be collected directly. - Timely data
Good	Survey/Census	Industry detail <u>only</u>	Sub-annual	- Expensive - High response burden	- Industry detail may not be sufficient to delineate sources of revenue or important residential/non-residential components using ISIC. - Timely data
Good	Combination of census (large companies) and administrative data	Industry detail <u>only</u>	Sub-annual	- Less expensive - low response burden	- Industry detail may not be sufficient. - Timeliness questioned - Different definitions for turnover in administrative data files may cause (justifiable) bias

⁶ The table is taken over from Goldhammer (2008); turnover statistics seem to be quite similar for most of the service sectors.

Minimum	Administrative (tax data, industry association data etc.,)	Industry detail <u>only</u>	Annual	- Least expensive - Little or no respondent burden	- Income and production definitions can differ adding imprecision to estimates using tax data in place of actual revenue received for services - Least timely
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3.1 Other Considerations

The surveyed NSI's identified no major challenges for turnover measurement for the sector.

It is common to combine different data sources for different strata. Two examples:

- Austria: For SBS, Statistik Austria conducts a survey for enterprises above a legally defined threshold. For companies below the threshold, a model based estimation of enterprises is employed; complementary administrative sources are also used.
- Singapore: For SBS, a census is conducted for large companies in combination with a survey (simple random sampling) for medium-sized and small companies. Administrative data is used to complete the picture.
- Poland: For STS, Poland covers large companies (more than 50 employees) with a census. Those with employment figures between 10 and 49 are represented by a 10% sample that is surveyed. For smaller ones, an estimation based on administrative data (VAT) is under preparation.

Turnover data collections also provide the opportunity to collect additional information that is not product related. It is fairly common to collect employment levels, payroll data, and other variables as part of turnover surveys. This can help to improve other surveys and registers as well.

Communication between national accountants and turnover statisticians about the methods being used in national accounts will help ensure that efforts are in line and the resulting statistics will be as applicable as possible. However, national accounts is not the only user of turnover data so it is important to ensure that other needs are met as they are identified as important.

4.0 SPPI Recommended Development Options

It is obvious that the actual practices and availability of data determine the most appropriate method(s) of estimating price change. However, looking at the pricing methods applied by the member of the Voorburg Group, there are apparently similarities which allow the deduction of recommended development options.

Before clarifying how things are asked, a word should be spoken about who is asked. The main sources of addresses are official business registers, often combined with sector information, e.g. address lists commercially issued for the logistics industry. The method of determining the respondents differs from country to country. The most popular approach seems to be – in line with the recommendations of the SPPI methodological guide⁷ – PPS-sampling (Probability Proportional to Size). It is often combined with a cut-off limit – only companies above a certain minimum limit are considered – and a total stratum, i.e. all companies exceeding a certain level of size are included in the sample. The criterion, on which PPS sampling is based, however, is not common sense: some NSI's use turnover, others number of employees. But PPS is not the only sampling technique commonly used. It is worth mentioning that many NSI's use purposive sampling (sometimes called judgemental sampling), especially those of smaller countries like Slovenia. Because warehousing and storage is a rather small service industry, this might be a feasible way for smaller countries where only few entities exist.

A core problem for setting up an SPPI for warehousing and storage service is the decision whether to create a product-based or an industry-based SPPI. From an industry point of view, warehousing and storage companies offer many services that are the primary activity of other industries. If it was decided to set up an industry-based SPPI, these services need to be considered. However, the survey showed that only three out of 15 NSI's calculating or developing an SPPI use the industry-based concept.

If it was decided to set up a product-based SPPI, then the secondary production of other industries has to be considered. This approach is followed by six out of 15 NSI's. The remaining NSI's focus on w&s companies and their w&s service products only, a rather narrow concept. It is recommended to follow either the industry-based or the product-based concept, depending on the national situation. Another solution is presented by Hungary, which calculates both industry-based and product-based indices by using the same set of price quotations but different weighting schemes.

When developing the methodological concept for an SPPI, it is important to know the characteristics of the sector. As stated in the introduction, before 2010, warehousing and storage services have been addressed by two papers of the Voorburg Group: USA (2004)⁸ and New Zealand (2004)⁹, which provide – besides explaining the national approach – very good insights into the characteristics of warehousing and storage services. Combined with the results of the survey conducted before the preparation of this paper

⁷ OECD/Eurostat (2005), p. 23.

⁸ Lucier(2004).

⁹ Parbhu (2004).

among the members of the Voorburg Group, the characteristics of warehousing and storage services can be summarized:

- "...warehousing and storage is of special interest because of the bundling of services that is inherent to the industry. The primary service in this industry is the storage of goods; the bundled services include such things as sorting, inspection and handling."¹⁰ I.e. bundling is a phenomenon very common to this industry; here, the highly important secondary activities show up again.
- "Different refrigerated warehousing establishments offer different bundled services at unique rates in order to differentiate their services and attract customers."¹¹ I.e. there are special contracts for each customer. The output of the industry is based on a contract which details "...what type of product is being stored, how much of the product is being stored, the density of the product, the temperature of said product (on arrival and its necessary temperature), how the product will arrive, and what additional services will be required."¹² So, the output of the industry can be described easily; this helps setting up an SPPI.
- The US paper from 2004 also describes some of the most important additional services beyond pure storage:¹³
 - o Labeling and stenciling
 - o Office rentals within the warehouse
 - o Inspection
 - o Freight consolidation
 - o Sorting
 - o Weighing
 - o Import/ export services
 - o Bill of lading

Some more additional service are mentioned in the German weighting scheme:

 - o Picking
 - o Packaging
 - o Wrapping
 - o Move into/take out of storage
- "The challenge in pricing this industry is to incorporate all the services that take place into the pricing methodology."¹⁴

Bearing in mind this service description, it is no wonder that contract pricing is the dominant pricing method identified in the survey. 11 out of 16 NSI's surveyed use contract pricing as their pricing method of choice. Because storage services are easily to describe, 7 NSI's use direct pricing of repeated services, which is closely related to contract pricing with the difference, that it means offering a standard service at the same price to different customers. 5 NSI's stated to use model pricing. For this industry, it is a rather thin line between model pricing and direct pricing of repeated services: The company is asked for a price for a well-specified storage service. When it offers this

¹⁰ Lucier (2004), p. 2.

¹¹ Lucier (2004), p. 2.

¹² Lucier (2004), p. 2.

¹³ Lucier (2004), p. 4.

¹⁴ Lucier (2004), p. 4.

service and sells it at this point of time, it is direct pricing of repeated service; when it is currently not sold, it is model pricing. An example for a model can be found in the New Zealand paper¹⁵:

“General storage (assorted storage, basic storage, static storage, palletised goods, general goods)

- short and long-term storage
- per metre or per pallet per week (1.2 cubic metre pallet)
- covered space
- not stackable, of reasonable standard of care, away from dust
- basic handling charge.”

Another pricing method, unit value, is used by only three out of 16 NSI's. For pure storage services, unit value based price indices can make sense, e.g. revenue per day per pallet or m². However, there are some disadvantages:

- The storage service must be as homogenous as possible. E.g., if a unit value price for refrigerated storage relates to different storage temperatures, the unit value price will be affected by the difference in quality and there will be problems to compare this price to the unit value for the next period with differences in temperature. So, the unit value price should relate to a single storage temperature only.
- There are different “units” for different types of cargo stored: e.g. TEU for containers, pallets or m² for general goods, m³ for grain storage or liquids. Comparability will lack if they replace each other; so, there is a need for a rather detailed weighting scheme.
- The unit must be identified correctly. E.g. chemical substrates are stored in silos and measured in m³. However, the price to be paid is not per m³, but per silo; a price measurement based on money per m³ would be wrong. As there are different pricing systems possible for one type of cargo, this is a problem to the price statistician.
- A unit value price index may not reflect different requirements for storage systems and different techniques correctly, but they may have an influence on the price. So, a change in technology may induce a change in the unit value price without having a real price change. Hence, the category for which a unit value is calculated must be well-defined.

In conclusion, contract pricing seems to be the most suitable pricing method for this sector. It accounts for the individual contracts with many price-determining characteristics and reflects the pricing mechanism of the sector. Direct use of pricing of repeated services and model pricing are a good solution, too, when service products that are easy to describe are common to the respondents. Unit value pricing is feasible, but should be employed with care. But there might be circumstances when it provides the best solution for measuring price change. Table 4.0 summarizes the options for developing SPPI's.

¹⁵ Parbhu (2004), p. 3.

Table 4.0: Options for Developing SPPI Statistics

Category	Pricing method	Data type in the survey	Quality and Accuracy	Cost
Best	Contract Pricing	Data is based on real transaction prices	Detailed service specifications allow time-consistent comparisons.	<ul style="list-style-type: none"> - Most expensive, with high response burden. - Quality adjustment crucial for correct price measurement when contract expires.
Good	Direct use of prices of repeated services/model pricing	Data is based on list and tariff prices offered, collected by survey; there may be expert estimates as well.	Good representation of pricing and services offered by warehousing and storage companies. Movements in price reflect those in the industry fairly accurately. Models should be reviewed from time to time to assure that they are not outdated.	<ul style="list-style-type: none"> - Less need for respondent assistance than for contract pricing, therefore less expensive. - No quality adjustment necessary (as long as description does not change). - When expert estimates are necessary, response burden may be higher than for contract pricing
Minimum	Average unit price	Total revenue and operating parameters like days of storage, m ² , TEU, tonnes, or pallets stored are taken from respondents in order to estimate revenue per unit of output as a proxy for price.	<p>Transactions in a group must be sufficiently homogeneous (i.e. quality of individual services is unchanged and their quantities in the transactions do not vary). Otherwise, changes can be highly volatile and non-comparable.</p> <p>Revenues have to be well-defined for consistency in comparison.</p> <p>Pricing mechanism must fit to allow unit value pricing.</p>	<ul style="list-style-type: none"> - Less expensive, and least response burden. - Quality adjustment problematic; statisticians have to keep a close look on the figures. - Development of questionnaires requires intense and careful research.

4.1 Other Considerations

4.1.1 Main challenges

Within the survey, the NSI's were asked about the main challenges in developing the SPPI for warehousing and storage. They responded the following statements:

- Customised services/Adjustments of survey sheets: Some respondents asked for adjustments of the questionnaire because they offer non-standard services to their clients. (Austria)
- Company-internal prices/Drop out of enterprises: Some foreign companies establish storage and warehousing firms only for their own products. These enterprises normally charge only their costs (sometimes plus a profit surcharge) against the affiliated company. Hence, they should not be included in the index. (Austria)
- Treatment of bundled services (e.g. cargo handling and warehousing or transportation and warehousing, etc.). (Finland)
- Model pricing and bundled services: "It was difficult to define the activities (models) in such a way that only the price for storage was given, and not the price for storage plus additional services – warehouses often provide more service than just storage." (Netherlands)
- Questionnaire design: It requires close collaboration with the industry and adequate vocabulary. (Spain)
- Secondary activities, w&s as internal services: "The main problem was to separate the respondents' activities in storage and warehousing from other activities. Many of the respondents are part of a business group which has their main activities in other areas and they are more a support company with internal prices." (Sweden)
- Keeping the response rate up: "The main challenge is maintaining continued response from our sampled companies as the usefulness of price indexes is not obvious to most respondents." (USA)

In conclusion, problems with bundling and with subsidiaries offering warehousing and storage services only to their parental companies seem to be the main challenges inherent to the industry. A solution for bundling is to put such a service into the category that represents the major service part; or, if a certain combination of bundling is produced frequently, to create an own service product for this combination in the index. Regarding subsidiaries, a well-designed pre-survey will help to sort out this kind of companies.

Another problem seems to be communication. Keeping contact with the industry throughout the ongoing survey is necessary to get information about trends which may affect the SPPI and to secure a high response rate. Communication is one of the key to an SPPI of high quality: many NSI's see it as a major challenge to convince the respondents of the necessity of an SPPI and to get the right price quotations. Visits "at home" are certainly a good measure to obtain good results. In advance of the survey, it helps to get a better understanding about the industry and may give good hints for designing a questionnaire tailored to the needs of warehousing and storage companies.

4.1.2 Weighting

One result of the survey was surprising: The derivation and use of weights is very heterogeneous among the surveyed NSI's.

Regarding derivation of weights, many different approaches are followed:

- Conduction of an own pre-survey for the derivation of the weighting pattern. This survey also helps to identify potential respondents for the price survey. If this survey is done by the price statistics department itself, then it represents the best way to obtain results that perfectly match the needs of a weighting pattern.
- Use of results from structural business statistics: often, SBS shows detailed turnover figures on low level aggregates (e.g. 5-digit NACE). Some NSI's use this source of data for their weighting pattern. If there is a close collaboration between turnover statistics and price statistics, this is viable way to determine the weighting pattern and even lowers the burden for the respondent. However, identification of potential respondents might not be possible by this way due to legal restraints. Hence, some NSI's combine an own pre-survey for SPPI with the results of SBS or similar statistics.
- Use of the results of National Accounts' input-output-tables. This procedure was not clear to the author and should be subject to further discussion.

For the use of weights, the OECD/Eurostat guide for SPPI's recommended the following two approaches:¹⁶

- Aggregation through elementary aggregates of service products: The surveyed companies contribute a varying number of price relatives to each elementary aggregate that represents a service product (e.g. refrigerated storage). All elementary aggregates are then added up according to their weights.¹⁷
- Aggregation of firm level indices: Elementary aggregates are calculated for each company in the index. They are added up by using weights representing each company's size.

These practices are very common. However, the survey identified two other practices that are also used:

- Weights for each single price relative
- Calculation of an unweighted index which is the arithmetic mean of the elementary index of each price relative.

These indices may be the right solutions for special conditions. Especially for small countries with only few companies, they may represent the only way to calculate an index at all. Other situations may include the lack of valid data on enterprise or service product weights; a lack of resources to obtain this information may also contribute to the decision to calculate these simple types of SPPI's.

¹⁶ OECD/Eurostat (2005), p. 55ff.

¹⁷ Within the service product, there might be another division by company size strata; so, the elementary aggregate represents a specific service product offered by companies of a specific size; see the example in box 16, OECD/Eurostat (2005), p. 57.

5.0 Summary and Further Suggestions

The sector of warehousing and storage activities is characterized by a high importance of secondary activities. This creates challenges to both turnover and price programs.

Regarding classification, all classifications have similar breakdowns on higher aggregation levels, but show variations regarding the detailed breakdowns. Especially NAPCS shows very detailed service products of the sector. While uniform treatment on high level aggregation is recommended to assure international comparability, detailed breakdowns are more a question of national requirements and should be designed by the NSI's to provide information as useful as possible to the customers.

A major challenge for collecting turnover data is the high importance of secondary activities – both storage as secondary activity of other sectors and other activities as secondary activity of the storage sector. Hence, industry-based and product-based turnover will hardly match and therefore, results will be different.

As markets for warehousing and storage services show national differences and characteristics, each NSI has to discover the best pricing method for their country when developing SPPIs for these services. However, the results of the survey suggest that contract pricing is the method of choice. There are some examples of unit value as pricing method as well, but the use of this pricing method must be carefully considered in order to maintain a good level of quality.

When developing turnover and pricing statistics, it is necessary to keep in mind that there are many customers for these kinds of statistics. NSI's are demanded to care about the often different needs for data of National Accounts, central banks, private enterprises and scientists. Hence, they should try to design statistics, that suit the needs as best as possible; sometimes, a solution can be found by calculating different indices from the same data input custom-tailored to the specific needs.

APPENDIX

Table A.0: Comparison of Industry Classifications

Level	ANZSIC	ISIC 4.0	NACE Rev.2	NAICS 2007
General	<p>Division I: Transport, Postal and Warehousing</p> <p>Subdivision 53: Warehousing and Storage Services</p> <p>Group 530: Warehousing and Storage Services</p>	<p>Section: H - Transportation and storage</p> <p>Division: 52 - Warehousing and support activities for transportation</p> <p>Group: 521 – Warehousing and Storage</p>	<p>Section: H - Transportation and storage</p> <p>Division: 52 - Warehousing and support activities for transportation</p> <p>Group: 52.1 – Warehousing and Storage</p>	<p>48-49 Transportation and Warehousing</p> <p>493 Warehousing and storage</p>
First main level of detail	<p>Class 5301 Grain Storage Services</p> <p>This class consists of units mainly engaged in the storage of cereal grains. Primary activities:</p> <ul style="list-style-type: none"> • Grain elevator operation • Grain silo operation • Grain storage service <p>Exclusions/References Units mainly engaged in operating grain loading facilities at water transport terminals are included in Class 5212 Port and Water Transport Terminal Operations.</p> <p>Class 5309 Other Warehousing and Storage Services</p> <p>This class consists of units mainly engaged in operating warehousing and storage facilities (except cereal grain storage). Primary activities</p> <ul style="list-style-type: none"> • Bond store operation • Bulk petroleum storage service • Cool room storage service • Controlled atmosphere store operation • Free store operation (storage of goods not under bond) • Furniture storage service • Refrigerated storage 	<p>Class: 5210 - Warehousing and Storage</p> <p>This class includes:</p> <ul style="list-style-type: none"> • operation of storage and warehouse facilities for all kind of goods: operation of grain silos, general merchandise warehouses, refrigerated warehouses, storage tanks etc. • storage of goods in foreign trade zones • blast freezing <p>This class excludes:</p> <ul style="list-style-type: none"> • parking facilities for motor vehicles, see 5221 • operation of self storage facilities, see 6810 • renting of vacant space, see 6810 	<p>Class: 52.10 - Warehousing and Storage</p> <p>This class includes:</p> <ul style="list-style-type: none"> • operation of storage and warehouse facilities for all kinds of goods: operation of grain silos, general merchandise warehouses, refrigerated warehouses, storage tanks etc. • storage of goods in foreign trade zones • blast freezing <p>This class excludes:</p> <ul style="list-style-type: none"> • parking facilities for motor vehicles, see 52.21 • operation of self storage facilities, see 68.20 • rental of vacant space, see 68.20 	<p>4931 Warehousing and storage</p> <p>49311: General Warehousing and storage</p> <p>Establishments primarily engaged in operating merchandise warehousing and storage facilities. They are not specialized in handling bulk products of any particular type, size, or quantity of goods or products.</p> <p>Exclusions:</p> <ul style="list-style-type: none"> • Renting or leasing space for self storage see 531130 • Selling in combination with handling and/or distributing goods to other wholesale or retail establishments see Sector 42-- Wholesale Trade. <p>49312: Refrigerated Warehousing and storage</p> <p>Establishments primarily engaged in operating refrigerated warehousing and storage facilities. The services include blast freezing, tempering, and modified atmosphere storage</p>

	<p>service</p> <ul style="list-style-type: none"> • Storage n.e.c. • Warehousing n.e.c. • Wool storage service <p>Exclusions/References Units mainly engaged in</p> <ul style="list-style-type: none"> • operating grain loading facilities at water transport terminals are included in Class 5212 Port and Water Transport Terminal Operations; • grain elevator, silo and storage operation are included in the Class 5301 Grain Storage Services; and • self-storage renting or leasing are included in Class 6712 Non-Residential Property Operators. 			<p>services.</p> <p>Exclusions: Storing furs (except for the trade) and garments - see 812320.</p> <p>49313: Farm Product Warehousing and storage</p> <p>Establishments primarily engaged in operating bulk farm product warehousing and storage facilities (except refrigerated).</p> <p>Exclusions: Storing grains and field beans as an incidental activity to sales, see 424510</p> <p>49319: Other Warehousing and storage</p> <p>Establishments primarily engaged in operating warehousing and storage facilities (except general merchandise, refrigerated, and farm product warehousing and storage).</p> <p>Exclusions:</p> <ul style="list-style-type: none"> • Renting or leasing space for self storage, see 531130 • Storing hazardous materials for treatment and disposal see 562211 • Wholesaling of petroleum bulk see 424710
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Table A.1: Comparison of Product Classifications

Level	CPC -Ver.2	CPA 2008	NAPCS – Ver 0.1
General	<p>Section: 6 - Distributive trade services; accommodation, food and beverage serving services; transport services; and electricity, gas and water distribution services</p> <p>Division: 67 - Supporting transport services</p> <p>Group: 672 - Storage and warehousing services</p>	<p>H: Transportation and storage services</p> <p>52 : Warehousing and support services for transportation</p> <p>52.1 Warehousing and storage services</p>	<p>493 Warehousing and Storage</p> <p>4931 Warehousing and Storage</p> <p>49311 Warehousing services</p>
Main sub-groups	<ul style="list-style-type: none"> • 6721 Refrigerated storage services • 6722 Bulk liquid or gas storage services • 6729 Other storage and warehousing services 	<p>52.10 Warehousing and storage services</p> <p>52.10.1 Warehousing and storage services</p> <ul style="list-style-type: none"> • 52.10.11 Refrigerated storage services • 52.10.12 Bulk liquid or gas storage services • 52.10.13 Grain storage services • 52.10.19 Other warehousing and storage services 	<p>49311 Warehousing services</p> <p>1.1 Bundled warehousing services</p> <p>1.2 Storage services for goods</p> <p>1.2.1 Storage services for bulk liquids and gases</p> <p>1.2.2 Storage services for dry bulks</p> <p>1.2.3 Storage services for climate-controlled goods</p> <p>1.2.4 Storage services for boxed, palletized, and other packed goods, except climate-controlled</p> <p>1.2.5 Storage services for intermodal containers</p> <p>1.2.6 Storage for automobiles</p> <p>1.2.7 Storage for project cargo</p> <p>1.2.9 Storage for other goods</p> <p>49312 Fulfillment services</p> <p>49319 Related products</p> <p>9.1 Handling services for goods</p> <p>9.1.1 Handling services for bulk liquids and gases</p> <p>9.1.2 Handling services for dry bulks</p> <p>9.1.3 Handling services for climate-controlled goods</p> <p>9.1.4 Handling services for boxed, palletized, and other packed goods, except climate-controlled</p> <p>9.1.5 Handling services for intermodal containers</p> <p>9.1.6 Handling services for Automobiles</p> <p>9.1.7 Handling services for project cargo</p> <p>9.1.9 Handling services for other cargo</p> <p>9.2 Packing services for goods</p> <p>9.3 Transformation and enhancement services for goods</p> <p>9.3.1 Blast and slow freezing services</p> <p>9.3.2 Blast freezing services</p> <p>9.3.3 Fumigation of agricultural products</p> <p>9.3.4 Liquefaction and regasification of natural gas</p> <p>9.4 Packaging and labeling services</p> <p>9.4.1 Promotional packaging services for goods</p> <p>9.4.2 Labeling services</p>

			<p>9.5 Operations and supply chain management consulting and implementation services bundle</p> <p>9.6 Operations and supply chain management consulting services</p> <p>9.7 Rental of land for nonresidential use</p> <p>9.8 Rental of nonresidential space in buildings or other facilities</p> <p>9.9 Transportation of goods by road</p> <p>9.10 Insurance brokerage and agency services</p> <p>9.11 Rental of intermodal containers</p> <p>9.12 Freight transportation arrangement services (e.g. freight forwarding)</p> <p>9.12.1 Domestic freight transportation arrangement service</p> <p>9.12.2 International freight transportation arrangement services</p> <p>9.99 Other related products</p>
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