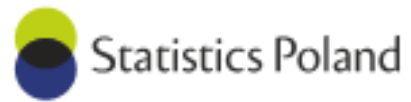




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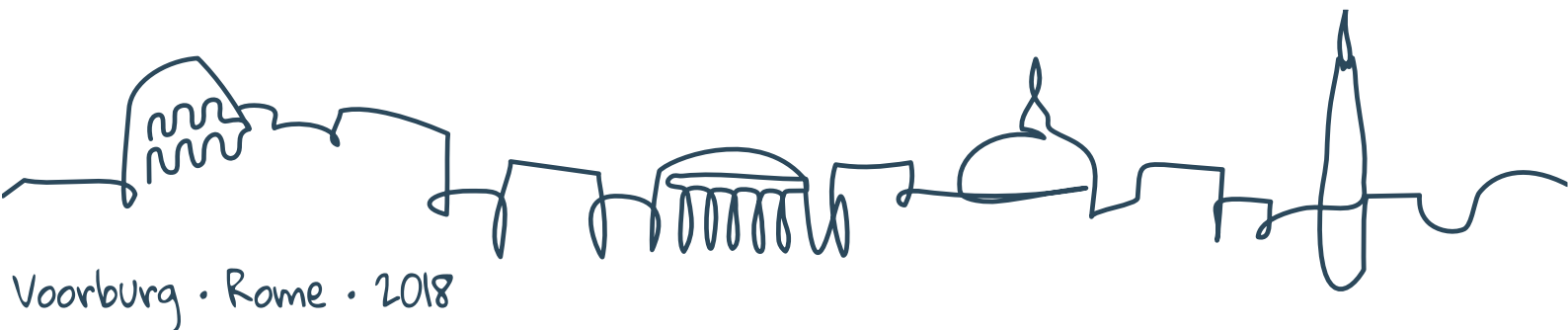
Statistics Poland

Mini-Presentation on SPPI for Data Processing, Hosting and Related Activities (ISIC 6311)

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1. Introduction

The main purpose of paper is to present practices and experiences of Statistics Poland when information on the services produce price index (SPPI) for Data processing, hosting and related activities (ISIC/NACE 6311) are compiled.

The reference year 2018 is the turning point for the services producer prices statistics in Poland. Following the methodological recommendations concerning the SPPI few years ago Statistics Poland launched the pilot study which aimed at modernizing the system of SPPI survey. The effects of these efforts are going to be presented within this paper.

At the beginning it should be also stated that the changes introduced into the SPPI survey were partly driven by the statistical obligations resulted from the membership in the European Union (EU).

2. Description and characteristics of the industry

2.1 Definition of the industry

Data processing, hosting and related activities are classified into 6311 class according to the ISIC Rev. 4 and NACE Rev.2. Description of activity in both above specified classifications is the same and this class includes:

- provision of infrastructure for hosting, data processing services and related activities;
- specialized hosting activities such as: web hosting, streaming services, application hosting;
- application service provisioning;
- general time-share provision of mainframe facilities to clients;
- data processing activities: complete processing of data supplied by clients, generation of specialized reports from data supplied by clients;
- provision of data entry services;

In the Central Product Classification (CPC) the products of Data processing, hosting and related activities (ISIC/NACE 63.11) are classified under category Other hosting and IT infrastructure provisioning services (CPC 83159) while in the Statistical Classification of Products by Activity (CPA2015) the products of Data processing, hosting and related activities (ISIC/NACE 63.11) are classified as follows:

CPA Code	Name
63.11	Data processing, hosting and related services
63.11.1	Data processing, hosting, application services and other IT infrastructure provisioning services
63.11.11	Data processing services
63.11.12	Web hosting services
63.11.13	Application service provisioning
63.11.19	Other hosting and IT infrastructure provisioning services
63.11.2	Advertising space or time in Internet
63.11.20	Advertising space or time in Internet

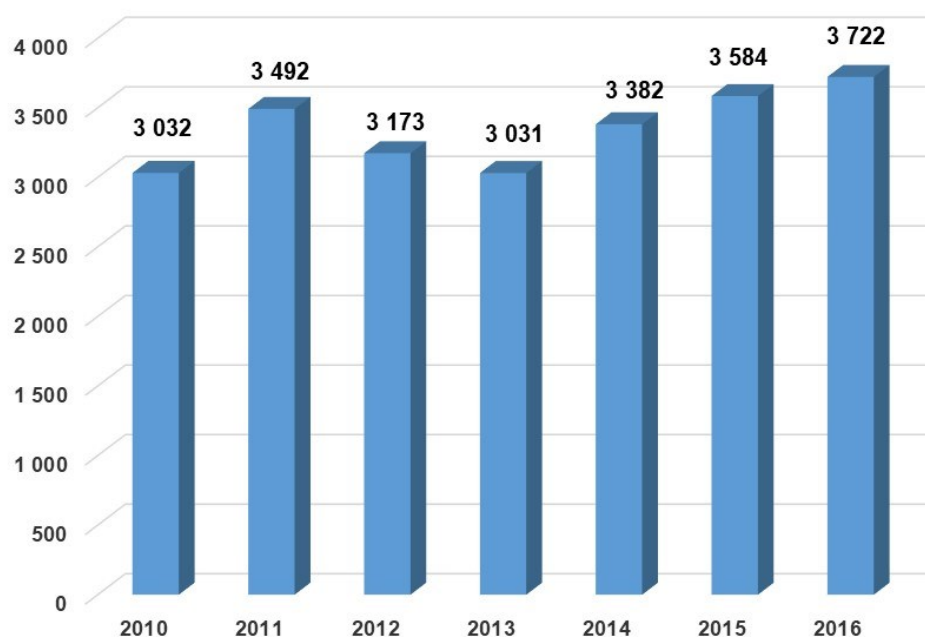
Undoubtedly, due to dynamic development of technology the currently existing version of classifications, both industry as well as product, do not follow the changes which take place in the services sector. The services, especially such as data processing, hosting and related services, become more and more intangible. Moreover, the data processing, hosting and related services are very often provided together with other services. All these issues make the analyzed services industry more difficult to be measured.

2.2 Market conditions and constraints

In 2016 in Poland there were over 3,7 thous. of enterprises with their core activity classified into the Data processing, hosting and related activities (ISIC/NACE 63.11) and they constituted about 0,5% of total number of enterprises classified into market services industries (except insurance and financial services)¹. In the same year they employed almost 20,5 thous. of persons (with above 0,7% share in market services industries) and generated a little above EUR 1,0 bln (with about 0,7% share in market services industries).

Figure 1

Number of enterprises with the core activity in ISIC/NACE 6311 in Poland in years 2010-2016

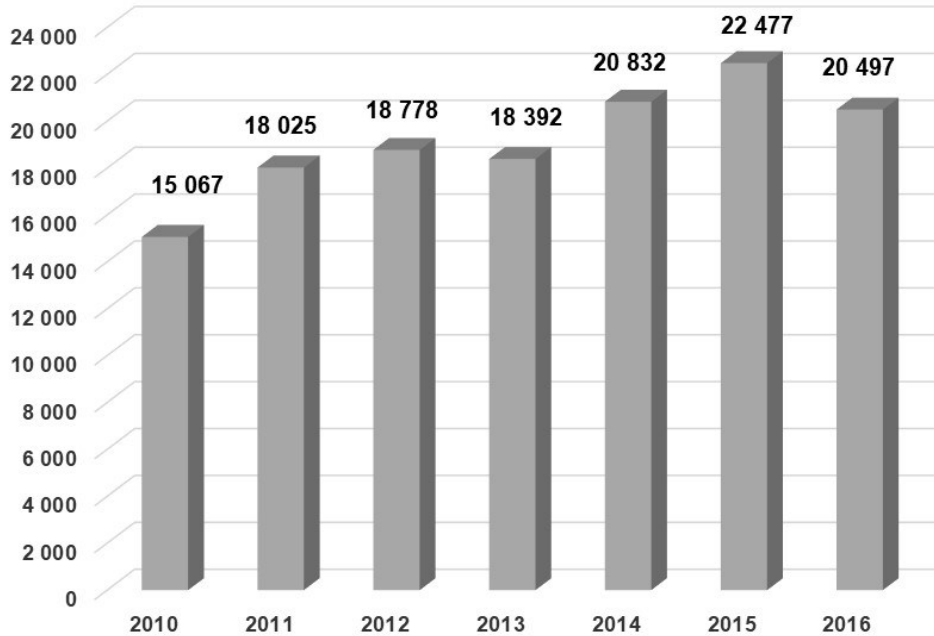


Source: Statistics Poland, Structural Business Statistics

¹ For the needs of this analysis the market services industries comprise the activities classified into the ISIC/NACE sections: H Transportation and storage, I Accommodation and food service activities, J Information and communication, L Real estate activities, M Professional, scientific and technical activities, N Administrative and support service activities as well as ISIC/NACE division 95 Repair of computers and personal and household goods;

Figure 2

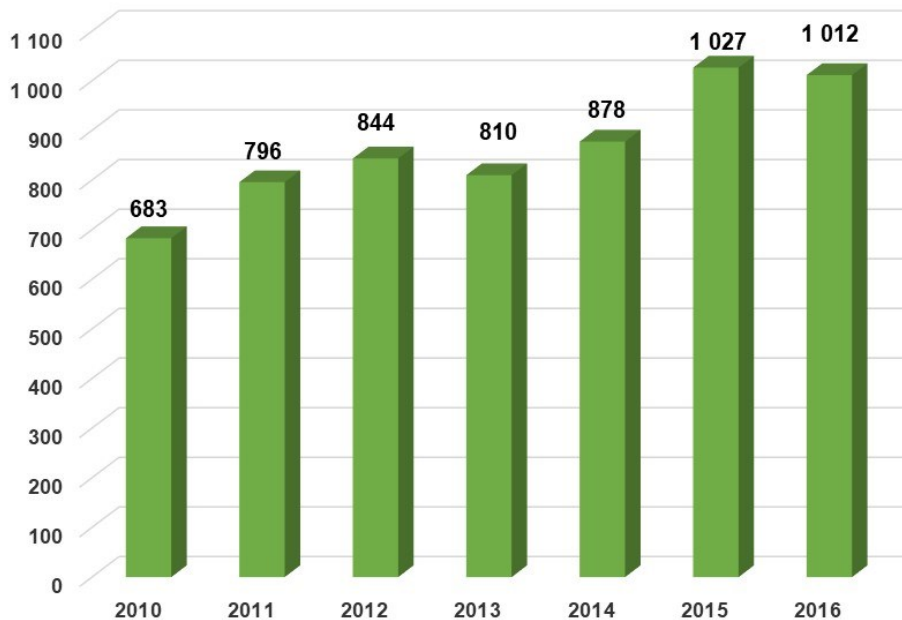
Number of persons employed in ISIC/NACE 6311 in Poland in years 2010-2016



Source: Statistics Poland, Structural Business Statistics

Figure 3

Turnover in ISIC/NACE 6311 in Poland in years 2010-2016 in EUR mln



Source: Statistics Poland, Structural Business Statistics

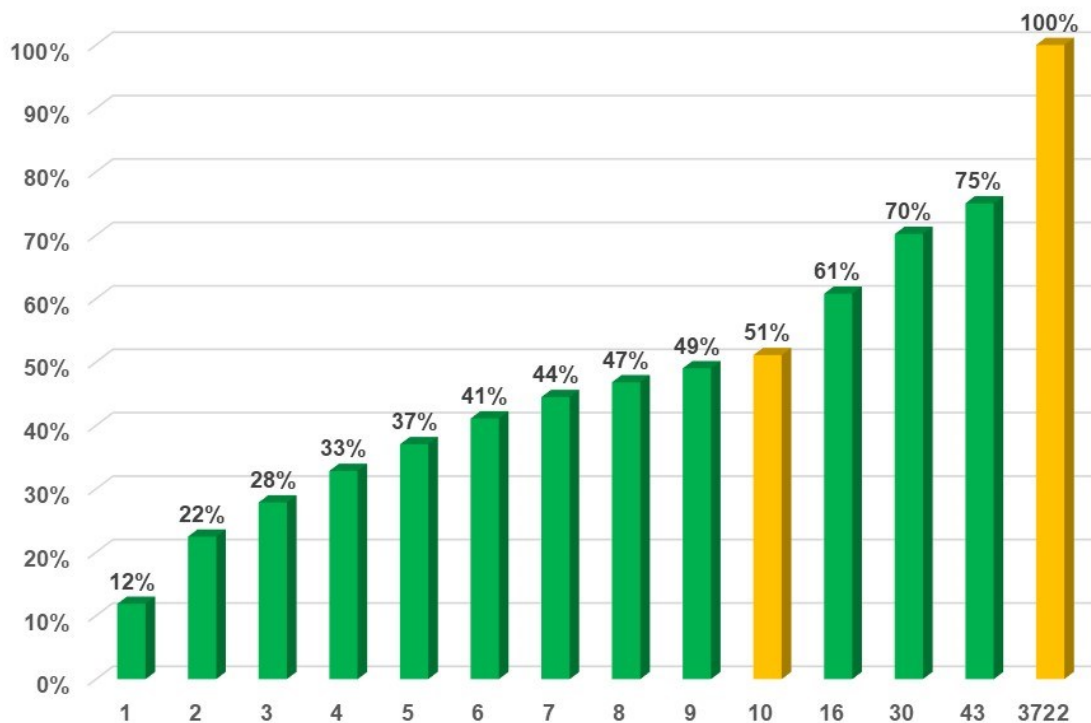
In the period 2010-2016 the number of enterprises engaged in ISIC/NACE 6311 increased by almost 23%. In the same time the number of persons employed in these enterprises rose by about 36% while the value of generated turnover – by over 48%.

The population of enterprises classified to Data processing, hosting and related activities (ISIC/NACE 63.11) is dominated by entities with the number of persons employed 9 and less. In 2016 they constituted 96,1% of total number of enterprises. However, almost 83% of turnover in ISIC/NACE 6311 was generated by enterprises with the number of persons employed 10 and more which at the same time employed almost 73% of persons employed in that industry.

As far as the concentration of industry is concerned in 2016 the half of turnover value was generated by 11 enterprises with the highest turnover values.

Figure 4

Accumulated share of turnover in ISIC/NACE 6311 by accumulated number of enterprises in Poland in 2016

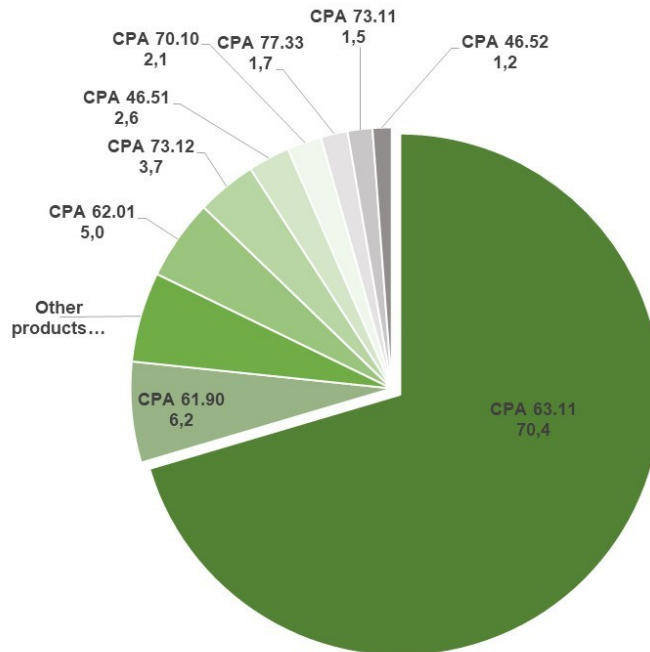


Source: own calculations on the basis of Annual survey of business activity of enterprise

Basing on information collected from enterprises classified into ISIC/NACE 6311 (in compliance with their core activity) with the number of persons employed 10 and more it is possible to establish the structure of their turnover by product.

Figure 5

Structure of turnover in ISIC/NACE 6311 by product* in Poland in 2016 in %



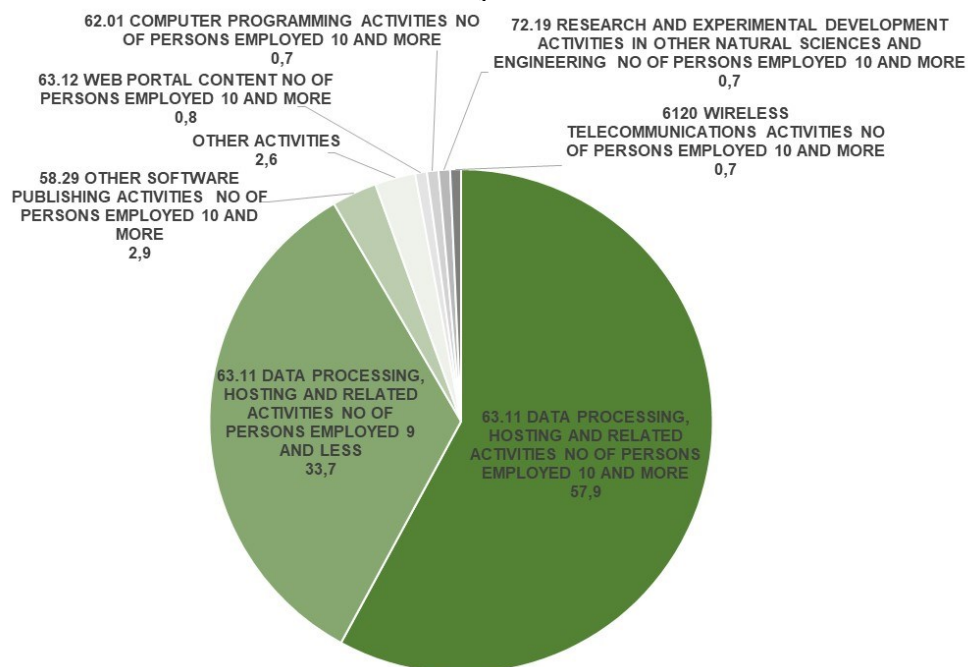
Source: own calculations on the basis of Annual survey of business activity of enterprises

- * 46.51 Wholesale trade services of computers, computer peripheral equipment and software
- 46.52 Wholesale trade services of electronic and telecommunications equipment and parts
- 61.90 Other telecommunications services
- 62.01 Computer programming services
- 70.10 Services of head offices
- 73.11 Services provided by advertising agencies
- 73.12 Media representation services
- 77.33 Rental and leasing services of office machinery and equipment (including computers)

In 2016 in Poland over 70% of turnover generated by enterprises with activity in ISIC/NACE 6311 came from the sale of products of their core activity - Data processing, hosting and related services (CPA 63.11). Other IT related services together (CPA 58.2, CPA 62 and CPA 63.12) constituted 6,2% of total turnover, within this Computer programming, consultancy and related services (CPA 62) – 5,5%. As far as non-IT related services are concerned other telecommunications services (CPA 61.90) generated 6,2% of turnover in ISIC/NACE 6311 while the media representation services (CPA 73.12) – 3,7%. Other products constituted 5,6% of turnover.

Taking into account all available data on turnover by product for enterprises with the number of persons employed 10 and more and assuming that enterprises classified into ISIC/NACE 63.11 with the number of persons employed 9 and less deal only with their core activity the market of data processing, hosting and related services (CPA 63.11) can be estimated for Poland as many as EUR 845,9 million in 2016.

Figure 6
Structure of turnover for CPA 63.11 by industries in Poland in 2016

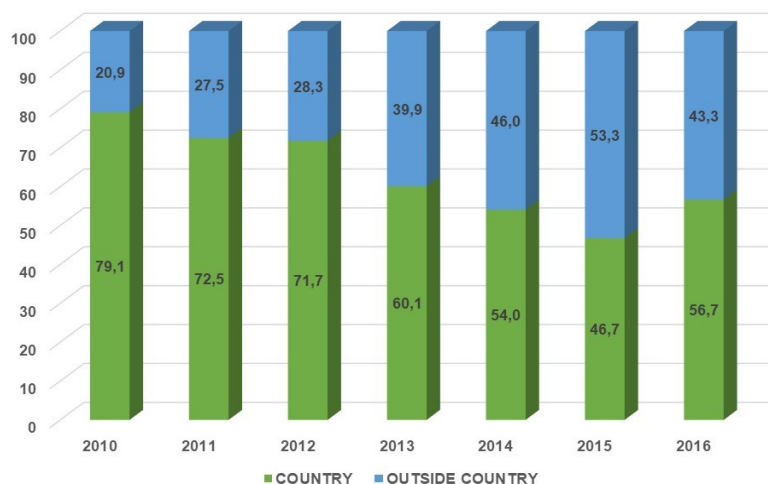


Source: own calculations on the basis of Annual survey of business activity of enterprises

Almost 92% of total turnover is generated by enterprises with their core activity in ISIC/NACE 63.11 and 2,9% - by enterprises with the number of persons employed 10 and more with their activity in ISIC/NACE 58.29 Other software publishing activities.

In 2016 the enterprises classified into Data processing, hosting and related activities (ISIC/NACE 63.11) with the number of persons employed 10 and more reported that above 43% of their total turnover comes from the sale of services to clients with residence outside country. In 2010 that share amounted to about 21%.

Figure 7
Structure of turnover in ISIC/NACE 6311 by residence of client in Poland in years 2010-2016 in %



Source: own calculations on the basis of Business services survey

Dynamic growth in export of enterprises classified into Data processing, hosting and related activities (ISIC/NACE 63.11) is also reflected in international trade in services statistics². In 2016 the value of services provided by enterprises in ISIC/NACE 6311 to non-residents accounted for over EUR 336 million and increased more than 3 times in PLN and 2,8 times in EUR comparing to 2010 reference year.

2.3 Specific characteristics of the industry

Despite the fact that the population of enterprises with their core activity in Data processing, hosting and related activities (ISIC/NACE 63.11) is dominated by enterprises with the number of persons employed 9 and less the larger enterprises generate the vast majority of turnover. In Poland there are subsidiaries of multinational enterprises which operate into Data processing, hosting and related activities (ISIC/NACE 63.11) as shared services centers for other subsidiaries located all over the world. They generate significant share of turnover but services they produce for other subsidiaries (affiliated entities) are not the free-market products.

The phenomena of reselling the services is not popular in analyzed industry in Poland. On the basis of data for the reference year 2016 it can be stated that among the enterprises with the number of persons employed 10 and more there are only four enterprises in which the share of services purchased in order to be resold accounted for above 30% of turnover at the enterprise level (18 enterprises with the share above 1%).

3. Measurement of SPPI

3.1 General framework

The Services Producer Price Index (SPPI) is one of variables compiled in the European Statistical System (ESS) within the short-term statistics (output prices – D310). In compliance with the requirements resulted from STS Regulation data on SPPI are compiled quarterly for specified groupings by NACE Rev.2 and transmitted to Eurostat within 60 days after ending the reference quarter. The SPPI is not required for Data processing, hosting and related activities (ISIC/NACE 63.11). Data on SPPI are compiled at the ISIC/NACE 63 division level as well as ISIC/NACE 63.1 group level.

In Poland the survey on SPPI was launched in 2008 in order to meet to the requirements resulted from the membership in the European Union. In 2008 the data processing, hosting and related activities were surveyed as a part of 72 NACE Rev.1.1 Computer and related activities. In 2009 after introducing the NACE Rev.2 the separate index for ISIC/NACE 63 Information service activities has been started to be compiled.

In order to follow newly emerging needs of data users and to improve data quality in years 2014 - 2015 Statistics Poland conducted pilot study. The purpose of pilot study was to obtain from the selected group of enterprises information on the characteristics of services they provide, pricing mechanisms applied by enterprises as well as accessibility of data necessary for compilation of SPPI.

² The survey *International trade in services* comprises all population of enterprises in Poland regardless their size measured by number of persons employed.

The pilot study comprised above 1 100 enterprises with the number of persons employed 10 and more which run selected business services industries, within this the Data processing, hosting and related activities (ISIC/NACE 63.11) as a sub-group of Information service activities (ISIC/NACE 63). There were 27 enterprises with the core activity in ISIC/NACE 63.11 selected for pilot study but only 13 responded³. Information obtained from enterprises enabled to better understand the way the market of data processing, hosting and related activities operates. In turn it allowed to observe the pricing mechanisms applied by enterprises.

As a result the new tool for data collection has been introduced since the first quarter of 2018. Moreover, the procedure for selecting the sample frame as well as the procedure for index estimation has been changed. It will enable to collect more detailed data on level prices for services and improve data quality.

Data on SPPI are used for deflating various nominal values in current prices, for example macroeconomic variables, turnover, revenues from the sale of products, etc. They are widely used in the national accounts statistics and business statistics. Moreover, data on SPPI are used when analyses of inflation are conducted.

3.2 Measurement issues

Nowadays, in Poland the SPPI is compiled and disseminated at the industry level, however, data on prices are collected from respondents at the product level. The SPPI is to reflect the changes in levels of prices for services received by their producers.

The survey on SPPI comprises enterprises with the number of persons employed 10 and more which run, within both the primary as well as secondary activity, the selected services industries. The enterprises are selected purposively basing on information included in the business register (*the Base of Statistical Units – BJS*) as well as data on turnover collected within the business statistics, especially within the SP questionnaire *Annual survey on enterprises*⁴ and the BS questionnaire *Report on business services*⁵.

The sample frame is established separately for each of services industry covered by the SPPI survey on the base of information collected within the above mentioned questionnaires as well as the business register. Information on the revenues from the sale of products, goods and materials broken down by the kind of activity at the 4-digit class level of NACE which are collected within the SP questionnaire, are particularly useful. Basing on this information it is possible to establish the primary and secondary activity of enterprises.

As a result starting from the first quarter of 2018 in the sample frame there are two groups of enterprises. The first one includes the enterprises with their core activity classified into

³ For ISIC/NACE 63 Information service activities - 46 in a sample frame and 25 responded;

⁴ The SP report is filled in by enterprises with the number of persons employed 10 and more. The subjective scope of survey concerns information included in the financial statements: balance sheet and the profits and losses account. However, there are also collected information on turnover with the breakdown into the kind of activity at the 4-digit class level of NACE. These data are used for selecting the sample frame.

⁵ The BS report is filled in by enterprises with the number of persons employed 10 and more which run the selected business services industries, amongst IT services industries. There are collected information on turnover by product or residence of services receiver (country, EU country, non-EU country) Information from survey are used as a supplementary data source when the sample frame of survey is established.

ISIC/NACE 6311 and the second one enterprises with other core activities which report the significant share of revenues from the sale of data processing, hosting and related services (CPA 63.11).

In case of Data processing, hosting and related activities (ISIC/NACE 63.11) the SPPI survey for 2018 reference year comprised 57 enterprises, within this 26 units with the number of persons employed 50 and more. At the same time the number of services representatives amounted to above 110 services representatives. The enterprise selected for survey establishes at least one services representative. However, the respondents with the number of persons employed 50 and more are obliged to provide information on at least 3 services representatives.

Data on services producer prices are collected by the use of the C-06 questionnaire which is filled in by respondents electronically by statistical website. When respondents choose their services representatives firstly they select 6-digit CPA grouping of services which should have the significant share in their turnover value. Then within such a grouping they establish the services representatives following the below recommendations:

- The service should be as representative as possible for the activity of given enterprise;
- The service should have significant share in the turnover value of 6-digit CPA grouping;
- The service should be rendered the most often, repeatable and foreseen to be produced also in future;
- The service should individual and named;
- The dynamic of price should be as much as possible characterizes the changes in price levels which take place in the grouping;

The selected representative service should be constant for consecutive reference periods. It means that in the consecutive quarters the prices should be reported for the same representative services which were selected when enterprise entered the survey. The change of representative service is possible only if the representative was not rendered any more or stopped to be representative for the given enterprise.

Till 2018 within the C-06 questionnaire *Report on producer services prices* enterprises provided information on the 6-digit CPA grouping, kind of price, unit of measure, then they described the services representative in open field in order to finally report the price level in the given and previous reference quarter as well as the reasons for their change. The number of filled-in fields and their type (open/ closed) were the same for all surveyed services industries. Moreover, the sample frame of survey covered only enterprises with their core activity. The secondary activity of enterprises was not regarded.

From the first reference quarter of 2018 data on SPPI are collected on the modernized C-06 questionnaire. Currently used questionnaire consists of 22 modules. Each module is dedicated for separate services industry covered by the SPPI survey. In a given module there are as many sections as the pricing methods possible for given services industry. Comparing to the previous version of questionnaire the scope of collected information has been widened by data on type of clients and their residence. These information are necessary in order to compile the SPPI for export and the SPPI with the breakdown into the type of client. Moreover, description of services representatives has been expanded and generally, it depends on the

kind of services observed. It was necessary due to the high fluctuations of level prices which were observed in case of some services industries. After analyzing price data collected within the old C-06 questionnaire it turned out that the price development very often results from the changes in quality of services rather than real prices development.

Information on SPPI for Data processing, hosting and related activities (ISIC/NACE 63.11) is collected within the module no 6 dedicated to Information service activities (ISIC/NACE 63). The respondents are obliged to fill in one or more modules depending on their primary and secondary activity.

The module no 6 consists of three sections:

- section no 1: representative services pricing method;
- section no 2: long-term contract pricing method;
- section no 3: unit value method;

After providing the 6-digit CPA code for the representative services respondent ticks the kind of services from the list of services. To each 6-digit CPA code the suitable names of services are assigned. Then the enterprise describes the scope of services and provides some additional information (see in Annex no 1). Each representative service has its unique number which is unchangeable during the survey. After that the responding unit fills in the suitable sections of questionnaire taking into account the applied pricing mechanism.

The Section no 1 is devoted for measuring the price development in representative services. As a result, in that section respondents are obliged to provide information on prices which are established using various pricing mechanisms. For Data processing, hosting and related activities (ISIC/NACE 63.11) in that section respondent provides data necessary for the direct use of prices of repeated services method. The reported prices can come from one invoice, be calculated on the basis of few invoices, come from the list of prices or to be estimated by staff of enterprise.

The Section no 2 concerns the long-term contract pricing method. As representative service the contract signed with the given client for the period of at least 6 months should be taken. Moreover, selected contract should assume providing the same or very similar service for longer time and payments for services should be made at least once a quarter.

The Section no 3 is aimed at monitoring the prices which are calculated as quotient of value and volume of sale realized in given reference quarter within many transactions. That pricing methods can be applied if enterprise is able to provide information on the value of turnover and volume of homogenous services provided to clients.

Within the sections of module no 6 the respondents report the following information:

Type of information	Section no 1 representative services	Section no 2 long-term contract	Section no 3 unit value
unit of measure (selected from the list)	X	X	X
type of client (enterprise, public body, individual client)	X	X	X
residence of client (in country, outside country)	X	X	X

type of price (price from the representative transaction, average price from few comparable transactions, price from the list, price from the model estimated by respondent)	X	X	X
price levels for the current and previous reference quarter	X		
reasons for change in price levels (selected from the list)	X	X	
length of contract		X	
name of client		X	
value of provided services for current and previous reference quarter			X
volume of provided services for current and previous reference quarter			X
unit value for current and previous reference quarter			X

Data collected from respondents via reporting website are validated automatically. After approving unit data provided by respondents they are downloaded to IT system of survey. In case of non-response data for given enterprise are imputed with the geometrical average of SPPIs compiled for other enterprises in given industry.

In order to calculate weights used for aggregation of indices data on turnover are applied. For compiling the ISIC/NACE class level indices the unit data collected within the above mentioned SP questionnaire are used. When the indices at the class level are aggregated into the higher ISIC/NACE levels the weights are calculated on the base of turnover which come from the structural business statistics. The system of weights is changed every 5 years.

3.3 Description of pricing methods and criteria for choosing the method

The pricing methods currently applied in measuring the price development for Information service activities (ISIC/NACE 63) were selected on the basis of experiences gained within the SPPI survey as well as the results of pilot study conducted by Statistics Poland in years 2014-2015.

The results of pilot study showed that in case of Information service activities (ISIC/NACE 63) the constant clients concerned 60% of services. About 80% of services were sold the domestic client, 60% - private enterprises, 80% - independent enterprises and almost 46% - large companies. The enterprises in 63.1 which took part in the pilot study reported also that the most important factors which determine the price level the scope of service, length of contract, kind of service and kind of services receiver are.

The main findings identified for measuring the SPPI in Information service activities (ISIC/NACE 63) are presented in the table below:

The CPA code of service	Pricing method	Type of collected price	Factors determining the services price
63.11.11 Data processing services 63.11.12 Web hosting services 63.11.13 Application service provisioning	<ul style="list-style-type: none"> direct use of prices repeated services 	<ul style="list-style-type: none"> transaction price price from the price list 	kind of service, scope of service, length of contract, type of client

63.11.19 Other hosting and IT infrastructure provisioning services	<ul style="list-style-type: none"> • contract pricing method 		
63.11.20 Advertising space or time in Internet	<ul style="list-style-type: none"> • direct use of prices of repeated services • contract pricing method 	<ul style="list-style-type: none"> • transaction price • price from the price list 	number of advertising broadcasts, time of advertising broadcast, length of contract, advertising form, format of advertising and type of client
63.12.10 Web portal content 63.12.20 Internet advertising space in web portals			
63.91.11 News agency services to newspapers and periodicals 63.91.12 News agency services to audio-visual media 63.99.10 Information services n.e.c. 63.99.20 Original compilations of facts/information	<ul style="list-style-type: none"> • direct use of prices of repeated services • contract pricing method 	<ul style="list-style-type: none"> • transaction price 	kind of service, scope of service, subject of report, type of report, size of report, type of client

The procedure of SPPI estimation consists of few stages:

- 1) Firstly, the basic indices for each reported services representatives are calculated with the previous quarter as the base reference period.
- 2) Then, the price indices at the enterprise level are compiled as a geometrical average of price indices for representatives reported by given responding unit. That average comprises only services representatives covered by surveyed industry. The price indices are calculated for all enterprises covered by sample frame established for given industry (also for enterprise with secondary activities).
- 3) After that the SPPI for the class ISIC/NACE level is estimated with the Laspeyres price index formula, i.e. weighted average of price indices at enterprise level. As the weights unit data on turnover for given enterprise are used. The index comprises indices for all enterprises in the sample frame established for given industry.
- 4) The next steps includes the aggregation of indices for higher level of ISIC/NACE levels. There is also Laspeyres price index formula used. For the group, division or section levels the calculations are carried out with the use of system of weights based on turnover values for the base year which come from the structural business statistics.

The SPPI is presented with the base of previous reference period = 100, the base year = 100 and the same reference period of previous year = 100.

3.4 Evaluation of comparability of price data with output data

In Poland the SPPI for Data processing, hosting and related activities (ISIC/NACE 63.11) is calculated as a one stage of above described procedure. The indices are not disseminated at that ISIC/NACE level. Data on SPPI for ISIC/NACE 631 are transmitted to Eurostat in compliance with the STS Regulation while Statistics Poland presents data at the ISIC/NACE division level in the Knowledge Database – Price⁶. Moreover, they are used as deflators in national account statistics as well as business statistics.

In case of annual data on turnover which are compiled at the ISIC/NACE class level, the SPPI at the division or group level is not enough. For quarterly data on turnover which are available at the group and division level the SPPI for ISIC/NACE 63 and ISIC/NACE 631 are applied as a deflators. For the needs of national account the SPPI for the ISIC/NACE 63 division is used in order to deflate the output.

However, according to the draft Framework Regulation in Business Statistics (FRIBS) there will be obligation to produce data on monthly index services production (ISP). The SPPI is one of variables which is necessary to compile the ISP. On one hand, the need for compilation of SPPI on monthly basis arises. On the other hand, regarding the trends observed in prices development for business services activities, including Information services activities (ISIC/NACE 63), there is no need for higher frequency of index. Therefore, in order to overcome constraint related to the lack of monthly SPPI the linear interpolation method is going to be applied. The timeliness of quarterly SPPI seems to be the next constraint put on the calculation of the ISP. The quarterly SPPI are available 60 days after ending the reference quarter and at the same 120 days after ending the reference month. It is planned that this problem will be sorted out by applying the extrapolation method.

4. Evaluation of measurement

As mentioned at the beginning of paper the reference year 2018 is the turning point for services producer price statistics in Poland. Implementation of new tool for data collection is about to improve the data quality as well as to widen the scope of compiled information. New approach for selecting the sample as well as compiling the indices should make the SPPI data more accurate to measure the changes in price levels recorded by given service industry. Although the SPPI is estimated at the industry level nowadays it becomes closer to the concept of product level.

Despite the developments implemented in the services producers price statistics there are still many challenges Statistics Poland faces. Some of them concern very practical issues related to the procedure of data collection, such as sample selection, modification of questionnaires, but there are also conceptual issues which influence all domains of statistics, such as classification issues.

Basing on the results of pilot study as well as regular SPPI survey the following challenges and issues have been identified which should be considered more detailed when the SPPI for Data processing, hosting and related activities (ISIC/NACE 63.11) is compiled:

- 1) The modernized C-06 questionnaire will enable to develop the SPPI with the breakdown into type and residence of client. When time series for new data are long enough Statistics Poland is going to start to compile and disseminate the SPPI with additional breakdowns. It is particularly important due to the dynamic growth in export of services. However, prior to

⁶ Available at the following address:

http://swaid.stat.gov.pl/en/Ceny_dashboards/Raporty_predefiniowane/RAP_DBD_CEN_34.aspx

this more methodological and experimental works are needed. The suitable data sources for weights system should be identified and tested.

- 2) When any changes to methodology of the SPPI survey are introduced it should be regarded that the population of enterprises with their primary activity classified in 63.11 is dominated by the units with the number of persons employed 9 and less. In 2015 they constituted above 96% of total number of enterprises and at the same time they generated about 20% of total turnover in 63.11. It justifies the currently applied method for selecting the sample of SPPI survey which covers all enterprises with the number of persons employed 50 and more and purposively selected group of enterprises with the number of persons employed between 10 and 49.

However, small number of enterprises with the number of persons employed 10 and more together with the cases of incorrectly assigned codes of ISIC/NACE activity it can cause the problems with ensuring the suitable number of respondents in the SPPI survey and as a result the proper representativeness of results.

- 3) Within the population of enterprises with their core activity in ISIC/NACE 63.11 with the highest turnover value there are multinational enterprises which provide services to their affiliated units. As a result these services cannot be treated as free market services. Moreover, such enterprises are not able to provide precise data on the prices. They have only information on the costs related with provision of services to other affiliated enterprises. How should these multinational enterprises be treated? Should the costs as an alternative for SPPI be monitored?
-